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Tactical allocation in falling stocks: Combining momentum and solvency ratio signals

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Tactical allocation in falling stocks: Combining momentum and solvency ratio signals

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Abstract

We identified 4500 US stocks with year ending losses of 50 percent or more during the 2001-2011 period. We screened our "falling knives" for financial strength to promote a greater likelihood of recovery and minimize any survivorship bias. We added the constraints of Altman Z-Scores, debt/equity ratio, and current ratio to our data set. We use GARCH-in-mean model to control the risk of the strategies. The results show consistent improvement of risk-standardized return profiles of the strategies in comparison with buy and hold strategy.

Keywords:
falling stocks, contrarian investing, financial strength ratios, GARCH in mean model, Augmented Dickey-Fuller test

JEL:
C58, G11, G17, G14

1. Introduction

There is a wide range of literature which deals with the concept of contrarian investment strategy in stock market. De Bondt and Thaler (1985) argued that investors overreact to both bad news and good news. Therefore, overreaction leads past losers to become underpriced and past winners to become overpriced. Fama and French (1992) concluded that size and price-to-book value together provide considerable explanatory power for future returns in U.S. markets. These results raised questions about the efficiency of the market if one accepts the capital asset pricing model, as Lakonishok, Schleifer and Vishny pointed out. In 1994, they published "Contrarian Investment, Extrapolation, and Risk". Using data from 1968 to 1994, they grouped U.S. stocks into value and glamour segments based on price-to-book, price-to-cash flow, and price-to earnings ratios, as well as sales growth. The researchers concluded that, for a broad range of definitions of "value" and "glamour", value stocks consistently outperformed glamour stocks by wide margins.

A Brandes Institute study (2005) defined "falling knives" as stocks that decline 60 percent or more during a 12-month period and measured their performance during three post-fall years. Surprisingly, the 1,904 stocks that satisfied Brandes' definition between 1980 and 2000 produced average annual returns that beat the market by 5.6 percent and 6.6 percent for two- and three-year holding periods, respectively. Using the same methodology Brandes Institute (2004) conducted examination of non-US stocks. In the three years after entering their study, for example, the average non-U.S. knife gained 10.8% per year while its MSCI country index advanced at a 5.3% annual rate. However, to the extent that falling knives can be thought of as deep value stocks, their performance should be less than surprising. This phenomenon was examined by Kochman and Tompkins (2008) who identified 979 stocks with year-ending losses of 60 percent or more during the 1993-2005 period. They screened the "falling knives" for financial strength to promote a greater likelihood of recovery and minimize any survivorship bias. When they added the constraint of Altman Z-Scores > 3.0, their data set produced two-year and three-year average annual returns that tripled their market counterparts. What is worth noting, they beat Brandes (2005) returns and lost no knives to bankruptcy and suffered no survivorship bias while Brandes (2005) lost nine percent of its knives and benefited from the bias.

The review of literature suggests that there is a great potential for abnormal returns when falling stocks are selected. However, the results of Kochman and Tompkins suggest that there is a need for the control of financial strength when we select stocks within "falling knives".

The aim of this paper is to explore which measure of financial stability should be used to select falling stocks that produce risk adjusted abnormal returns.

The structure of the paper is as follows: section 2 describes the data and the methodology, while in section 3 the empirical results are presented and analyzed. Section 4 concludes the paper and draws guidelines for future research.

