

THE IMPACT OF SARBANES-OXLEY ON MARKET EFFICIENCY: EVIDENCE FROM MERGERS AND ACQUISITIONS ACTIVITY

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ABSTRACT

One of the main goals of the Sarbanes Oxley Act of 2002 (SOX) is to ensure a greater flow of timely and accurate accounting information to investors. While there has been a lot of criticism of SOX, mostly with regard to compliance costs, very little light has been shed on the impact of SOX on market efficiency. The type of funding (stock vs. cash) used in mergers has been shown to be highly correlated with the level of firm mispricing. We thus use merger data gathered in the pre and post-SOX years to reveal a significant shift from stock type mergers (popular during periods of high misvaluation) to cash type mergers. We use logistic regression analysis to show that the implementation of SOX, resulted in greater reliability of market information, lower levels of mispricing and hence a more efficient market. In addition, our results also provide evidence that the SOX imposed compliance costs are not as burdensome as critics claim.

JEL: G34, G38

KEYWORDS: Sarbanes Oxley, Mergers and Acquisitions, Market Efficiency

INTRODUCTION

The Efficient Market Hypothesis (EMH) is one of the foundations of finance. It makes strong assumptions that all agents are rational and that new information entering the market is correctly and immediately impounded into securities' prices. An efficient market is essential, because in an efficient market, investors are protected as asset prices are at, or close to their intrinsic values. The availability of relevant information to all investors directly impacts the efficiency of a market. If market participants are presented with a greater amount of relevant information, they will be able to price assets and securities more accurately.

The Sarbanes-Oxley Act of 2002 (SOX) was initiated in response to the blatant acts of manipulation and greed that resulted in significant loss of shareholder wealth. The actions of the management of Tyco, Enron and WorldCom are cases in point. SOX compelled managers to alter their actions and divulge information to investors, in greater quantity and more importantly, with greater reliability, than they had previously done. Managers were now directly accountable for the information firms released. Specifically, under the provisions of SOX, effective July 30, 2002: The CEO and financial officers are required to certify periodic financial reports and are subject to criminal penalties based on such certifications. They are required to forfeit certain bonuses and profits if their companies issue an accounting restatement as a result of misconduct.

In the corporate world, SOX was very unpopular and the main criticism stemmed from the allegation that it was too expensive to implement. Academic research on SOX has also tended to focus mostly on the cost aspect and not so much the benefits. One of the largely ignored benefits of SOX is improved market efficiency. In view of the current financial crisis, and the government's attempt at imposing new regulations, it becomes critically important and beneficial to understand how previous attempts to regulate financial markets fared. We thus advance the literature by investigating the impact of SOX on market efficiency. We also address the cost aspect of SOX.

Mergers (mergers and acquisitions) are a crucial strategic activity of firms. When considering a merger, misvaluation of both the acquire and target plays an important role in the choice of payment. A firm that is overvalued by the market would be more likely to use its overvalued stock as currency to acquire a target firm (especially if the target is undervalued by the market). When the stock prices are more accurate, financing a merger with stock would offer no material advantage and the firm would be indifferent to paying with cash or stock.

Since SOX compels managers to disclose more relevant (and accurate) information to investors, we expect that the market prices will be closer to the intrinsic value of the firm. We would thus expect to see a reduction in stock type mergers after the implementation of SOX. One of key variables that measure the level of mispricing is the Market-to-Book ratio (MB). We thus study the focus a significant portion of this study on the variations in the market-to-book (MB) ratio pre and post-SOX using both univariate tests as well as logistic regressions.

The next section is the literature review, followed by the hypothesis development and the data and methodology section. We then present and discuss the empirical results followed by our conclusion.

LITERATURE

Financial markets are crucial to corporations and the economy in general. Capital is a scarce resource and a market that is efficient will allow the most efficient and successful firms to have access to capital. When investors have better access to credible information, they are able to make better investment decisions, thus aiding the capital allocation process. However, this allocation process is complicated by the fact that managers possess more information about their firms' investment opportunities than investors. Investors thus look to managers to provide the information necessary to enable better assessment of the value of the firm's assets and to be able to make better investment choices for their respective investment horizons (Healy and Palepu 2001).

Optimal allocation of resources is not possible with severe informational asymmetry. If markets are inefficient, then investors would suffer repeated losses and would refuse to invest. Supply of capital would be severely curtailed leading to recession and ultimately market failure. Thus, the flow of credible information is of crucial importance to market efficiency. The greater the flow of this information and the more reliable it is, the more accurate will be the pricing of financial securities. The financial scandals at Tyco, Enron and Worldcom had eroded the faith of investors, lawmakers needed to act to restore confidence in financial markets. The SOX legislation was passed to make managers more accountable for the information that they provided the public (this ensured a greater credibility of the information). Firms were also now responsible for providing more information to the public (the greater volume of information would lead to better pricing).

Due to the additional pressure that SOX placed on firms and their management, it was of course not popular. One of the main criticisms was that it was too expensive to implement. There is however literature that challenges this assertion (Leuz 2007). However, as the author points out, the net effect of SOX on the economy remains unclear. Our work advances the literature on SOX and its impact on financial markets.

We chose mergers and acquisitions as the backdrop for our study for several reasons. Merger decisions being of extreme strategic importance have been a fertile area for research and the literature is well developed. According to theory, mergers and acquisitions are a response to system shocks such as regulatory changes (e.g. deregulation or imposition of regulation as in the case of SOX). Gort (1969) proposes a model which predicts an increase in M&A activity in times of economic change while Mitchell & Mulherin (1996) document an intensifying of merger activity and explain it as the result of

shocks like deregulation and financial innovation. Some research focuses on the return levels of firms surrounding intensified merger activity, while others have studied the methods of payment. Servaes (1991), Mitchell & Mulherin (1996), Franks & Mayer (1996), all report high abnormal returns of acquiring firms around mergers. Positive abnormal returns to acquirer firms in the 60's and 70's are documented by Eckbo (1983) and Asquith (1983). Contrary to this, Morck et al. (1990), Byrd Kent and John (1992) document negative abnormal returns during the '80s. For target firms, the picture is more encouraging. Eckbo & Langohr (1989), Schwert (1994), and Martynova et al. (2006) document positive cumulative abnormal returns to target firms. But, Dodd (1980), Smith & Kim (1994), and Andrade et al. (2001) show that these gains (or losses) are statistically insignificant.

