LOOKING FOR A CHANGE: USING FINANCIAL RATIOS TO PREDICT DISTRESSED STOCKS

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ABSTRACT

The purpose of the study is to cross examine the predictive power of fundamental measures in identifying distressed stocks during stock market crashes. A number of stock market crashes occurred around the world. The most recent one was the 2000 US stock market crash, where the stock price of all US indexes was adversely affected. This study sheds a light on what might be a new way to identify stock price movement based on fundamental measures. It builds on initial results of a study testing the predictive power of financial measures in identifying risky stocks (Bahhouth et al 2008). Research methodology includes the use of binary logistic regression along with the t tests, chi-square and other measures. The study showed that fundamental ratios have a significant predictive power in determining distressed stocks, but still need to be defined.

INTRODUCTION

Studies discussing stock market crashes are dated back to the 1980s, where the increase of the market stock price was not justified with the economic growth. Moreover, there were factors that were not explained by modern investment theories that forced these markets to surge. In October 1987 Wall Street lost over 20% of its value in one day and it was not followed by a recession. In the days preceding the crash, there were no significant external events or "bad news" that could justify the dramatic price fall. Stock crash market of year 2000 destroyed more than $8 trillion of investors' wealth. Its effect was felt in all industries at all levels. In year 1997, the Price/Earning ratio passed the record high of year 1929 and increased by an additional 33 percent in year 2000 (Baker, 2000). During the period from 1992 to 2000 the markets and economy experienced a period of record expansion. The IPO market had new companies trading at over a one billion dollar market capitalization with no profits and less than one million dollars in revenue (Bull Investors, 2004). Investors recognized that the market was highly priced. This paper discusses the stock crash from a different point. It will try to set measures that will allow investors to identify distressed (risky) stocks during crash periods.

LITERATURE REVIEW

There is no clear explanation to market crash. Zuckerman E. and Rao H. (2004) related the market crash of year 2000 to the main features of trading in Technology stocks early in the 1990s. Investors and stock traders were not able to explain the implications of the rise and fall of the Internet stock for many years. Ofek and Richardson (2002) pointed out that during that period the very high trading volume of trade in Internet stocks indicated the wide gap between the prices and their fundamental values. Demers and Lev (2001) gave two broad reasons for how Internet stocks reached unjustifiably high prices in the late 1990s and early 2000. The first focuses on the fundamental values that highlight the elements of capital gains and losses. Investors change their opinion often based on indicators rather than on fundamental values. The second suggests that fundamentals were indeed responsible for market prices but investors' interpretations of fundamentals were irrationally optimistic in making their assessments. Other researchers explained that fundamental limitations on arbitrage (De Long et al., 1993; Shleifer and Vishny, 1997) might have been responsible. Ofek and Richardson (2003) described a process whereby the significant constraints on the short selling of the Internet stocks prevented the opinions of more reasonable investors from being incorporated into prices. In the early 2000, with the expiration of the lock-up period that prevented insiders from selling stocks, prices of the Internet stocks fell, which led into a price crash (Ofek and Richardson, 2003).

Some other research focused on the trading activities between the markets by studying stock returns, volatility, price movements, co-movements, correlations, co-integrations, etc…. However, few studies present measures that would help small investors make rational decisions to protect their investments.

Datar, Naik and Radcliffe (1999) suggested that liquidity played a significant role in explaining cross-sectional stock returns. Chordia, Roll and Subrahmanyam (2000) concluded that liquidity retained a significant influence after adjusting for trading volume, volatility, and price movements. While Campbell, Crossman and Wang (1993) as well as Blume, Easley and O'Hara (1994) studied the liquidity effects of asymmetric information, which were influenced by trading costs. Alexander (1999) introduced the co-integration approach to portfolio modeling, which enabled the use of the entire set of information in a system of stock prices. Granger and Terasvirta (1993) argued that stock prices were long-memory process and co-integration was able to explain their long-run behavior. The co-integration rationale is based on the price difference between a benchmark (industry index) and the portfolio as well as the In explaining the factors that were behind the stock crash market, Stroh (2000) talked about unusual earnings. The cumulative P/E ratio of all domestic NASDAQ stocks hit unprecedented, levels of 81.2. He added, it would require a decline of over 75 percent to the stock price index to take back the NASDAQ's P/E ratio to where it started at the beginning of the bull market.

Mann (2000a,b) argued that investors' behavior and their confidence are prominent factors influencing stock markets. He said that overconfidence is the reason behind why investors tend to become irrational in the face of uncertainty. When investors face imminent danger, they tend to react instinctively rather than rationally. However, overconfidence causes investors first to misinterpret the accuracy of the information and then to overestimate their skills in analyzing it. This can lead to poor investment decisions, which is often reflected with excessive trading, risk

taking, and significant losses. In the same direction, Nofsinger (2001) argued that people in general tend to be overconfident, which leads investors to overestimate their knowledge, underestimate all kinds of risk, and exaggerate their ability to control and to predict events. Psychologists have found that two factors triggered people overconfidence, the successful experience they had in the past and the massive load of information. Thus, investors were trapped with the illusion of knowledge and the illusion of control.

