



Are Stock Prices Aligned with Investors' Expectations? Evidence from Financial Sector

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Abstract

Stock prices change as news become available about businesses; the change in price process is a reflection of financial markets' expectations about firms' performance. Consequently both, financial measures & fundamental measures change as a result. Researchers explored how well the financial measures explain firms' performance and future stock price movements. The purpose of this study is to explore if the volatility of financial measures are better predictors of stock price movements – an empirical evidence from the financial sector during 2008 market correction. Study develops a two-step scenario is developed; 1- The first step examines the use of the financial measures as leading measures to project stock price movement during 1998 and 2007 period. 2- The second step examines the co-movement of financial measures volatility with stock prices during the same period. Study shows evidence that the co-movement between Price/ Book volatility and that of stock price during 2008 market correction is significant and consistent across the six main financial industries.

Keywords: Volatility, Risk, Financial measures, Correlation, Market corrections, Stock price, Expectations.

JEL Classification: C12; C21; G01; G12.

1. Introduction

The purpose of the study is to explore if financial measures co-movement are good indicators in predicting stock price movement during financial market crash periods. Market crash, flash crash, or market correction are all a product of systematic risk as they result in a significant drop in value of the stock market. Many studies challenged the argument that financial system key driver is the systemic risk. De Bandt and Hartmann (2000) argued that the functioning of financial system is adversely affected as a result financial crisis. Schwarcz (2009) explained a financial market crash event as a leading event that severely shock an economic sector and create simultaneous reactions with severe consequences on financial markets and institutions.

Internet is playing a key role in shaping the stock market. It allows investors to access information about firms and stock market for free or at a very low cost. Information is wide in scope; it ranges from trading activities to key highlights about firms' overall performance. They are expressed in terms of financial measures, which are firms' unique characteristics. The purpose of this paper is to examine if financial measures volatility better explains stock prices volatility during financial market crash period. The study is made of five parts, which are: 1) a literature review; 2) research methodology; 3) data analysis; 4) limitations; & 5) conclusions and recommendations.

2. Literature Review

Indicators are frequently used to help understand changes in financial markets as well as patterns in economic phenomena. Private and public entities often gather and publish socio and economic indicators that help us understand labor markets, productivity levels, price fluctuations, and buyer behavior. While indicators can help predict future market movements and behaviors, their accuracy may not always be exact. When applied to the world of financial instruments, debt and equity market indicators can provide valuable information about how markets will behave.

On the other hand, researchers argue that stock prices are driven by market reaction to news as a result stock prices move up with good news and move down with bad news Nettles (2003). Nettles (2003) debated that investors tend to invest stocks with projected high returns, which are not reflected when analyzing their firms' financials. Lei, Noussair, and Plott (2001) argued that daily trader play a key role in setting the direction of stock price movement; they added, rational arbitragers offset daily trader role by trading against them. In a study (Wen-Chen & Ku-Jun, 2005), showed evidence that daily traders have significant effect on stock market. They concluded that daily traders drive stock prices to move away from the projected ones, which cause extreme deviations between the price and assets value.

In a study, [Woida \(2016\)](#) showed evidence that stock price swings are severely affect financial markets and occurring at a faster pace [Figure 1](#). As a result, investors' wealth is adversely affected with the decline in their investment values. For example, the market crash of 1987 created losses that exceeded 20% for most investors. However, this crash did not result in a recession ([Baigent & Massaro, 2005](#)). The market downturn that occurred in 2000 caused the destruction of approximately \$8 trillion worth of investor assets ([DeGrace, 2011](#)). The 2000 crash impacted the entire economy and did not discriminate amongst industries. The most impactful crash in recent history occurred in 2008. The impact of the financial crisis resulted in a loss of more than half of equity market values and had significant economic repercussions in global economies.

Market crashes, their causes and repercussions have captured the attention of practitioners and researchers for decades. Studies have provided differing explanations for how these events start. [Sornette \(2004\)](#) found that irrational and overly optimistic investor expectations were the primary causes of market crashes. Investors relied on perception more than on fundamentals, and their buying and investment decisions reflected the disconnect. Investors favored firms that assured exceptional returns without necessarily having the financial fundamentals to honor their guarantee.