An important finding in merger research is that the method of payment is a key determinant of the abnormal returns. Researchers create sub-samples by method of payment (hostile, friendly or tender offers, related vs. unrelated mergers etc.) and find that all equity bids show significant negative returns, whereas cash deals have positive returns (Loughran & Vijh, 1997; Mitchell & Stafford, 2000; Sudarsanam & Mahate, 2003). While hostile takeovers seem to fare better than friendly bids (Franks et al., 1991), corporate raiders incur losses (Crocì, 2007). Goergen & Renneboog (2004) find that returns of bidding firms are significantly higher in the case of stock payments than those where cash was used. This indicates that the gains are due to overvaluation of bidding firms' stock.

There is sufficient variation in findings to warrant further investigation. Besides this, merger activity is highly sensitive to mispricing levels. Dong et al. (2006) find broad evidence which indicates that investor mispricing is a driver. Melicher et al. (1983) show that stock price and bond yield changes can predict merger activity. Andrade and Stafford (2004) find similar results. Myers and Majluf (1984) imply that managers exploit their insider information and the knowledge that their firm's stock is overvalued, to make capital structure decisions.

The preceding discussion show that the motivations driving cash vs. stock type mergers during different periods have been well documented. On a different front, emerging behavioral theories of finance claim that market timing by managers is a possible reason for merger waves (Schleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan 2004). Both these studies claim that managers tend to strategically use their overvalued stock as currency in mergers.

In the years subsequent to the passing of SOX, a great deal of criticism was directed towards SOX, mostly questioning its efficacy and complaining of the onerous costs of compliance. Not surprisingly several studies have focused on these issues. Jain and Rezaee (2005) find that SOX has restored investor confidence and had a positive impact on shareholder wealth. Jain, Kim and Rezaee (2008) find that market liquidity measures had improved, however Li, Pincus and Rego (2003) report adverse market reaction immediately after SOX but favorable reaction subsequently. Engel, Hayes and Wang (2007) indicate that prohibitive costs may have compelled small firms to go private. Another thread of literature examines the impact of SOX on financial reporting (i.e. on levels of earnings management and conservatism). Cohen et al. (2005a,b) find that accrual-based earnings management which had increased from 1987 onwards had declined subsequent to SOX. Zhou & Lobo (2006) report similar results and document an increase in conservatism. What is relevant though is how the costs compare to the benefits of SOX and one of the greatest benefits would be an increase in market efficiency.

HYPOTHESES

The most important aspect of SOX is the fact that managers were now accountable for their actions and that firms are required to provide more accurate information and in greater quantity, to investors. This increased flow of credible information should lead to more informed analysis by investors, which would in turn result in smaller pricing error, more accurate prices and consequently a more efficient market. If

the stocks are not significantly overpriced there is no incentive to pay for mergers with stock and there should be a significant fall in the proportion of stock type mergers. Furthermore, if SOX was as costly to implement as claimed by firms, there should be a decrease in the overall cash holdings of firms and the proportion of cash type mergers. But on the other hand if SOX is not as costly as claimed, then the proportion of cash type mergers would either increase or remain at pre-SOX levels. The impact of higher costs would also lower the average relative cash balances of firms. We test these contentions with the following hypotheses which compare the pre and post-SOX periods.

- H1: The proportion of stock type mergers will significantly decrease in the post-SOX period.
- H2: The proportion of cash type mergers will increase or remain unchanged in the post-SOX period.
- H3: The average cash balances of firms would decrease if costs are significant

Prior research as mentioned in the literature review, has established that the Market-to Book ratio is closely related to pricing error and the variance of the MB ratio would be greater. The greater the overpricing, the greater will be the likelihood of stock type mergers. Therefore the MB ratio will have a significant and positive impact on the likelihood of stock type mergers. This yields the next two hypotheses

- H4: The variance of the MB ratio would decrease in the post-SOX period
- H5: The MB ratio has a positive impact on the likelihood of stock type mergers

One of the central arguments of this paper is that SOX has impacted market efficiency through increasing the information flow between firms and investors. If prices move closer to their intrinsic value due to reduction in informational asymmetry then, this should result in a reduction of the impact of MB ratio on the likelihood of stock type mergers. Our fifth hypothesis tests the impact of SOX on market efficiency by analyzing the market-to-book ratio of publicly traded firms by a logistic regression.

- H6: Post SOX, the impact of the MB ratio on the likelihood to pay with stock will decrease.

Besides this, in comparison to pre-sox levels, the variance of the market-to-book ratio, across firms should diminish post-SOX, reflecting lower levels of over and under-pricing in publicly traded firms.

DATA AND METHODOLOGY

The sample consists of all mergers in the SDC database, between January 1989 and April 2008 excluding 2002 which was the year SOX was implemented. The earliest year of the sample was chosen as 1989 so to avoid contamination from the effects of the tax reforms of 1987. All financial and holding companies, leveraged buy-outs (LBOs) and management buy-outs (MBOs) are excluded from the acquirers group. This leaves a sample of 4185 mergers. We use this sample to test the trends in merger activity and to test changes in proportions (method of payment in pre and post-sox). The sample for the logistic regressions consists of firms with prices and accounting data available on CRSP and COMPUSTAT. The target firms are comprised of 1965 public firms, 2099 private firms and 121 subsidiaries.

