Can Put/Call Ratios Help Predict the Stock Market? An Empirical Examination[1)]

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1. Introduction

The purpose of this paper is two-fold: first, to test the hypothesis that put/call ratios help forecast stock market movement; second, to evaluate a contrarian trading strategy based on put/call ratios. It is widely accepted among professional market participants that put/call ratios can be used to time the market, especially as a contrarian sentiment indictor.[2)] The underlying premise is that put/call ratios mirror the market sentiment. Contrarian market participants, who use put/call ratios base their trading decisions on this indicator, look for extreme values of put/call ratios. When put/call ratios reach extremely high levels, contrarian market participants initiate bullish moves. In contrast, when put/call ratios reach extremely low levels, contrarian market participants initiate bearish moves.

This paper was motivated by two questions. First, can put/call ratios help forecast stock market movement? Second, do contrarian strategies based on put/call ratios really work? Answers to these questions have practical implications for market participants who try to use put/call ratios to time the market. In an attempt to answer these questions, I examined daily time series data on equity put/call ratios and the S&P 500 index over a 5-year period. A vector autoregressive model (VAR) was applied to the data. I experimented with a market-timing strategy that is based solely on equity put/call ratios. I found that put/call ratios have practically no predictive power on market movement, nor can they be an effective timing device.

The paper is organized as follows: Section 2 presents a brief discussion of the options market and put/call ratios. Section 3 discusses the methodology used in this research and section 4 discusses the data. Section 5 presents empirical results and section 6 presents the concluding remarks.

1) The author would like to thank David Schneider for proof-reading and polishing the manuscript.

2) The so-called principle of contrarian opinion is a casual empiricism that the vast majority of market participants are wrong more often than not in predicting the market. Following this line of thought, a contrarian market participant would first determine what most market participants are doing and then move in the opposite direction.

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2. Options Market and Equity Put/Call Ratios

Puts and calls are contracts between buyers and sellers in the options market. They are derivatives of some underlying securities such as stocks and bonds, or underlying commodities such as gold and corns. Specifically, the buyer of a put has the right (but not the obligation) to sell a specified amount of the underlying security (or commodity) at a specified strike price by a specified expiration date.[3] Meanwhile, the buyer of a call has the right (but not the obligation) to buy a specified amount of the underlying security (or commodity) at a specified strike price by a specified expiration date. The seller of a put (or call) option, however, is obligated to buy (or sell) the underlying security/commodity at the strike price when the buyer decides to exercise the option. Put/call ratios are simply the volume of puts traded on all the underlying securities (or commodities) divided by the volume of calls traded in a specific period.

Options are used by two types of market participants, those who hedge their positions against potential adverse market movements (relative to their positions) and those who speculate on potential market movements or lack of market movements. For example, a Japanese exporter, bearish about the dollar and expecting to receive US$100 million in three months, can buy US$100 million put options against the Japanese yen. This transaction hedges her long position in the dollar against a potential rise in the value of the yen in three months. An importer who needs to pay US$100 million in three months, however, may be bearish about the yen. Therefore, to hedge her long position in the yen, she wants to buy a US$100 million call. In either case, risk-neutral speculators sell the exporter put options and sell call options to the importer for a premium. If the dollar actually appreciates against the yen in three months, the exporter can sell her US$100 million at the prevailing market rate with her put option expiring worthlessly. The importer, however, exercises her option at the strike price (i.e., at the rate specified in her call option) which is lower than the prevailing rate.

There are two plausible explanations for different perceptions of the market. First, information is asymmetric among market participants. Second, even if there is assumed to be no private information among market participants, a piece of information available to the market may well be interpreted differently by different market participants. Those who are bullish would long calls whereas those who are bearish would long put on the underlying securities. This is the basis on which put/call ratios are used by market participants as a measure of market sentiment.

Apparently, the volumes of puts and calls traded on the options market each day may

3) This kind of options that can be exercised any time before or on the expiration date are known as American-style options. Another kind of commonly used options is European-style, which can only be exercised on the expiration date.

reflect market participants' sentiment with respect to where the market is heading over a certain period of time (even though the market may go in another direction). Thus, changes in put/call ratios may mirror changes in market participants' sentiment, which is the maintained hypothesis to be tested in this paper.