In the era of Internet Technology, it is clear that investors have access to large volume of information on the stock market. Most of that information explains technical issues of trading activities, which in most of the cases overlooks measures that highlight strength and weakness of stocks. These measures if introduced may lead investors to make better assessments. The purpose of this study is to cross verify the predictive power of financial measures in identifying distressed stocks by comparing the results of two samples taken from U.S. stock market. The first sample is taken from companies whose stocks are traded at NASDAQ and the second sample is taken from companies whose stocks are traded at S&P 500. NASDAQ is the stock exchange of the Over-The-Counter (OTC) stock market that was developed by the National Association of Securities Dealers (NASD). It started February 5, 1971 with an index value of 100. In contrast to the S&P 500, which has about a quarter of its market cap in technology, two-thirds of the NASDAQ Composite market capital is made of computers, software and telecommunication (telecom) companies. NASDAQ is the third-largest market in the world, after the New York and Tokyo exchanges, and handles over 45 percent of all shares traded in the major U.S. markets (Madura 2001). The Index crossed the 4,131 points early in January 2000 (Start of US crash market period) and ended up at a level below 1,979 points by December 2002 (end of the crash period. This reflects almost 52 % decline in average stock prices listed on NASDAQ.

The S&P 500 Index was introduced by McGraw Hill's Standard and Poor unit in 1957. Most of the time, it is used as a proxy for the US stock market (Gray, 2004). During the observed period, the index lost 21% of its market value (negative market swing) i.e. between the period of January 01, 2000 (Index points 1,455.22) and January 02, 2002 (Index points 1,154.67).

METHODOLOGY AND DATA DESCRIPTION

A binary logistic regression model (BLRM) is used to test the research problem. Logistic regression is superior to linear regression when the normality assumption of the independent variables is not met. It is simpler to read and to interpret because its values are between zero and one (Tsun-Siou, Yin-Hua & Rong-Tze, 2003).

The use of the logistic regression model in this study is to evaluate the predictive power of the independent variables (fundamental measures) in classifying traded stocks into two groups (dependent variable). The dependent variable is a non-metric measure and is used to identify these two-stock groups; distressed stocks (assigned a value = 0), and financially reliable stocks (assigned a value = 1).

Data used is a secondary type and is taken from morningstar.com. It is made of two samples. The first sample is made of 200 companies that are listed on the NASDAQ stock exchange market. Data of these companies were collected at two different times; the first time was on January 01, 2000 when the NASDAQ index was at high of 4131.15 points, and the second time was on January 01, 2002 when the NASDAQ index was at a low of 1,979.25 points. The sample was split equally into two groups: 1- a group of companies (distressed) experienced a sharp decline in its stock prices (i.e. a decline exceeds the average decline of NASDAQ - 52%. 2- a group of companies (financially reliable) didn't experience a sharp decline in its stock prices (i.e. a decline didn't exceed the average decline of NASDAQ - 52%.

The second sample is made of 100 companies that are listed on the S&P 500. The sample selection and criteria is the same as sample one with an average decline of 21% in the index. Financial information collected from each company included 31 variables, which represent the company's fundamental measures (financial ratios).

These fundamental measures are subdivided into four major areas: 1- Liquidity and activity ratio measures which indicate the adequacy of short term resources to pay the anticipated short term debt liabilities and the efficiency in using firm's resources (Monetary Bulletin, 2004). 2- Leverage Ratios measure the extent of the firm's "total debt" burden. They reflect the business's ability to meet both short- and long-term debt obligations (Chesnick, 2000). 3- Profitability Ratios measure the success of the firm in making earnings (Tyran, 1986). 4- Cash Flow Ratios provide information about organization's quality earnings and its financial growth (Urbancic, 2005). A list of these measures is as follows:

1 - Liquidity and efficiency ratios: A- Current Ratio (CR), B- Acid Test or Quick Ratio (QR), C- Working Capital (WC), D- Working Capital per Dollar of Sales Ratio (WCS), E- Working Capital to Total Assets Ratio (WCTA), F- Accounts Receivable Turnover Ratio (ART), G- Inventory Turnover Ratio (ITR), H- Fixed Asset Turnover Ratio (FAT), I- Asset Utilization Ratio (AU), J- Asset Turnover Ratio, K- Days Sales Outstanding Ratio (DSO), L- Payable Period Ratio (PPR).

2 - Solvency Ratios: A- Financial Leverage Ratio (FLR), B- Debt to Equity Ratio (DTE), C- Equity to Asset Ratio (EQTA), D- Debt to Asset Ratio (DTA), E- Debt to Fixed Asset Ratio (DTFA), F- Long Term-Debt to Total Assets Ratio (LDTA), G- Equity Multiplier Ratio (EM), H- Expense Ratio (ER).

3 - Profitability ratios: A- Net Profit Margin Ratio (NPM), B- Return on Asset Ratio (ROA), C- Return on Equity Ratio (ROE), D- Earning per Share Ratio (EPS).