We partition the sample into pre and post-SOX subsamples and using the methodology of Rhodes-Kropf & Viswanathan (2004), we construct the MB ratio as Market Value/Book Equity where Market Value is computed as CRSP Market Equity plus COMPUSTAT book assets (item 6) minus deferred taxes (item 74) minus book equity (item 60). We control for size with total assets (item 6), total plant, property and equipment (item 8), total cash (item 1) and CAPEX (item 128). The profitability leverage measures that we use are net income (item 172), ROE, ROA, Current Ratio, Quick Ratio, Book leverage and Market leverage. Book Leverage is computed as (1-book equity/total assets) and market leverage is calculated as (1 - market equity/market value). We also construct a relative value measure for the size of the merger

transaction as transaction value/market value. A dummy (=1) to indicate the pre-SOX period is also included. We use a test of proportions to test H1, H2 and H3 while we use the following logistic model to test H4 and H5

$$P\{MP = 1|x\} = \frac{e^{g(x)}}{1 + e^{g(x)}}$$

with the following logistic transformation of x for the pre and post-subsamples

$$g(x) = \beta_0 + \beta_1 LMB + \beta_2 LMval + \beta_3 LTransval + \beta_4 Relval + \beta_5 ROE + \beta_6 Lev + \beta_7 Mktlev + \beta_8 Bklev + \beta_9 LSP + \beta_{10} LNI + \beta_{11} EPS$$

For the pooled sample, a dummy DUM (=1 for pre-SOX and an interaction term Pre_LMB are added to obtain

$$g(x) = \beta_0 + \beta_1 LMB + \beta_2 LMval + \beta_3 LTransval + \beta_4 Relval + \beta_5 ROE + \beta_6 Lev + \beta_7 Mktlev + \beta_8 Bklev + \beta_9 LSP + \beta_{10} LNI + \beta_{11} EPS + \beta_{12} DUM + \beta_{13} Pre_LMB$$

MP the method of payment the dependent variable is binary and takes a value of 1 if the payment is by stock and zero if the payment is by cash. The ratio of the base of the natural logarithm raised to the logistic transform estimates the probability of MP being equal to one i.e. the probability of a stock type payment. The independent variables are defined as follows: LMB is the natural log of the MB ratio. If H4 is correct, the coefficient of this variable should be positive and significant. DUM is a dummy variable that is set to zero if transaction is pre-SOX and one otherwise.

We also have an interaction variable Pre_LMB which is constructed as DUM*LMB which estimates the difference in slopes or the difference between the impact of MB on the method of payment pre and post sox. The coefficient of this term should be significant and positive if the influence of mispricing was greater pre-SOX than post-SOX. The rest of the variables are to control for differences in firm size, transaction value returns etc. LMval is the log of market value. LTransval is the log of the transaction value of the merger deal. Relval is computed as (transaction value/market value). ROE is the return on equity. Lev represents the debt-to-total assets ratio and is computed as long-term debt/total assets. Mktlev is the variable for market leverage while Bklev is book leverage. LSP is the variable for the log of the S&P 500 index level. LNI is the Log of Net Income.

EMPIRICAL RESULTS

We begin by reviewing the breakdown of completed mergers (mergers and acquisitions) over the time period 1989 – 2008. In Table 1 below, Cash (Stock) signifies a merger where 80% or more of the consideration for the merger constituted cash (stock). Hybrid mergers are those that have a mix of cash and stock, where neither of these forms of consideration exceed 80%. For the S&P500, we have two columns; Level is the actual level if the S&P500 at the end of the year while S&P/15 is scaled by a factor of 15 which is to make the graph more readable. The merger activity is plotted in the graph (Figure 1) that follows immediately after. Figure 2 depicts merger activity by stock exchange.

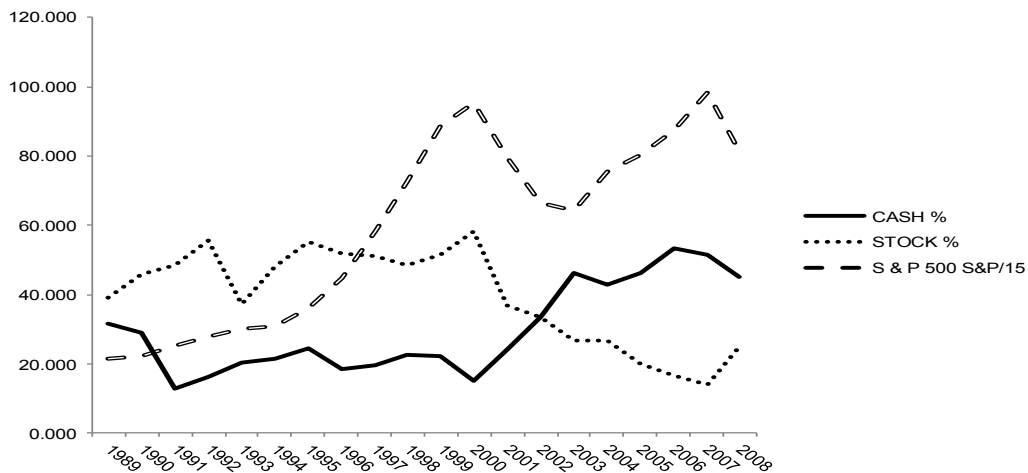
We see that the mergers of both types were positively correlated with market activity pre-SOX, which is expected since merger activity intensifies during periods when the market is hot. But during the post-SOX period the cash type mergers maintain the positive correlation, but the stock type mergers fall away dramatically. In fact they have a negative correlation. This is the first evidence in support of H1 which predicts a reduction in the level of stock mergers.