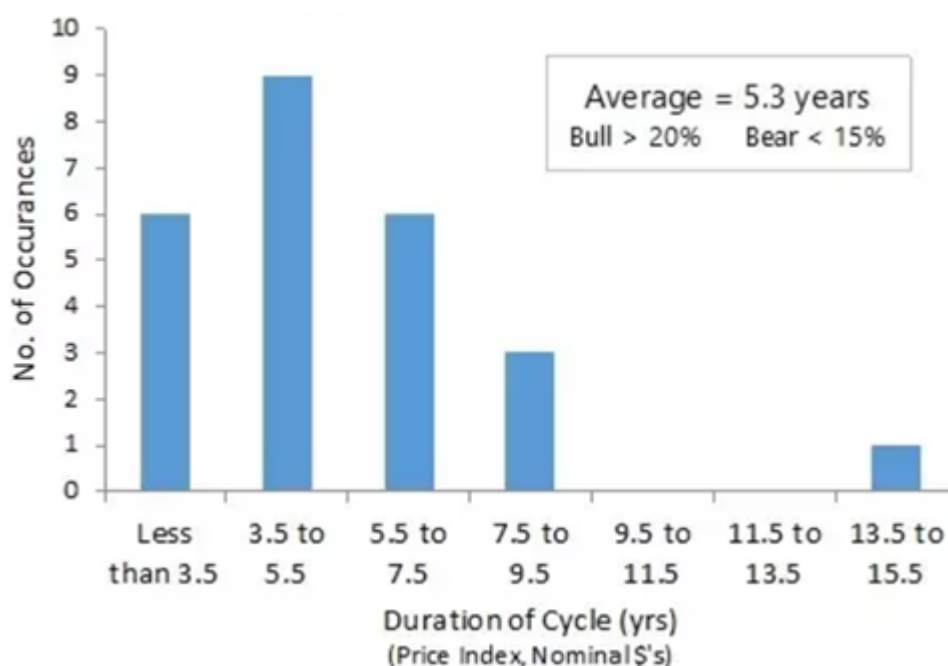


Figure 1. Duration of complete Bull-Bear Cycles from 1871 through 2015 vs No. of Occurrences.
Note: [Woida \(2016\)](#).

[Baigent and Massaro \(2005\)](#) studied the 1987 crash and concluded that the use of “portfolio insurance” as a hedging instrument by large institutional investors was a likely culprit. They also found an increased use of derivative securities in the first three-quarters of 1987 led to market cap inflations. [Ofek and Richardson \(2003\)](#) studied the market crash in 2000 and found that a large differential existed between market prices and their fundamental intrinsic values prior to the 2000 market crash. Similarly, [Zuckerman and Rao \(2004\)](#) also studied the 2000 crash and found that investments in technology stocks during the previous decade were likely a contributing factor given that brokers and dealers were unable to understand the consequences associated with the volatility seen in Internet stocks.

One cannot study market corrections without considering volatility and its impact on subsequent market behaviors. [Fridson \(2011\)](#) determines that cultural differences impact the volatility evidenced in financial securities. His study looks at volatility differences in debt and equity securities. The author concludes that volatility is to be expected even without the abnormal economic conditions witnessed in 2008. While typical explanations such as exposure to new information and overreactions to new information may continue to impact asset volatility, the author posits that variations in volatility across geographic regions can be attributed to cultural differences between market participants. In fact, [Fridson](#) recommends incorporating anthropological studies and assessments to better understand investor behavior.

[Campbell, Koedijk, and Kofman \(2002\)](#) note that while correlations exist across international returns during bear markets, studies that demonstrate this may be exposed to estimation bias. To eliminate concerns associated with such a bias, the authors model correlation as a time dependent variable since volatility varies across time. Their findings demonstrate a significant correlation in global returns during bear markets, even after controlling for the bias present in some previous studies.

[Chue, Wang, and Xu \(2015\)](#) focus on style investing when analyzing return correlations. Style investing is a process whereby investments are made based on a style or asset category as opposed to investment selection on an individual asset basis. Funds are rotated amongst the different styles or categories (i.e., large cap, small cap, emerging market, etc.) based on the style's market performance. The authors constructed market portfolios, factoring in size, value, and momentum (as determined by cumulative six-month returns). They found that investment momentum is more adversely affected by severe market crashes than portfolio size and value.