3. Methodology

The hypothesis that put/call ratios help forecast the market has no valid theoretical basis. It is simply a belief held by some market participants that this sentiment indicator has predictive power on the market. To test the validity of the purported causal relationship, one could regress the price variable on the put/call ratio variable. This approach, however, would be inappropriate, for the sentiment indicator may well be affected by observed market movement and therefore it may be endogenous itself. In addition, there is a need to account for the dynamics exhibited in the time series data. Therefore, it seems appropriate in this particular context that the hypothesized causal relationship (in the sense of Granger causality) may be tested by applying a bivariate autoregressive (VAR) model to the data.[4] In other words, testing the maintained hypothesis is tantamount to testing if put/call ratio changes Granger-cause market price changes.

The simple bivariate VAR model I used takes the following form:

(1) $\mathbf{y}_t = \mathbf{\Phi}_0 + \mathbf{\Phi}_1 \mathbf{y}_{t-1} + \ldots + \mathbf{\Phi}_q \mathbf{y}_{t-q} + \boldsymbol{\varepsilon}_t$,

where $\mathbf{y}_t$ is an (2×1) vector of values that 2 variables assume at time t, $\mathbf{y}$s on the right-hand side are (2×1) vector of the lagged values of the 2 variables, $\mathbf{\Phi}_0$ is a (2×1) vector of constants, $\mathbf{\Phi}$s are (2×2) matrices of coefficients of the lagged $\mathbf{y}$s, and $\boldsymbol{\varepsilon}_t$ is an (2×1) vector of error terms with $\boldsymbol{\varepsilon}_t \sim i.i.d.N(\mathbf{0}, \mathbf{\Omega})$ The variables used in the VAR model include daily price changes of the S&P 500 and daily put/call ratios.[5]

To evaluate the effectiveness of a contrarian trading strategy based on put/call ratios, I applied a simple and mechanical trading strategy based on the readings of put/call ratios. Specifically, a long position in the S&P 500 index is initiated when the reading of equity put/call ratios rises above 0.9.[6] The long position is then held for a specified period and is liquidated at the end of the holding period. To test the trading strategy one needs to determine whether the long position appreciates or depreciates at the end of the holding

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4) Granger causality is not to be interpreted in the conventional sense. Intuitively, if a variable x cannot help forecast another variable y, then x is said not to Granger-cause y. Formally, x fails to Granger-cause y if, $\forall s > 0$, $MSE\left[E(y_{t+s} | y_t, y_{t-1}, \ldots)\right] = MSE\left[E(y_{t+s} | y_t, y_{t-1}, \ldots, x_t, x_{t-1}, \ldots)\right]$. That is, x does not Granger-cause y if the mean squared error of the expectation of y at time t+s conditional on y's own past values is the same as the mean squared error of the y's conditional expectation on the past values of both y and x.

5) I experimented with put/call ratios in terms of daily rate of change as well as daily level (at the close) in order to determine if different treatments of this variable would have any impact on the estimation and testing.

6) See footnote 11 for the justification of this choice.

period. Therefore, testing the effectiveness of the contrarian strategy amounts to testing the following pair of hypotheses:

$$(2) \quad \begin{aligned} &H_0 : p = 0.5 \\ &H_1 : p > 0.5 \end{aligned}$$

where p is the proportion of those outcomes in which price appreciation occurs at the end of the holding period in all the observed outcomes (involving high readings of put/call ratios). If the null hypothesis is rejected in favor of the alternative, then there is evidence in favor of this strategy. That is, if long positions initiated on the basis of high readings of put/call ratios consistently result in price appreciation at the end of the holding period, the odds are better than 50% that price appreciation will result from applying this strategy. If, however, the null hypothesis is accepted, then one can conclude that this strategy is only as good as flipping a fair coin. The results of these exercises are presented in Section 5.

4. Data

The data set for the analysis was obtained from publicly available sources on the Internet. Specifically, the S&P 500 data were obtained from Yahoo Finance and Chicago Board of Options Exchange (CBOE). The data set contains daily data (open, high, low, and close) on the S&P 500 index and equity put/call ratios (only close) over a 5-year period from January 1997 till December 2002. The original price (levels) data are not stationary.[7] To ensure stationarity all the price series are converted to the first-difference form in logarithm. There are 1506 observations in total.[8] The descriptive statistics and histograms clearly indicate that daily price changes (defined as the first difference of log prices) exhibit similar behavioral patterns regardless what price data are used.[9] Price changes appear to be centered at 0% with slight left skews. Daily changes in put/call ratios are also centered at 0% with slight left skews. But they are more dispersed with standard deviation almost 20 times as large as those of price changes. (See Figures 1 through 6 and Table 1 for details.)