Table 1: Merger Activity by Method of Payment

YEAR	CASH		STOCK		HYBRID		OTHER		S & P 500	
	Number	%	Number	%	Number	%	Number	%	Level	S&P/15
1989	25	31.650	31	39.240	9	11.390	13	16.460	323.05	21.537
1990	17	28.810	27	45.760	9	15.250	6	10.170	334.53	22.302
1991	11	12.640	42	48.280	20	22.990	12	13.790	376.19	25.079
1992	16	16.160	55	55.560	12	12.120	14	14.140	415.75	27.716
1993	27	20.150	50	37.310	26	19.400	31	23.130	451.61	30.108
1994	45	21.430	101	48.100	43	20.480	21	10.000	460.42	30.694
1995	67	24.630	150	55.150	31	11.400	22	8.090	541.72	36.115
1996	62	18.510	174	51.940	57	17.010	33	9.850	670.49	44.700
1997	76	19.690	197	51.040	73	18.910	29	7.510	873.43	58.229
1998	94	22.490	202	48.330	94	22.490	23	5.500	1085.50	72.367
1999	103	22.100	239	51.290	98	21.030	25	5.360	1327.33	88.489
2000	70	15.020	270	58.060	96	20.650	15	4.590	1427.22	95.148
2001	54	24.000	83	36.890	71	31.560	7	3.230	1194.18	79.612
2002	53	33.330	54	33.390	43	27.040	9	3.950	993.93	66.262
2003	71	46.290	44	26.830	36	21.950	11	4.820	965.23	64.349
2004	79	42.930	49	26.630	48	26.090	8	3.430	1130.65	75.377
2005	102	46.150	44	19.910	60	27.150	11	5.820	1207.23	80.482
2006	104	53.330	32	16.410	50	25.640	9	4.620	1310.46	87.364
2007	97	51.600	26	13.830	55	29.260	10	5.320	1477.18	98.479
2008	9	45.000	5	25.000	4	20.000	2	10.000	1220.04	81.336

The above table reports merger activity by method of payment. The main columns denote payment by cash, stock, hybrid i.e. both cash and stock and the last column reports the level of the S&P500. The first of the sub-columns reports the number of mergers and the second shows the percentage of each type of payment. The last sub-column shows the S&P500 scaled by a factor of 15.

Figure 1: Mergers by Method of Payment



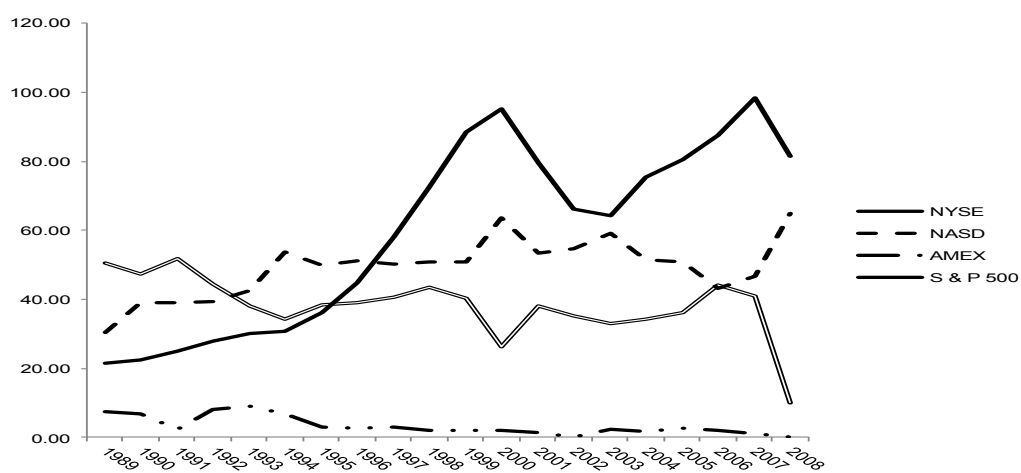
The figure plots the percentage of cash and stock type mergers from 1989 to 2008 along with the level of the S&P500 scaled by a factor of 15 for better contrast. The long dash line represents the scaled S&P500, the dotted line signifies percentage of stock type payments and the solid line represents the percentage of cash payment mergers.

Table 2: Merger Activity by Exchange

YEAR	NYSE		NASDAQ		AMEX		S & P 500	
	Number	%	Number	%	Number	%	Level	S&P/15
1989	40	50.630	24	30.380	6	7.590	323.05	21.537
1990	28	47.460	23	38.980	4	6.780	334.53	22.302
1991	45	51.720	34	39.080	2	2.300	376.19	25.079
1992	44	44.440	39	39.390	8	8.080	415.75	27.716
1993	51	38.060	57	42.540	12	8.960	451.62	30.108
1994	72	34.290	113	53.810	14	6.670	460.42	30.694
1995	104	38.380	135	49.820	8	2.940	541.72	36.115
1996	131	39.100	171	51.040	9	2.690	670.50	44.700
1997	156	40.520	193	50.130	11	2.860	873.43	58.229
1998	181	43.410	212	50.840	9	2.160	1085.5	72.367
1999	188	40.340	237	50.860	9	1.930	1327.3	88.489
2000	122	26.240	296	63.660	10	2.150	1427.2	95.148
2001	86	38.220	120	53.330	3	1.330	1194.2	79.612
2002	56	35.220	87	54.720	0	0.000	993.94	66.262
2003	54	32.930	87	59.150	4	2.440	965.23	64.349
2004	63	34.240	95	51.630	3	1.630	1130.6	75.377
2005	80	36.200	112	50.680	6	2.710	1207.2	80.482
2006	84	44.100	84	43.080	4	2.050	1310.5	87.364
2007	77	40.960	88	46.810	2	1.060	1477.2	98.479
2008	2	10.000	13	65.000	0	0.000	1220.0	81.336

The table above shows merger activity by exchange, i.e. number and percentage of mergers on each major exchange. Each of the main columns contains data for NYSE, NASD and AMEX while the last column shows the market level scaled by a factor of 15. The first of the sub-column reports the raw number of mergers while the second reports the percentage. The rows do not add up to 100% since activity on minor exchanges is not reported.