2. Methodology and data

The portfolio formation and backtesting procedure has been conducted through screenstock123.com application[1]. The application is well-tested for its reliability by wide range of users. We screened the US database stocks. We excluded least liquid stocks[2] and closed-end funds. The average number of stocks during period 31/3/2001 - 05/11/2011 is 5376. The cumulative rate of return for this dataset is 145,8 %, which is considerably higher than S&P 500 rate of return which amounts to 8,2%. We screened for stocks that fulfill the following rules:

- suffer losses of 50 percent or more in relation to the benchmark which is index S&P 500 in last 500 trading days
- stock price is above $0.5

Having completed this screen we examine the performance of strategies depending on level of three conditions, which are called "ratios":

- debt/equity (the lowest levels within industry)
- current ratio (the highest levels within industry)
- Altman Z-Score (in range between 1.2 – 2.8)

The Debt/Equity ratio is calculated as follows:

$$\frac{\text{Short} - \text{term Debt} \; + \; \text{Long} - \text{term Debt due in one year} \; + \; \text{Long} - \text{term Debt}}{\text{Shareholders Equity}}$$

The Current ratio is calculated as follows:

$$\frac{\text{Current Assets}}{\text{Current Liabilities}}$$

We classify stocks according its position within industry with regards to the debt/equity and current ratio and divide the stocks into following groups of intervals:

- At least within 10% of the best in the industry
- At least within 15% of the best in the industry
- At least within 20% of the best in the industry
- At least within 25% of the best in the industry
- At least within 30% of the best in the industry
- At least within 35% of the best in the industry
- At least within 40% of the best in the industry
- At least within 45% of the best in the industry
- At least within 50% of the best in the industry

[1] http://www.stockscreen123.com
[2] Over-The-Counter stocks

The holding period is 4 weeks and then the portfolio is rebalanced. We apply slippage of 0,5% as a transaction costs measure. The number of stocks is determined by the constraints. The selected stocks have equal weights in the portfolio. We calculate cumulative returns for each strategy within the group and compare the distributions of the cumulative returns within each group. We use regression analysis to find out if there is significant linear relationship between cumulative returns and particular interval (level) of each strategy. Finally, we examine the riskiness of the strategies based on two metrics: standardized cumulative returns and GARCH in mean model.

The return differences of the strategies from their corresponding benchmarks are calculated and tested whether are stationary using the Augmented Dickey Fuller test (ADF). Stationarity implies that our data are properly selected and statistically adequate for econometric work. We calculate Augmented Dickey-Fuller (ADF) tests using average returns of each ratio. ADF test is based on 1 lag, without trend and constant model.

Volatility of trading strategies are controlled by GARCH in mean (GARCH-M) model introduced by Engle, Lilian and Robins (1987). The model is calculated for average returns for of the ratios using daily data. We employ this model to calculate the forecasted volatility of the return difference series of each ratio from its benchmark. The benchmark for the strategy is equally weighted index of all US based stocks after excluding least liquid stocks and closed-end funds. The model takes into consideration the time varying patterns of stock returns and allows for conditional variance to enter the mean (return) equation, thus acting as risk premium. We aggregate the returns for each ratio and compute GARCH in mean model using *average* returns of each *ratio*. We add another ratio – *High* Debt/Equity - to make a comparison of the tested strategies – to test whether higher proportion of debt has influence on risk premia. We classify stocks according its position within industry with regards to debt/equity and divide the stocks into following groups of intervals:

- At least within 10% of the worst in the industry (the highest ratio)
- At least within 20% of the worst in the industry (the highest ratio)
- At least within 30% of the worst in the industry (the highest ratio)

We are curious if there is any difference between high and low Debt/Equity strategies with regards to volatility of the strategies.

GARCH-M model is given by the specification:

$$y_t = \mu + \delta\sigma_{t-1} + u_t,\ u_t \sim N(0, \sigma_t^2) \quad (1)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1} + \beta\sigma_{t-1}^2 \quad (2)$$

If δ is positive and statistically significant, then increased risk, given by an increase in the conditional variance, leads to a rise in the mean return. Thus δ can be interpreted as a risk premium. In some empirical applications, the conditional variance term, σ_{t-1}^2, appears directly in the conditional mean equation, rather than in square root form, σ_{t-1}.