[Jacquier and Marcus \(2001\)](#) note that correlation relationships change often, and this change is further augmented during periods of high volatility. In fact, they find that much of the variation in correlation structures is a direct result of changes in market volatility. Certainly, business cycles also play a role in influencing volatility. [Erb, Harvey, and Viskanta \(1994\)](#) declare that asset allocation decisions are largely influenced by correlations of equity returns. When studying correlations, researchers should keep in mind that these are non-static and studying how cross-country correlations evolve provides better insight into why we see these changes in the first place. The authors find that correlations between countries are impacted by the business cycles the respective countries are

experiencing. There appear to be higher degrees of correlation during declining economic periods than during expansions. Page and Panariello (2018) draw similar conclusions. They find that higher degrees of correlation during recessionary periods and crashes is evident in equity securities, equity markets, equity industries, debt markets and currencies.

While researchers have reached differing conclusions as to why market crashes occur, they have largely agreed on the use of financial measures as tools for explaining stock market phenomena. Fama and French (1992) found that the relationship between asset returns and size helped explain increasing risk-associated returns not otherwise explained in the asset-pricing model. The same could be said for price-to-book ratio and prior return measures. Aras and Yilmaz (2008) focused on the use of price-earnings ratios, market-to-book ratios, and dividend yields to help explain emerging market returns. Ang and Bekaert (2007) used price-earnings ratios to help understand dividend growth rates, and Lamont (1998) found the same measure was helpful in predicting excess returns. Lewellen (2004) reached similar conclusions regarding financial ratios in general.

Although the reasons behind why market crashes occur vary, their increasing frequency and dire consequences require researchers learn more about how equity volatility and price movements work during these periods. Study sheds a light on the volatility of financial measures and their potential use as predictor of equity risk during market corrections; it eliminates industry risk by exploring an evidence from financial sector. An improved understanding of this relationship will help investors make better transaction decisions.

The following research problems are addressed: 1) Are market measures key indicators of stock price movement during market corrections? 2) Does the volatility of market measures capture the price movement during market corrections?

3. Research Methodology

The research methodology of the study includes five sections, which are 1- Variables and measurements, 2- Sample and data collection, 3- Research instruments, 4- Data analysis, and 5- Conclusions.

3.1. Variables and Measurements

Study employs eighteen financial measures, which are divided into two groups; 1- fundamental measures; and 2- market measures.

In addition, it sub-divide the financial sectors into six major industries. The following is a list of measures that are included in each group:

3.1.1. Fundamental Measures

Profit Margin; Return on equity; Earnings Before Interest, Taxes, Depreciation and Amortization; Earnings/Retention; Return on Assets; Debt to Earnings Before Interest and Taxes; Free Cash Flows+ Dividends / Debt; Total Assets Turnover; Financial Leverage; Free Cash flow + Interest / Debt; Debt Service Coverage; and Z score.

3.1.2. Market Measures

Beta; Cumulative Change in Price; Return on Investment; Common Stock Ranking; Price Earnings; and Price Book Value.

3.1.3. Financial Sector:

The finance sector is made of the following industries:

Finance Companies; Banks; Thrift Companies; Insurance; Real Estate Investment Trusts; and Dealers, Brokers and Investment Banks.

3.2. Sample and Data Collection

Data is made of financial measures of all public firms for the 10-year period ended by 12/31/2008 taken from Market Place – S&P Global. Sample is made of 9,503 firms but few firms remained in the study due to missing information.

3.3. Research Instrument

Study employs two-stage research model process: 1st stage: a- Co-movement of the financial variables and 2008 stock price volatility is measured Equation 1; b- 5% level of significance is used to test validity; c- then, a T test is used to examine if correlation coefficient is significantly different from zero Equation 2. 2nd stage: a- compute annual financial measures volatility; b- measure financial measures' volatility co-movement with 2008 stock price volatility Equation 1; and c- test validity of co-movement of stock price volatility and financial measures volatility Equation 2.

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}} \quad (1)$$

$$t_{stat} = (r - \rho) / \sqrt{[(1-r^2) / (n - 2)]^{0.5}} \quad (2)$$

4. Data Analysis

The process of analyzing data of financial-sector six industries is applied in two stages. Data output of banks industry (significant results) is reflected in Table 1. At a 5% level of significance, the coefficient of correlation of one financial measure volatility with that of the stock price showed a significant result; it is Price / Book value ($r = 27\%$, P-value 0%). Stage 2: measures the significance of the coefficient of correlation of market measures with stock price volatility using alpha of 5%; four measures showed significant results. These are A- fundamental measures: 1- Debt/Earnings Before Interest Taxes Depreciation & amortization ($r = -11\%$, P-value 1%), 2- Earnings Before

Interest Taxes Depreciation & amortization / Assets ($r = -23\%$, P-value 0%), and 3- Total assets turn over ($r = -23\%$, P-value 5%). B- market measures: 1- Price/Book Value ($r = 33\%$, P-value = 0%).