Figure 2: Merger Activity by Exchange



The figure shows merger activity from 1989 to 2008 on each exchange along with the level of the S&P500. The solid line represents the S&P500 scaled by 15 for contrast, while the dashed line represents the NASD. The double line represents the NYSE and dash-dot line signifies the AMEX

Table 3 that follows, provides descriptive statistics of firm characteristics from the Pre and Post Sox sub-samples. Standard errors are relatively small but the distributions are skewed to the right which is an expected result as it is mostly large and successful firms that would indulge in merger activity.

Table 3: Pre and Post Sox Descriptive Statistics

Name	PANEL A					PANEL B				
	Mean	Std Err	Median	Std Dev	Skewness	Mean	Std Err	Median	Std Dev	Skewness
Cash & Equivalents	304.12	20.132	51.657	954.73	8.504	1299.6	121.47	142.52	3056.0	3.343
Inventories	293.70	17.419	18.267	826.08	4.547	450.63	48.272	36.936	1214.5	4.719
Current Assets	1246.3	75.444	192.13	3577.8	6.615	3135.3	294.27	450.19	7403.7	3.946
PPE	994.15	74.055	61.441	3511.9	8.383	1704.6	226.65	136.20	5702.4	7.225
Total Assets	3183.2	201.26	376.05	9544.5	7.156	8065.9	782.58	1042.1	19689	4.167
Current Liabilities	858.52	60.744	74.786	2880.7	7.335	2070.4	219.84	184.56	5531.1	4.391
Debt	501.42	35.521	16.227	1684.5	7.379	1140.7	129.90	96.300	3268.2	5.327
Total Liabilities	1767.7	124.83	142.40	5920.1	7.422	4214.3	463.50	391.00	11662	4.929
Retained Earnings	793.32	56.743	36.531	2691.0	6.941	1785.6	308.06	100.36	7750.7	0.4970
Book Equity	1368.9	83.982	202.61	3982.7	7.644	3783.1	342.50	544.77	8617.1	3.721
Stockholders' Equity	1385.5	84.519	202.91	4008.2	7.562	3789.9	342.74	544.77	8623.2	3.723
Profitability Measures										
Net Income	210.59	17.109	15.910	811.37	5.976	567.81	62.806	38.062	1580.2	3.632
EBITDA	552.40	36.486	47.946	1730.3	6.115	1225.0	122.32	121.50	3077.6	4.041
Revenue	2897.1	171.09	324.77	8113.9	5.984	6335.6	623.62	826.52	15690	3.884
EPS	0.7030	0.0430	0.7700	2.049	-4.189	1.025	0.0780	0.8300	1.954	0.1770
ROE	0.3150	0.1760	0.1170	8.356	22.367	-0.1750	0.1750	0.1060	4.398	-22.173
ROA	0.0180	0.0060	0.0540	0.2890	3.662	-0.0020	0.0150	0.0560	0.3660	-11.804
Leverage Measures										
Current Ratio	3.344	0.0950	2.273	4.501	9.642	3.069	0.1270	2.149	3.198	5.589
Quick Ratio	2.879	0.0950	1.700	4.510	9.734	2.656	0.1260	1.696	3.183	5.834
Leverage	0.1360	0.0030	0.0840	0.1570	1.316	0.1340	0.0060	0.0990	0.1450	1.106
Market Leverage	0.2110	0.0040	0.1530	0.1890	0.9980	0.2250	0.0070	0.1880	0.1710	1.148
Book Leverage	0.4350	0.0050	0.4340	0.2160	0.1180	0.4200	0.0080	0.4180	0.2010	0.2680
Financial Leverage	0.1030	0.0030	0.0500	0.1250	1.475	0.1090	0.0050	0.0730	0.1200	1.131
Market Measures										
Market Equity	11457	870.72	981.37	41293	6.607	14909	1349.1	1590.7	33944	3.410
Market Value	13272	931.86	1281.1	44192	6.015	19191	1714.4	1958.7	43134	3.283
Market to Book	14.725	2.474	4.165	117.34	22.257	5.044	0.7930	3.155	19.953	22.910
Other Measures										
Net Cash Flow	32.841	6.268	3.555	297.26	1.354	151.08	38.139	4.647	959.56	1.774
CAPEX	243.21	18.014	20.575	854.27	7.779	327.14	38.461	32.696	967.66	6.386
Transaction Value	845.01	110.18	85.037	5224.9	19.566	901.73	159.11	136.49	4003.2	13.499
Relative Value	0.1820	0.0040	0.1020	0.1960	1.470	0.1620	0.0070	0.0850	0.1860	1.574

Table 3 above shows descriptive statistics of the firm characteristics and control variables used in the logistic regressions. The variables of interest are divided into categories viz. size variables, profitability, leverage and market measures. Panel A and Panel B show the statistics for the Pre-and Post Sox subsamples respectively. The column report from left to right, the mean, standard error of the mean, median, standard deviation and the skewness in that order.

In Table 4, we evaluate the difference in proportions of mergers by payment type and the difference in means of cash balances. Post signifies the post SOX period (after the year 2002) while Pre signifies the pre-SOX period (before the year 2002). We also include the distribution of private and public targets as well as activity on the major exchanges during these periods. H1 states that the proportion of stock type mergers would decrease in the post-SOX period, the Post-Sox proportion is 0.2543 whereas the pre-SOX proportion is 0.7022 and the difference is negative and is highly significant showing that the proportion of stock type mergers has decreased as hypothesized. Similarly the proportion of cash type mergers has increased from 0.2489 (pre) to 0.6346 and the increase is also very significant proving H2. Finally H3 is also supported by the data since the mean cash balance increased from 337.44 to 1674.33, thus providing evidence that SOX implementation did not impact the liquidity position of firms negatively.