3. Results

Table 1 is a summary of the results of the strategies. Cum Ret is a cumulative return during period 31/3/2001-05/11/ 2011. The level indicates the higher bound of the specified intervals. Correlation coefficient represents the average dependence between respective ratio and the benchmark. The benchmark for the strategy presented below is equally weighted index of all US based stocks after excluding least liquid stocks and closed-end funds. The average number of stocks in this index is during the 31/3/2001-05/11/ 2011 is 5266. *The cumulative return for the benchmark is 205,64% and annualized return is 9,91%.* The following example reveals the logic behind the table. The highest return of 1722% is result of applying strategy which buy stocks that fall more than benchmark by at least 50% and have Altman Z-Score at least 2.2. Moving to right, the lowest return of 135% is a result of applying strategy which buy stocks that fall more than benchmark by at least 50% and its Current Ratio is at least within 10% of the highest in the industry.

Table 1. Cumulative returns of the strategies with respect to different financial strength ratios and its range.

Altman Z-Score		**Current Ratio**		**Total Debt/Total Equity Ratio**	
Level	Cum Ret	Level	Cum Ret	Level	Cum Ret
1,2	554%	0,1	135%	0,1	901%
1,4	427%	0,15	162%	0,15	825%
1,6	613%	0,2	208%	0,2	782%
1,8	1174%	0,25	482%	0,25	681%
2	803%	0,3	506%	0,3	749%
2,2	1722%	0,35	609%	0,35	669%
2,4	534%	0,4	641%	0,4	488%
2,6	68%	0,45	484%	0,45	484%
2,8	22%	0,5	568%	0,5	411%
Correlation :	83%		77%		78%
Average Cum Ret:	657%		422%		666%
Annualized return	61%		40%		62%

Figures 1, 2, 3 presents graphical representation of the results in Table 1.

Table 3 is a quantitative representations of the graphs. We use regression analysis to examine if there is significant linear relationship between cumulative returns and particular interval (level) of each strategy. The levels are sorted in ascending order. The quantitative analysis confirm us that there is strong and significant linear relationship between intervals with regards to strategies based on current ratio and debt/equity ratio. The lower interval for debt/equity ratio the higher cumulative return. However, the lower interval for current ratio the lower cumulative

return, that is quite surprising observation. Analyzing the regression for debt/equity ratio, there is increase in cumulative return by 60% (on average) if we decrease interval. In other words we can notice that on average if we select stocks from lower interval, the cumulative return increases by 60%.

Figure 1. Cumulative returns for the strategies based on Altman Z-Score.