5. Results

5.1. The VAR Results

Empirical evidence in favor of the maintained hypothesis that put/call ratios have predictive power on stock market prices seems weak. A simple scatter plot of price changes against put/call ratio changes indicates that put/call ratio changes may not have any

7) Unite root tests are performed and the test statistics are as follows: -0.36929 (P-value: 0.99587, based on augmented weighted symmetric test), and -1.21672 (P-value: 0.90702, based on Dickey-Fuller test). Therefore, the null hypothesis that the series has a unit root cannot be rejected.

8) Since five lags and a first difference are used, the actual number of observations for model estimation is 1500.

9) Figures 7 through 12 show that prices at the open or at the close, at daily highs or at daily lows make practically no difference in capturing daily price movement.

correlation with price changes. (See Figure 12 for detail.) The bivariate 5-lag VAR model also offers weak, if not questionable, evidence in favor of the maintained hypothesis.[10)]Table 2A lists the estimated coefficients obtained from regressing price changes on the lagged values of price changes and put/call ratio changes. Table 2B lists those estimated coefficients obtained from regressing put/call ratio changes on the same set of the lagged values. The first equation in the model has R^2 being 0.1255, indicating the repressors do not have much explanatory power. In order for put/call ratio changes to Granger-cause price changes, the estimated coefficients of the lagged put/call ratios changes need to be significant. But only three out of five estimated coefficients of the lagged put/call ratio changes are individually significant (two at 5% level and one at 10% level). The joint F-test (Granger causality test) statistic (7.8927, P-value: 0.000) indicates that the null hypothesis, i.e., there is no Granger causality, can be rejected. This suggests that there is some evidence in favor of the maintained hypothesis that changes in put/call ratios may Granger-cause price changes.

In the second equation where put/call ratio changes are regressed on the right-hand side lagged variables four out of five estimated coefficients of the lagged price changes are individually significant (two at 5% level and two at 10% level). The higher R^2 (0.2588) is largely attributable to the significance of the lagged values of put/call ratio changes. The joint F-test (4.4310, P-value: 0.001) suggests that price changes also Granger-cause put/call ratio changes. This is not entirely surprising because market participants constantly update their assessment of the market conditions based not only on new information but on the stock market price movement. The coefficient estimates and test statistics suggest that there may be some correlation between price changes and put/call ratio changes, but evidence in favor of the maintained hypothesis appears to be weak. In order to ensure that the estimation and testing are robust to different treatment of the put/call ratio variable, I run the same model using put/call ratio level data. The results are very similar to those with first differenced data. (The coefficient estimates and test statistics are omitted.)

Impulse responses offer some further evidence that put/call ratio changes may not have much predictive power on the stock market movement. Table 3A lists the impulse response of price changes to Choleski factored shocks in both price changes and put/call ratio changes. The small magnitudes of impulse responses clearly indicate that shocks in put/call ratio changes have hardly any impact on market price changes and vice versa. (See Table 3B for details.)

10) Since there is no theoretical guidance for choosing the number of lags in this particular context, I simply decide arbitrarily on 5 lags, which corresponds to a typical 5-day trading week. I also experiment with other choices and the results seem to be invariant to lag choices.

5.2. The Contrarian Strategy Results

To evaluate the effectiveness of a contrarian trading strategy based on put/call ratios, I tested a simple and mechanical trading strategy based on the readings of put/call ratios. Put/call ratios are calculated after market close and market participants typically make their trading decisions based on previous day's put/call ratio data. Therefore, a long position in the S&P 500 index is initiated the day after the reading of equity put/call ratios rises above 0.9.[11] The long position is then held for a specified period and is liquidated at the end of the holding period. I experimented with four different holding periods (i.e., one-week through four-week holding period) and the results are given in Table 4. Each panel corresponds to a specific time frame for holding the position.[12]

The data in Table 4 indicate that the first three time frames, i.e., one-week to three-week holding periods, yield similar results. Approximately 63% of the times the strategy results in price appreciation. The four-week holding time, however, results in price appreciation approximately 80% of the times. Can these statistics be considered evidence in favor of this mechanical contrarian trading strategy? Not necessarily. With respect to the first three holding periods, my hypothesis test using these sample statistics fails to reject the null at 5% significance level.[13] Thus, this simple contrarian strategy does not seem to work, at least not with these time frames. My hypothesis test using the four-week holding time, however, rejects the null hypothesis in favor of the alternative at 5% significance level.[14] Therefore, it appears likely that this mechanical contrarian trading strategy would work with a longer time frame. Given that the motivation of this kind of contrarian trading strategy is to time and beat the market, the mixed evidence collected in this paper suggests that any attempt to use put/call ratios as a timing device does not seem likely to yield profitable results.