Table 4: Test of Proportions/Means of Method of Payment (Post – Pre)

Name of Proportions (Means)	Post	Pre	Z
Cash Payment (All)	0.6346	0.2489	19.950***
Cash Payment (No Hybrids)	0.6308	0.2234	18.990***
Stock Payment	0.2543	0.7022	-21.810***
Cash Balance Means (Equal Variance)	1674.1	337.44	6.642***
Cash Balance Means (Unequal Variance)	1674.1	337.44	3.603***
Private Targets	0.5336	0.4664	3.670***
Public Targets	0.4602	0.4995	-2.150***
Merger Activity on NYSE	0.4250	0.4302	-0.2700
Merger Activity on NASD	0.5750	0.5698	0.2700

The above table shows the proportions and means of mergers and other quantities before and after SOX and the result of a test of differences. The first column reports the Post Sox proportion or mean, the next shows the same values for the Pre SOX period and the last reports the Z-statistic of the difference test. The difference in proportions of Cash and Stock type mergers are shown in the first three rows. The difference in means of cash balances are in the next two. Finally difference proportions of private and publicly owned targets and difference in proportion of mergers on the NYSE and NASD are in the subsequent rows. ***, **, * indicate significance at the 0.01, 0.05 and 0.10 level, respectively.

Before proceeding with the logistic regression analysis, we test the relevant for any abnormalities. That is whether there is an extreme value or an outlier which may bias the estimates of the logistic regression. Table 5 below shows the means of the variables before and after SOX and reports the t-statistic of the test of difference in means. The average MB of the Pre SOX period seems to be significantly higher which is as expected and the post SOX cash balances are higher lending credence to the contention that implementation costs are not as burdensome as firms seem to claim. The average acquiring firm seems to have more net income but less profitable. There does not seem to be a difference in leverage. Table 6 shows that the variances of the variables Pre and Post Sox and the F-statistic of the results of the test of difference in variance. It can be seen that the variance of MB has decreased from 13769.6 (pre) to 398.13 (post) with a highly significant F-statistic. This directly proves Hypothesis 4.

Table 5: Difference in Means (Pre – Post SOX)

Name	Pre-SOX	Post-SOX	t-Stat
MB	14.724	5.044	3.726***
Cash	304.12	1299.6	-8.085***
Total Assets	3183.2	8065.9	-6.043***
Net Income	210.59	567.81	-5.488***
ROE	0.3140	-0.1750	1.972**
Leverage	0.1360	0.1340	0.346
Market Equity	11457	14909	-2.149***
Market Value	13272	19191	-3.034***
Transaction Value	845.01	901.73	-0.293
Net Cash Flow	32.841	151.08	-3.059

The table above shows the means of the variables used in the logistic regressions. Column one shows the means of the pre SOX and column two the post SOX values. The last column reports the t-statistic of the test of difference along with the significance level. MB i.e. Market-to-Book is the main variable of interest since it proxies for mispricing and information. The others are control variables. ***, **, * indicate significance at the 0.01, 0.05 and 0.10 levels respectively.

Table 6: Difference in Variance Pre & Post Sox

Name	Pre-SOX	Post-SOX	F-Stat
MB	13770	398.13	34.586 ***
Cash	911518	9339218	10.246 ***
Total Assets	91096845	387664886	4.256 ***
Net Income	658320	2496897	3.793 ***
ROE	69.810	19.340	3.609 ***
Leverage	0.0200	0.0200	1.173 ***
Market Equity	1705071900	1152173434	1.480 ***
Market Value	1952941181	1860582470	1.050
Transaction Value	27299452	16025534	1.703 ***
Net Cash Flow	88362	920756	10.420 ***

The table above shows the variances of the market-to-Book ratio and other control variables used in the logistic regression model. It also reports the difference in variance of each of the variables between the pre and post SOX subsamples and the F-static of the test. The first column reports the re SOX and column two the post SOX values respectively. The last column shows the F-statistic of the test of difference in variance. As noted, MB is of particular interest since it is in agreement with H4. ***, **, * indicate significance at the 0.01, 0.05 and 0.10 level, respectively.

Previous research has established that MB is a driver of merger and acquisition activity and in particular is higher MB increases the probability of stock type mergers. The results of the logistic regression of the pre and post sub-samples is documented in Panels A and B of Table 7. In support of H5 the coefficient of LMB is significantly positive in both periods (pre-Sox: 1.839 and post-Sox: 1.106) showing that MB, the proxy for misevaluation is indeed a positive factor in increasing the likelihood of a stock type payment.

Table 7: Logistic Regressions

Parameter	PANEL A: Pre-SOX			PANEL B: Post-SOX			PANEL C: Pooled		
	Estimate	Std Err	Wald	Estimate	Std Err	Wald	Estimate	Std Err	Wald
Log MB	1.839	0.2350	61.498***	1.106	0.3930	7.908***	1.177	0.2210	28.467***
Log Market Value	0.1390	0.1190	1.375	0.6770	0.2680	6.388**	0.2300	0.1070	4.618**
Relative Value	0.5920	0.6810	0.7560	6.298	1.369	21.164***	1.815	0.6150	8.719**
ROE	-0.0380	0.0070	27.125***	-0.2470	0.4150	0.3540	-0.0420	0.0070	33.886***
Leverage	0.6530	0.6160	1.121	-0.4710	1.340	0.1240	0.5760	0.5600	1.056
Market Leverage	6.590	1.307	25.434***	2.100	1.877	1.252	6.420	1.139	31.751***
Book Leverage	-6.532	1.030	40.222***	-3.411	1.735	3.863**	-6.196	0.8820	49.376***
Log Transaction Value	0.2430	0.0790	9.502**	-0.0260	0.1460	0.0320	0.1700	0.0690	6.001**
Log SP500	-0.5200	0.1310	15.836***	-2.554	0.8990	8.071***	-0.5740	0.1290	19.745***
Log Net Income	-0.2470	0.0980	6.366**	-0.5320	0.2250	5.583**	-0.2760	0.0890	9.756***
EPS	-0.2260	0.0640	12.69***	-0.1810	0.1400	1.661	-0.2190	0.0570	14.779***
DUM							1.206	0.2670	20.465***
Pre_LMB							0.7000	0.1800	15.166***
Intercept	2.274	0.912	6.217**	12.388	6.396	3.752*	0.8590	0.9830	0.7650