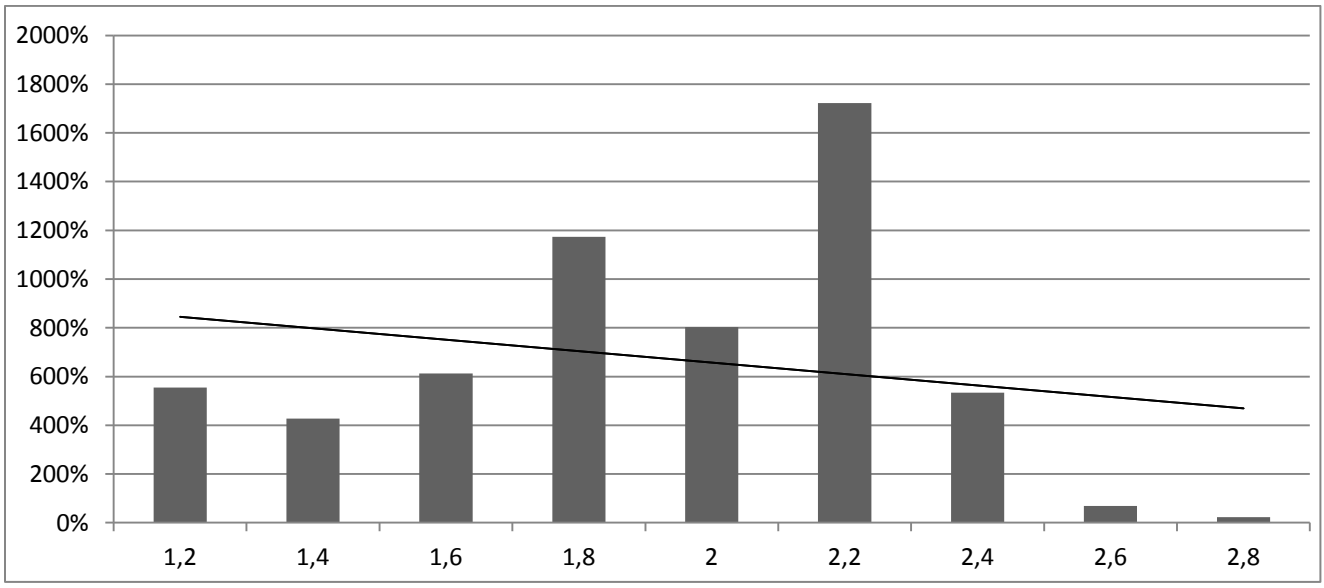


Figure 2. Cumulative returns for the strategies based on Current ratio.

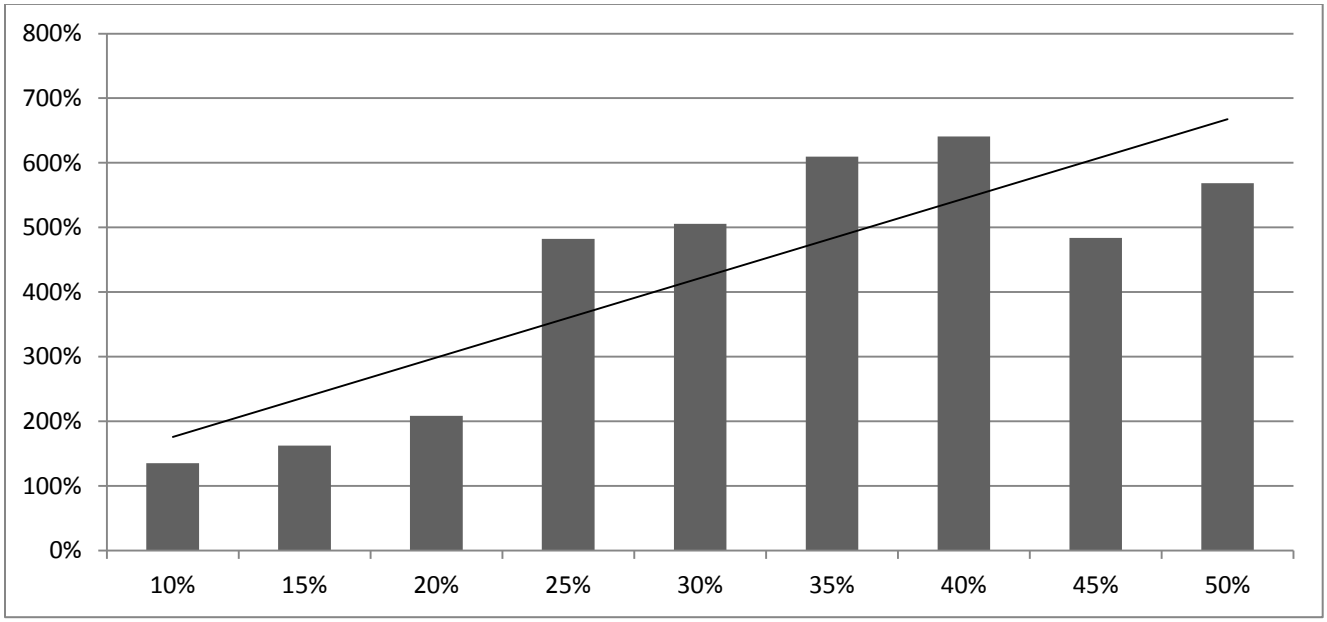


Figure 3. Cumulative returns for the strategies based on Debt/Equity ratio.