4 - Cash Flow Ratios: A- Free Cash Flow to Sales Ratio (FCFS), B- Free Cash Flow to Net Income Ratio (FCFNI), C- Cash Conversion Cycle Ratio (CCC), D- Operating Cash Margin Ratio (OCM), E- Earnings Quality Ratio (EQR), F- Asset Efficiency Ratio (AER), G- Capital Asset Ratio (CAR), H- Current Liability Coverage Ratio (CLC).

Testing Reliability and Validity

In testing the reliability of the model, the coefficient of determination (R^2_{Logit}) is used. It is similar to that of the ordinary least squares (OLS) regression:

$$R^2_{Logit} = 1 - (2LL_0 / 2LL_1)^{1/2}, \quad (1)$$

where $-2LL_0$ is the log-likelihood (represents unexplained variations) of the model without the independent variables. $-2LL_1$ is the log-likelihood of the research model based on the independent variables that remained in the model and exhibited significant power in explaining the two stock groups. In general, the interpretation of R^2_{logit} is similar to the coefficient of determination R^2 in multiple regression. It has a value that ranges between 0 and 1. When R^2_{logit} approaches 0, the model is poor. When R^2_{logit} approaches 1, the model is a perfect predictor.

Testing Validity: The external validity of the research model is tested by comparing the results of the two samples - i.e NASDAQ versus S&P 500.

Data collection: The selection process of data was carefully done. Cases with missing information were avoided. In studying outliers, few cases reported values that exceeded three standard deviations. In checking these cases, nothing abnormal was found about these companies and accordingly they were kept in the model.

DATA ANALYSIS

The first step in the analysis was done by using the forward stepwise procedure of logistic regression. This procedure allows only those variables that exhibit significant predictive power to enter into the model. At a level of significance of 5% of the thirty-one independent variables that were in the model, only eight variables entered into the model. These variables are Current Ratio, Quick Ratio, Receivables Turnovers, Days Sales Outstanding Ratio, Expense Ratio, Return on Assets, Capital Asset Ratio, and Current Liability Coverage Ratio. The summary output of the SPSS showed the following hit ratio results:

Table 1: predicted Ratios

	Predicted		
NASDAQ	Distressed	Reliable	Correctly classified %
Observed - Distressed	49	1	98%
Observed - Reliable	3	47	94%
Overall Hit Ratio			**96 %**
S&P 500			
Observed - Distressed	37	13	74%
Observed - Reliable	14	36	72%
Overall Hit Ratio			**73%**

The model correctly classified distressed stocks during crash period - 0 group - 98% (NASDAQ) and 74% (S&P 500). The model misclassified the same group 2% (NASDAQ) and 26% (S&P 500). As for reliable stocks, the model correctly classified 94% (NASDAQ) and 72% (S&P %). The model misclassified 6% (NASDAQ) and 28% (S&P 500). The overall hit ratio (average) is 96% (NASDAQ) and 73% (S&P 500), it means the model correctly classified 96% NASDAQ stocks and 73% S&P500. While, it misclassified 4% of NASDAQ stocks and 27% S&P 500 stocks.

Variables remained in the model and exhibited significant predictive power are listed in the following table:

Table 2: Variables in the Model

NASDAQ	**Common Variables**	**Coefficient**
Current Ratio	No	-3.8897
Quick Ratio	No	+7.0354
Receivables Turn over	No	-0.4857
Days Sales Outstanding	No	-0.0780
Expense Ratio	No	-9.6143
Return on Assets	No	-0.3091
Capital Assets Ratio	No	+1.2558
Current Liabilities Coverage Ratio	No	-15.3474
S&P 500	No	
Working Capital – WC	No	-.003
WC to total assets	No	6.391
Fixed assets turnover	No	-.200
Cash Conversion Cycle	No	-.017
Earning Quality Ratio	No	-.511
Payable Period	No	-.016

Eight variables exhibited significant power in predicting distressed NASDAQ stocks, while six variables exhibited significant power in predicting S&P 500 stocks.

Testing Reliability and Validity

Testing the reliability of the model is done by using the coefficient of determination (R-Square), which represents the proportion of the total variation that is explained by the independent variables. The model explained 87% of the total variation of NASDAQ stocks and 51 % of S&P 500 stocks. Both are considered significant.

External validity of the research model was addressed by using two different samples. Both samples showed that financial measures have significant predictive power with a coefficient of determination exceeding the 50%.

Limitations of the study

There are two practical problems associated with this study. First is that the data is secondary that was taken from a public site. Secondly, the study is based on a limited number of companies and thus the sample issues.

CONCLUSIONS

The results of the study showed that there is a major structural difference in the fundamental measures between the two stock groups of firms (financially reliable versus distressed). But a clear issue there were a be addressed and these are 1) even though, the coefficient of determination of both were significant, but that showed significant Even though, the model showed a significant predictive power but Accordingly, this model could be used to help investors to identify those stocks that are adversely affected during traumas from other stocks. Future research could include testing the external validity of this model by applying the model to other stock markets. In addition, it is advisable to focus on standardized models that are derived from fundamental measures, which would better help investors in making better decisions.

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