The above table is the most important of all. It reports the results of the logistic regressions of the pre and, post SOX and pooled samples in Panel A, B and C respectively. The logistic regression has a transform function for the pre and post SOX subsamples as follows $g(x) = \beta_0 + \beta_1 LMB + \beta_2 LMval + \beta_3 LTransval + \beta_4 Relval + \beta_5 ROE + \beta_6 Lev + \beta_7 MktLev + \beta_8 BkLev + \beta_9 LSP + \beta_{10} LNI + \beta_{11} EPS$ and $g(x) = \beta_0 + \beta_1 LMB + \beta_2 LMval + \beta_3 LTransval + \beta_4 Relval + \beta_5 ROE + \beta_6 Lev + \beta_7 MktLev + \beta_8 BkLev + \beta_9 LSP + \beta_{10} LNI + \beta_{11} EPS + \beta_{10} DUM + \beta_{11} Pre_LMB$ for the pooled sample. The logistic function is set to evaluate the likelihood of a stock type payment. Log MB is natural logarithm of Market-to-Book. It is the main variable of interest as it proxies for mispricing and information. The rest are control variables of various effects such as the market controlled by log of market value and log S&P500, profitability controlled by ROE, EPS and log Net Income. Leverage effects are accounted by three measures i.e. log overall leverage and market and book leverages. The pre and post regressions do not contain the Dummy DUM and the interaction term Pre_LMB. DUM is set to 1 for the pre SOX sample and zero for post SOX. The key variable is Pre_LMB which is the interaction between DUM and log MB. It measures the difference in effect of MB i.e. Pre – Post. Column 1 of each panel records the estimate of the coefficient, column 2 shows the standard error of the estimate and the last column shows the Wald statistic along with the significance level.

***, **, * indicate significance at the 0.01, 0.05 and 0.10 levels respectively.

The central hypothesis of this paper is that SOX has reduced the level of mispricing and thereby improved market efficiency as hypothesized by H6. The previous two tables have shown that the coefficient of the LMB variable was smaller for the post-SOX period but a formal proof of that is produced in the pooled

regression (Panel C of Table 8) where once again the coefficient of LMB is positive and significant. But, most importantly, the interaction term Pre_LMB which measures the difference in size of the coefficients i.e. Pre – Post has a positive and significant coefficient. This is the crucial result in support of H6 which confirms that that SOX has indeed increased market efficiency

CONCLUSION

SOX was implemented to provide protection to investors by increasing the level of information available to them as well as by holding managers responsible for the information that their firms provided. Surprisingly, the impact of SOX on financial markets has been largely unexplored; our research provides insights that are particularly relevant, given the current financial crisis that has impacted global financial markets.

In this study, our main goal is to review the effectiveness of SOX in terms of its impact on financial market efficiency. We also evaluate the criticism that SOX imposed an unnecessary burden on firms. Our results indicate that mispricing in the market decreased significantly after the imposition of SOX, causing the market to become more efficient.

The significant reduction in the variance of the MB ratio across firms in the post-SOX environment is a clear indication that firm prices across the spectrum of firms are more accurate. The reduction in the variance is caused by fewer firms being significantly overvalued or undervalued. The evidence of the reduction in mispricing comes from the results of the logistic regression. The difference in the size of the coefficient of the MB term is clear from the pre and post logistic regression is apparent. However the convincing proof comes from the coefficient of the interaction term in the pooled regression. This effectively measures the difference in coefficients

The reversal in the proportion of cash mergers vs. stock mergers after the implementation of SOX is expected after the above finding on the MB ratio. The extent of the reversal though is absolutely stunning. This reversal that we find from the test of proportions is further confirmed using the logistic regression methodology. In examining the average cash balances of acquiring firms before and after SOX we find that cash balances have increased significantly from 304.12 pre-SOX to 1299.6 post-SOX (see Tables 3 & 5). This fact indicates that firms are not overly burdened by the implementation costs of SOX. We use the cash balances as an indicator since all SOX related implementation costs are necessarily cash. Also this evidence should be examined in the light of the fact that the average acquirer is less profitable (ROE pre SOX ROE: 0.3140 and post SOX ROE: -0.1750 see Table 5). If on one hand firms are less profitable but have increased cash balances, and yet indulge in costly and critical mergers knowing well that their profitability in the near future is likely to be low, we are propelled towards the conclusion that firms are not apprehensive of the recurring costs of SOX. Claims have been made that quite a number of firms are going private to avoid the costs of SOX. We do not see compelling evidence of this, in fact, the extra cash coupled with the lesser profitability seems to contradict this claim. However we must admit that the evidence we provide is not conclusive but only inferential.

Overall we conclude that SOX has achieved its main goal of injecting greater accuracy and transparency into the market place, and contributed to the restoration of investor confidence and increased stock market efficiency. A further research in this area can include target attributes and a comparative sample surrounding another regulatory event. However it may be difficult control for differences between the two events and to find common measures of performance. The evidence supports the conclusion that regulatory reforms can be successful and though they may be unpopular and attract criticism, they must nevertheless, be implemented.