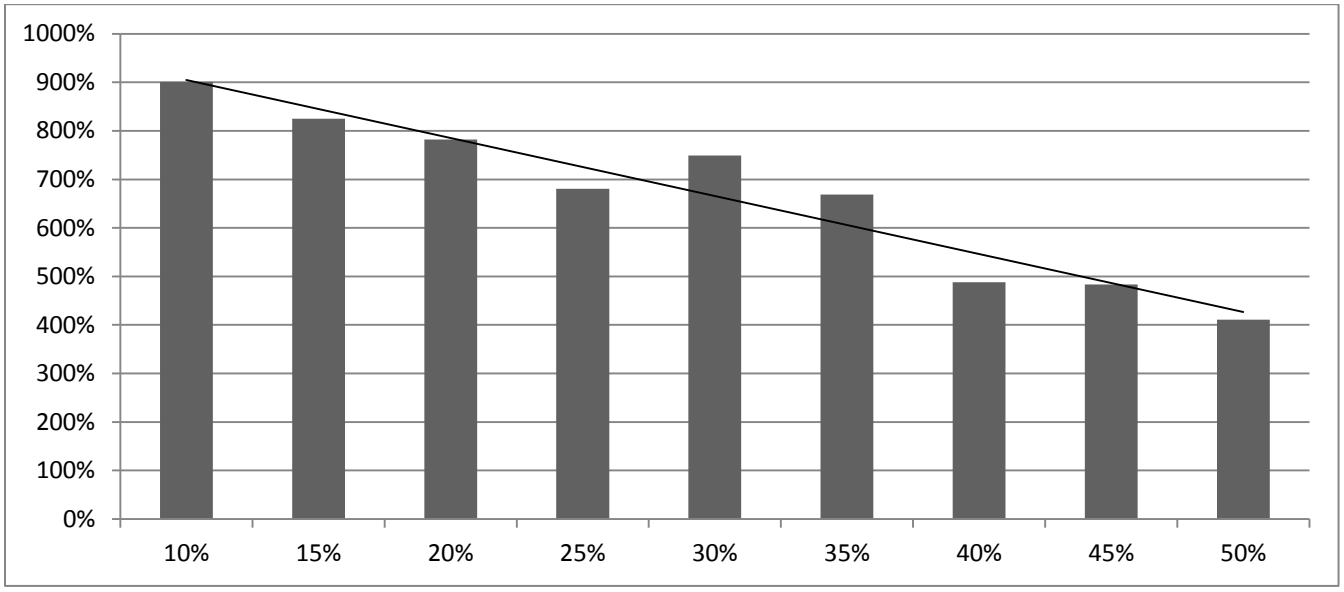


Table 3. Basic characteristics of the regressions that represent relationship between cumulative returns and particular interval within given strategy.

Independent variable:		Cumulative returns			
Dependent variable:		Level[3]			
Type of strategy:		*Altman Z-Score*			
R-squared: 0.06	coefficient	std. error	t-ratio	p-value	p-value (F)
const	8,92	4,00	2,23	0,06	0,53
level	-0,47	0,71	-0,66	0,53	
Type of strategy:		*Current Ratio*			
R-squared: 0.92	coefficient	std. error	t-ratio	p-value	p-value (F)
const	7,29	0,81	-8,98	0,00	0,00
level	0,62	0,14	-4,26	0,00	
Type of strategy:		*Debt/Equity*			
R-squared: 0.92	coefficient	std. error	t-ratio	p-value	p-value (F)
const	9,64	0,36	26,97	0,00	0,00
level	-0,60	0,06	-9,40	0,00	

[3] Ascending order

Figures 4 is the graphical representation of performance of the *average* cumulative returns for each ratio in relation to the benchmark which is equally weighted index of all US based stocks after excluding least liquid stocks and closed-end funds.

The figure 4 shows that there is a large difference between cumulative returns of the strategies and the benchmark. However, there is a need to examine the volatility of the returns. The first step is to calculate standardized cumulative returns.