Table 1. Banks industry.

Financial Measure	Financial Measure Volatility			Financial Measure		
	N	Correlation	Significance	N	Correlation	Significance
Price /Book Value	231	27%	0%	573	33%	0%
Debt / EBITDA				547	-11%	1%
EBITDA / Assets				548	-23%	0%
Total Asset Turn Over				578	-8%	5%

Data output of finance companies' industry (significant results) is reflected in Table 2. At a 5% level of significance, the coefficient of correlation of five financial measures volatility with that of the stock price showed a significant result: these are A- fundamental measures: 1- Return on Assets ($r = 62\%$, P-value 0%); 2- Earnings before Interest, Taxes & Amortization / Assets ($r = -32\%$, p-value 3%); 3- Free CFL+ Dividends / Debt ($r = 46\%$, P-value 1%), and 4- Free CFL + Interest Expense/Debt ($r = -59\%$, P-value = 0%). B- market measures: Price /Book Value ($r = 62.54\%$, P-value = 0.0%). Stage 2: Measuring the coefficient of correlation of financial measures with stock price volatility (Alpha 5%), six financial measures showed significant results; these are A- fundamental measures: 1- Return on Assets ($r = 36\%$, P-value 0%), 2- Return on Equity ($r = 32\%$, P-value 1%), 3- Total Assets Turn Over ($r = 27\%$, P-value 2%), market measures: 1- Price /Book Value ($r = 31\%$, P-value = 1%), 2- Beta ($r = -11\%$, P-value = 0%), 3- Return on Investment ($r = 34\%$, P-value 2%).

Table 2. Finance companies industry.

Financial Measure	Financial Measure Volatility			Financial Measure		
	N	Correlation	Significance	N	Correlation	Significance
Price /Book Value	38	79%	0%	83	31%	1%
Beta				886	-11%	0%
Return on Assets	48	62%	0%	82	36%	0%
Return on Equity				79	32%	1%
Return on Investment				80	34%	2%
EBITDA / Assets	44	-32%	3%			
Total Asset Turn Over				82	27%	2%
Free CFL +Dividends/Debt	28	46%	1%			
Free CFL + Interest Exp/Debt	28	-59%	0%			

Data output of finance Insurance industry (significant results) is reflected in Table 3. At a 5% level of significance, the coefficient of correlation of six financial measures volatility with that of the stock price showed a significant result: these are A- fundamental measures: Return on Equity ($r = 22.65\%$, P-value 1.58%), 2- Earnings Before Interest Taxes Depreciation & Amortization / Assets ($r = 28.04\%$, P-value 0.52%). B- market measures: Price /Earnings ($r = -26.02\%$, P-value = 1.22%), 2- Price /Book Value ($r = 62.54\%$, P-value = 0.0%), 3- Return on Investment ($r = 25.15\%$, P-value 0.67%), 4- Common Stock Ranking ($r = 29.74\%$, P-value = 1.31%). Stage 2: Measuring the coefficient of correlation of financial measures and stock price volatility (Alpha 5%); five financial measures showed significant results, and these are A- fundamental measures: 1- Return on Assets ($r = 22\%$, P-value 1%), 2- Return on Equity ($r = 22\%$, P-value 0%). B- market measures: Price /Earnings ($r = -17\%$, P-value = 4%), 2- Price/Book Value ($r = 64\%$, P-value = 0%), 3- ROI ($r = 19\%$, P-value 2%).

Table 3. Insurance industry.

Financial Measure	Financial Measure Volatility			Financial Measure		
	N	Correlation	Significance	N	Correlation	Significance
Price /Earnings	92	-26.02%	1.22%	144	-17%	4%
Price /Book Value	94	62.54%	0.00%	155	64%	0%
Return on Assets				160	22%	1%
Return on Equity	113	22.65%	1.58%	160	22%	0%
Return on Investment	115	25.15%	0.67%	160	19%	2%
EBITDA / Assets	98	28.04%	0.52%			
Common Stk. Ranking	69	29.74%	1.31%			