REFERENCES

- Andrade, G., Mitchell, M., & Stafford, E. (2001). New evidence and perspectives on mergers. *Journal of Economic Perspectives*, 15, 103–120.
- Andrade, G., & Stafford, E. (2004). *Investigating the economic role of mergers*. *Journal of Corporate Finance*, 10, 1–36.
- Asquith, P. (1983). Merger bids, uncertainty, and stockholder returns* 1. *Journal of Financial Economics*, 11, 51–83.
- Byrd Kent, A., & John, W. (1992). Do outside directors monitor managers?* 1: Evidence from tender offer bids. *Journal of Financial Economics*, 32, 195–221.
- Cohen, D., Dey, A., & Lys, T. (2005a). The Sarbanes Oxley Act of 2002: Implications for compensation structure and risk-taking incentives of CEOs. New York University, New York, NY, .
- Cohen, D., Dey, A., & Lys, T. (2005b). Trends in earnings management and informativeness of earnings announcements in the pre-and post-Sarbanes Oxley periods. In Available at SSRN: <http://ssrn.com/abstract.volume658782>.
- Croci, E. (2007). Corporate raiders, performance and governance in Europe. *European Financial Management*, 13, 949–978.
- Dodd, P. (1980). Merger proposals, management discretion and stockholder wealth* 1. *Journal of Financial Economics*, 8, 105–137.
- Dong, M., Hirshleifer, D., Richardson, S., & Teoh, S. (2006). Does investor misvaluation drive the takeover market? *The Journal of Finance*, 61, 725–762.
- Eckbo, B. (1983). Horizontal mergers, collusion, and stockholder wealth. *Journal of Financial Economics*, 11, 241–273.
- Eckbo, B., & Langohr, H. (1989). Information disclosure, method of payment, and takeover premiums: Public and private tender offers in France. *Journal of Financial Economics*, 24, 363–403.
- Engel, E., Hayes, R., & Wang, X. (2007). The Sarbanes–Oxley Act and Firms. *Journal of Accounting and Economics*, 44, 116–45.
- Franks, J., Harris, R., & Titman, S. (1991). The postmerger share-price performance of acquiring firms. *Journal of Financial Economics*, 29, 81–96.
- Franks, J., & Mayer, C. (1996). Hostile takeovers and the correction of managerial failure* 1. *Journal of Financial Economics*, 40, 163–181.
- Goergen, M., & Renneboog, L. (2004). Shareholder Wealth Effects of European Domestic and Cross-border Takeover Bids. *European Financial Management*, 10, 9–45.
- Gort, M. (1969). An economic disturbance theory of mergers. *The Quarterly Journal of Economics*, 83, 624–642.

Healy, Paul M., and Krishna G. Palepu. "Information Asymmetry, Corporate Disclosure, and the Capital Markets: A Review of the Empirical Disclosure Literature." *Journal of Accounting & Economics* 31, nos. 1-3 (September 2001): 405-440

Jain, P., Kim, J., & Rezaee, Z. (2008). The Sarbanes-Oxley Act of 2002 and market liquidity. *Financial Review*, 43, 361–382.

Jain, Pankaj K., and Zabihollah Rezaee. (2005). "Industry-wide effects of Sarbanes-Oxley Act of 2002", *Journal of Forensic Accounting*, 6, 147-162.

Leuz, C., (2007). Was the Sarbanes-Oxley Act really this costly? A Discussion of Evidence from Event Returns and Going-Private Decisions, *Journal of Accounting and Economics*, 44, 146-165.

Li, H., Pincus, M., Rego, S., (2008) "Market Reaction to Events Surrounding the Sarbanes-Oxley Act of 2002 and Earnings Management," *Journal of Law & Economics*, 51, 111-134

Loughran, T., & Vijh, A. (1997). Do long-term shareholders benefit from corporate acquisitions? *Journal of Finance*, 52, 1765–1790.

Martynova, M., Renneboog, L., & Room, B. (2006). Mergers and acquisitions in Europe. *Advances in Corporate Finance and Asset Pricing*, (pp. 13–75).

Melicher, R., Ledolter, J., & D'Antonio, L. (1983). A time series analysis of aggregate merger activity. *The Review of Economics and Statistics*, (pp. 423–430).

Mitchell, M., & Mulherin, J. (1996). The impact of industry shocks on takeover and restructuring activity* 1. *Journal of Financial Economics*, 41, 193–229.

Mitchell, M., & Stafford, E. (2000). Managerial Decisions and Long-Term Stock Price Performance. *The Journal of Business*, 73, 287–329.

Morck, R., Shleifer, A., & Vishny, R. (1990). Do managerial objectives drive bad acquisitions? *Journal of Finance*, 45, 31–48.

Myers, S., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. NBER Working paper,

Rhodes-Kropf, M., & Viswanathan, S. (2004). Market valuation and merger waves. *The Journal of Finance*, 59, 2685–2718.

Schwert, G. (1994). Mark-up pricing in mergers and acquisitions. NBER Working Paper.

Servaes, H. (1991). Tobin's Q and the Gains from Takeovers. *Journal of Finance*, 46, 409–419.

Shleifer, A., & Vishny, R. (2003). Stock market driven acquisitions* 1. *Journal of Financial Economics*, 70, 295–311.

Smith, R., & Kim, J. (1994). The combined effects of free cash flow and financial slack on bidder and target stock returns. *Journal of Business*, 67, 281–310.

Sudarsanam, S., & Mahate, A. (2003). Glamour Acquirers, Method of Payment and Post-acquisition Performance: The UK Evidence. *Journal of Business Finance & Accounting*, 30, 299–342.

Zhou, J., & Lobo, G. (2006). Did conservatism in financial reporting increase after the Sarbanes-Oxley Act? Initial evidence. *Accounting Horizons*, 20, 57–73.

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