Table 3 presents cumulative average returns of each group of strategy divided by monthly standard deviation.

Table 3. Standardized cumulative returns.

	Cum Ret / St. Dev.
Average - Altman Z-Score	49,62
Average - Current Ratio	33,67
Average - Debt/Equity Ratio	55,31
Benchmark	31,40

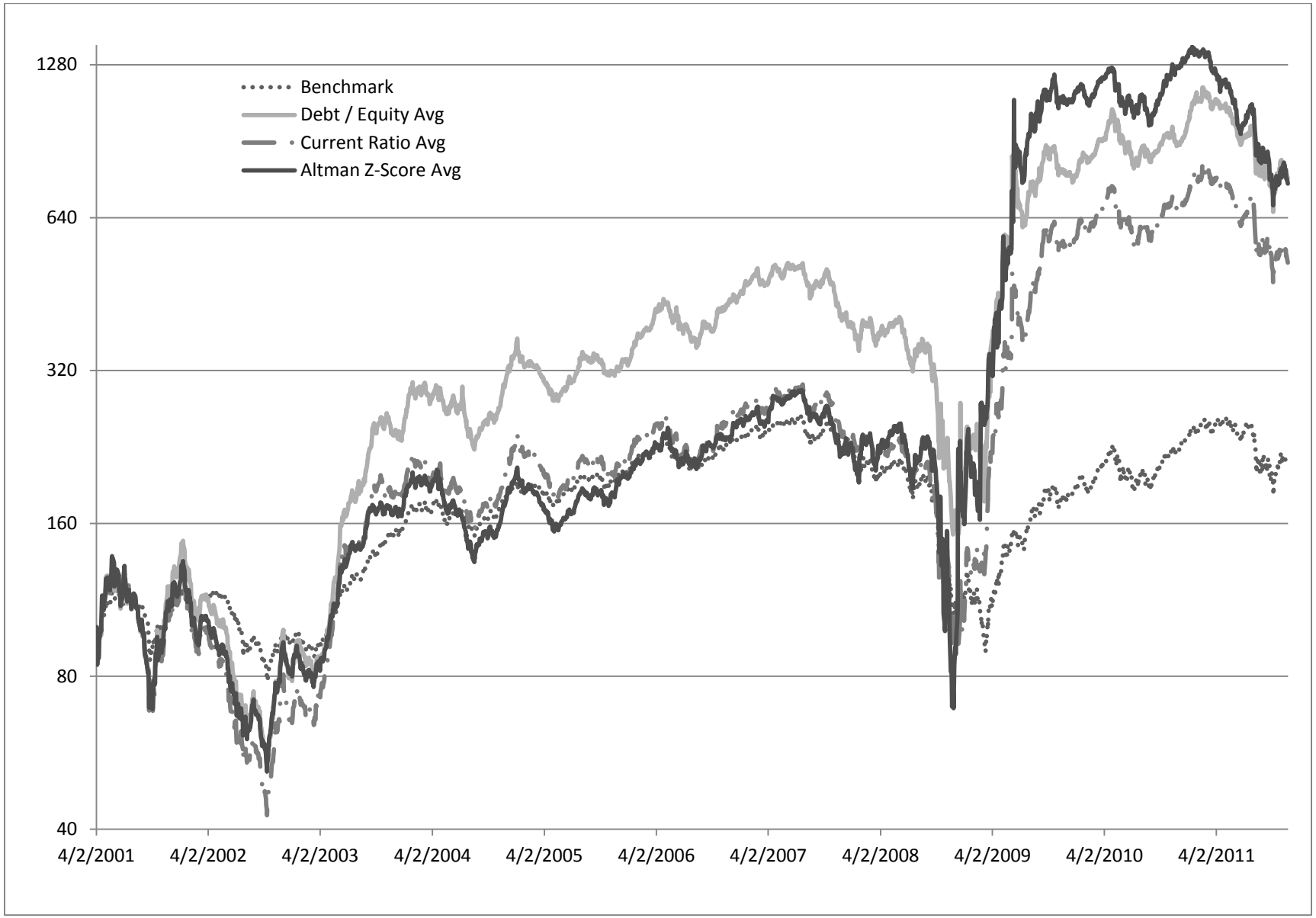
Finally, in table 4 we present volatility analysis of the strategies. We use *average* returns of each ratio.