Data output of real estate investment trusts industry (significant results) is reflected in Table 4. At a 5% level of significance, the coefficient of correlation of six financial measures volatility with that of the stock price showed a significant result: these are A- fundamental measures: 1- Return on Assets ($r = 32.13\%$, P-value 0.03%); 2- Return on Equity ($r = 19.64\%$, P-value 3.46%); 3- Tangible Financial Leverage ($r = 21.86\%$, P-value 0.45%). B- market measures: 1- Price/Book Value ($r = 26.30\%$, P-value = 0.40%); 2- Return on Investment ($r = -19.58\%$, P-value 2.93%); 3- Z Score ($r = 100\%$, P-value 0%). Stage 2: Measuring the coefficient of correlation of financial measures and stock price volatility (Alpha 5%), nine financial measures showed significant results, these are A- fundamental measures: 1- Return on Assets ($r = 31.20\%$, P-value 0%), 2- ROE ($r = 23.40\%$, P-value 0.30%); 3- Earnings Before Interest Taxes Depreciation & Amortization / Assets ($r = 35.40\%$, P-value 2.50%); 4- Total Asset Turn Over ($r = 14.70\%$, P-value 5.0%); 5- Tangible Financial Leverage ($r = 25.10\%$, P-value 0.10%); 6- Free CFL +Dividend/Debt ($r = 20.40\%$, P-value 1.0%); 7- Z Score ($r = 81.70\%$, P-value 4.70%). B- market measures: 1- Price/Book Value ($r = 17.30\%$, P-value = 2.30%); and 2- Return on Investment ($r = 20.10\%$, P-value 0.80%).

Table 4. Real estate investment trusts industry.

Financial Measure	Financial Measure Volatility			Financial Measure		
	N	Correlation	Significance	N	Correlation	Significance
Price/Book Value	118	26.30%	0.40%	172	17.30%	2.30%
Return on Assets	124	32.13%	0.03%	173	31.20%	0.00%
Return on Equity	116	19.64%	3.46%	163	23.40%	0.30%
Return on Investment	124	-19.58%	2.93%	173	20.10%	0.80%
EBITDA / Assets				40	35.40%	2.50%
Total Asset Turn Over				173	14.70%	5%
Tang Financial Leverage	167	21.86%	0.45%	167	25.10%	0.10%
Free CFL +Dividend/Debt				160	20.40%	1.00%
Z Score	2	100.00%	0.00%	6	81.70%	4.70%

Data output of dealers, brokers, & investment banks industry (significant results) is reflected in Table 5. At a 5% level of significance, the coefficient of correlation of one financial measure volatility with that of the stock price showed a significant result: it is a market measure: Common stock ranking ($r = 70.34\%$, P-value 0.16%). Stage 2: Measuring the coefficient of correlation of financial measures and 2008 stock price volatility (Alpha 5%): None of the financial measures showed significant results.

Table 5. Dealers, brokers, and investment banks industry.

Financial Measure	Financial Measure Volatility			Financial Measure		
	N	Correlation	Significance	N	Correlation	Significance
Common Stock Ranking	17	70.34%	0.16%			

Data output of thrift industry (significant results) is reflected in Table 6. At a 5% level of significance, the coefficient of correlation of six financial measure volatility with that of the stock price showed significant result; these are A- fundamental measures: 1- Return on assets ($r = 27.67\%$, P-value 0.29%); 2- Earnings Before Interest Taxes Interest Depreciation & Amortization / Assets ($r = 32.87\%$, P-value 0.05%); 3- Free CFL +Dividend/Debt ($r = -58.48\%$, P-value 3.58%). B- market measures: 1- Price/Book Value ($r = 78.46\%$, P-value = 0.00%); 2- Beta ($r = -16.61\%$, P-value 3.29%); 3- Cumulative price change ($r = 32.57\%$, P-value 0.01%). Stage 2: Measuring the coefficient of correlation of financial measures and 2008 stock price volatility (Alpha 5%): Nine financial measures showed significant results. these are: fundamental measures: 1- Earning / Retention ($r = 48.40\%$, P-value 4.90%); 2- Return on Assets ($r = 25.40\%$, P-value 0%); 3- Return on Equity ($r = 30.50\%$, P-value 0.0%); 4- Debt / Earnings Before Interest Taxes Depreciation & Amortization ($r = 20.60\%$, P-value 0.60%); 5- Earnings Before Interest Taxes Depreciation & Amortization / Assets ($r = 32.20\%$, P-value 0.00). B- market measures: 1- Price/Book Value ($r = 59.10\%$, P-value = 0.00%); 2- Beta ($r = -28.10\%$, P-value 0.00%); 3- Return on Investment ($r = 27.50\%$, P-value 0.00%); 4- Cumulative price change ($r = 32.60\%$, P-value 0.00%).