In the case of ratios which stands for financial health of the stocks, the estimated parameters on the mean equation is not statistically significant. We would thus conclude that for these strategies' returns, there is no feedback from the conditional variance to the conditional mean. However, with regards to Average - High Debt/Equity, there is significant feedback from conditional variance on returns that conform our assumptions that this kind of strategy is relatively more risky.

Table 4. Test statistics and p-values of parameter δ - conditional variance – in equation (1) and ADF test.

	GARCH-M: t-value (p-value)	ADF: t-value (p-value)
Average - Altman Z-Score	0.779 (0.43)	-34,99 (0.00)
Average - Current Ratio	1.034 (0.30)	-35,56 (0.00)
Average - Debt/Equity Ratio	1.042 (0.30)	-32,85 (0.00)
Average - High Debt/Equity	2.113 (0.03)	-32,17 (0.00)

Figure 4. Average cumulative returns for each ratio and the benchmark. Logarithmic scale.



4. Conclusions

It is widely believed that falling stocks are very risky. The present study revealed that it is possible to make proper selection of these "risky" stocks to achieve higher return without significant feedback from volatility.

In this study we examine the effect of incorporating firm specific information on the performance of contrarian trading strategies based on buying "falling stocks". The portfolios are constructed using the www.stockscreen123.com platform, using stocks of firms traded in NYSE, NASDAQ and AMEX for period between 31/3/2001 and 05/11/ 2011.

The purpose of this study was to examine if certain financial stability factors have any impact on stock selection within group of "falling stocks". In particular we wanted to explore which measure of financial stability should be used to select falling stocks that produce risk adjusted abnormal returns.

We try to summarize the conclusions from this study and formulate some thoughts regarding further research.

First of all, the results confirm Kochman and Tompkins suggestion that there is a need for the control of financial strength. We use Altman Z-Score, Debt/Equity Ratio and Current Ratio as proxy for factors controlling financial stability.

Our findings suggest that the returns of the benchmark strategy is significantly lower in the tested period compared to the returns of the strategies based on Altman Z-Score, Debt/Equity Ratio and Current Ratio.

We find out that there is strong and significant linear relationship between intervals with regards to strategies based on current ratio and debt/equity ratio. The same conclusion is not valid for Altman Z-Score ratio but we can assume that the most profitable interval for this ratio is between 1.8 and 2.2.

The risk analysis of the strategies reveals that parameter of conditional volatility in the mean equation of GARCH in mean model is not significant which implies that there is no risk premia for higher returns. The same conclusion is drown analyzing standardized cumulative returns.

The analysis of profitability and the riskiness of the strategies imply that most efficient criterion for searching "falling stocks" is debt/equity ratio within industry. We find out that this kind of strategy has following characteristics: the highest standardized cumulative returns, insignificant parameter of conditional volatility in mean equation of GARCH in mean model and strong negative and significant linear relationship between intervals of this ratio.

Our study is by no means exhaustive and further research is required to ascertain various issues regarding the effect of firm "financial health" variables on the performance of contrarian strategies. A detailed analysis of "hidden" risk can be further explored. It would be worth to examine the optimal level for current ratio. We find that the higher level of the interval of this ratio, the higher cumulative return. However our analysis is cut for stocks that stands at least

within 50% of the best in the industry. It is likely that higher intervals can produce higher returns. Moreover, there is also possible to explore which macroeconomic conditions are favorable for the strategies based on the selected ratios and apply regime switching strategy to enhance cumulative returns and lower risk.

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