Table 6. Thrift industry.

Financial Measure	Financial Measure Volatility			Financial Measure		
	N	Correlation	Significance	N	Correlation	Significance
Price/Book Value	95	78.46%	0.00%	199	59.10%	0.00%
Beta	165	-16.61%	3.29%	202	-28.10%	0.00%
				17	48.40%	4.90%
Return on Assets	114	27.67%	0.29%	203	25.40%	0.00%
				202	30.50%	0.00%
				162	27.50%	0.00%
Cumulative price change	138	32.57%	0.01%	138	32.60%	0.00%
Debt / EBITDA				175	20.60%	0.60%
EBITDA / Assets	108	32.87%	0.05%	178	32.20%	0.00%
Free CFL+Dividends /Debt	13	-58.48%	3.58%			

5. Limitations of the Study

Limitations of the study are made of the following:

1- Study is based on a small sample because of missing data. 2- The study is based on one market incident (adjustment). 3- The study is based on one economic sector.

6. Conclusions and Recommendations

Study showed that the correlation coefficient of financial measures' volatilities with that of stock price volatility is significant. The following is a summary of observations:

In banking sector Table 7, correlation coefficient of Price/Book Value volatility with that of stock price volatility is significantly.

Table 7. Banking sector industry.

Financial Measure	Financial Measure's Volatility		
	N	Correlation	Significance
Price /Book Value	23	27%	0%

In finance companies' industry Table 8, the correlation coefficient of Price /Book Value; Return on Assets; and Earnings Before Interest Taxes Depreciation & Amortization/Assets volatilities are significantly correlated with the stock price's volatility.

Table 8. Finance companies industry.

Financial Measure	Financial Measure's Volatility		
	N	Correlation	Significance
Price /Book Value	38	79%	0%
Return on assets	48	62%	0%
EBITDA / Assets	44	-32%	3%

In the insurance industry Table 9, correlation coefficient of Price/Earnings, Price /Book Value, Return on Equity, and Return on Investment volatilities are significantly correlated with the stock price volatility.

Table 9. Insurance industry.

Financial Measure	Financial Measure's Volatility		
	N	Correlation	Significance
Price/Earnings	92	-26.02%	1.22%
Price/Book Value	94	62.54%	0.00%
Return on Equity	113	22.65%	1.58%
Return on Investment	115	25.15%	0.67%

In the real estate investment trust industry Table 10 the correlation coefficient of Price/Book Value, Return on Assets, Return on Equity, Return on Investment, Tangible Financial Leverage, and Z score volatilities are significantly correlated with stock price volatility.

Table 10. Real estate investment trust industry.

Financial Measure	Financial Measure's Volatility		
	N	Correlation	Significance
P/BV	118	26.30%	0.40%
ROA	124	32.13%	0.03%
ROE	116	19.64%	3.46%
Return on Investment	124	-19.58%	2.93%
Tang Financial Leverage	167	21.86%	0.45%
Z Score	2	100.00%	0.00%

In thrift industry Table 11, the correlation coefficient of Price/Book Value, Beta, Return on assets, Cumulative Price Change, Earnings Before Interest Taxes Depreciation & Amortization / assets, and Free CFL +Dividends/Debt volatilities are significantly correlated with the stock price volatility.

Table 11. Thrift industry.

Financial Measure	Financial Measure's Volatility		
	N	Correlation	Significance
Price/Book Value	95	78.46%	0.00%
Beta	165	-16.61%	3.29%
Return on assets	114	27.67%	0.29%
Cumulative price change	138	32.57%	0.01%
EBITDA / Assets	108	32.87%	0.05%
Free CFL +Dividends/Debt	13	-58.48%	3.58%

The measure with the highest consistency across the financial sector is the volatility of Price/Book ratio; it exhibited significant effect across five industries. It is worthy to note that Beta, a measure of systematic risk, showed significant effect (strong negative) only in one sector, which is thrift industry. In addition, none of the financial measures showed any effect in brokers, dealers, and investment bank sectors.

It is recommended to build on this study by exploring the effect of financial measures volatility on other economic sectors, using different time frames, and accounting for other variables such as firm size to address the reliability of the results. In addition, it is important to address the failure of Beta to explain stock price movements during market crash period. Finally, it is vital to address a key question; what are the real forces that are driving financial markets?

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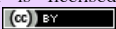
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