6. Concluding Remarks

The purpose of this short paper is to test the hypothesis that put/call ratios help forecast stock market movement, and to evaluate a contrarian trading strategy based on put/call ratios. I examined daily time series data on equity put/call ratios and the S&P 500 index over a 5-year period by applying a vector autoregressive model (VAR) to the data, and experimented with a market-timing strategy that is based solely on equity put/call ratios. The empirical evidence collected in this paper leads to the following conclusions: First,

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11) Over the 5-year-long sample period the reading of equity put/call ratios rose above 0.9 only 30 times, i.e., approximately 2% of the time. Therefore, a reading above this level may well be considered as "extreme" bearish levels.

12) The data are obtained assuming that positions are initiated at daily lows. Numbers listed in the first column are computed assuming that the positions are liquidated at daily lows, numbers in the second column are computed using daily highs, and numbers in the third column are computed using daily closes.

13) The one-tailed test yields $z = 1.4241$ and p-value = 0.0772.

14) The one-tailed test yields $z = 3.2863$ and p-value = 0.0005.

put/call ratios contain no valuable information about the direction of the stock market and, therefore, they have practically no predictive power. Second, put/call ratios are an ineffective timing device. Market participants who rely on the readings of put/call ratios for initiating positions may have a slightly better chance of success than relying on the toss of a coin.

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Table 1. Descriptive Statistics

	Mean	Std Dev	Minimum	Maximum
DLGC	0.00012919	0.013401	-0.071139	0.055744
DLGO	0.00010444	0.013129	-0.071127	0.057501
DLGH	0.00012273	0.010728	-0.041014	0.052655
DLGL	0.00010933	0.012898	-0.071963	0.066282
DLGA	0.00011610	0.010787	-0.049471	0.046019
RATIO	0.52154	0.15052	0.23800	1.20600
DLGR	0.00043718	0.20672	-0.95149	0.75835

	Sum	Variance	Skewness	Kurtosis
DLGC	0.19443	0.00017959	-0.059277	2.10683
DLGO	0.15719	0.00017238	-0.13446	2.16735
DLGH	0.18471	0.00011508	0.10143	1.60529
DLGL	0.16454	0.00016637	-0.22933	2.90359
DLGA	0.17473	0.00011636	-0.12497	1.26609
RATIO	784.92023	0.022657	1.07149	1.38641
DLGR	0.65795	0.042734	-0.32685	0.96181

	Median	1st Qrt	3rd Qrt	IQ Range
DLGC	0.00021315	-0.0073514	0.0079823	0.015334
DLGO	0.00014639	-0.0074461	0.0079992	0.015445
DLGH	0.000048161	-0.0059752	0.0059242	0.011899
DLGL	0.00069332	-0.0069788	0.0073445	0.014323
DLGA	0.00076389	-0.0063016	0.0065997	0.012901
RATIO	0.49174	0.40600	0.61000	0.20400
DLGR	0.0082816	-0.13005	0.13777	0.26782

Note:
DLGC = daily price changes based on the daily close
DLGO = daily price changes based on the daily open
DLGH = daily price changes based on the daily high
DLGL = daily price changes based on the daily low
DLGA = daily price changes based on the average of the daily high and the daily low
RATIO = put/call ratios at the market close
DLGR = daily changes in the put/call ratios

Table 2A.

Dependent variable: DLGA

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
DLGA(-1)	.262385	.029661	8.84620	[.000]
DLGA(-2)	-.154797	.030463	-5.08154	[.000]
DLGA(-3)	.020421	.030389	.671966	[.502]
DLGA(-4)	-.013374	.030354	-.440587	[.660]
DLGA(-5)	-.022928	.027771	-.825589	[.409]
DLGR(-1)	-.856800E-02	.167174E-02	-5.12519	[.000]
DLGR(-2)	-.110805E-02	.195856E-02	-.565747	[.572]
DLGR(-3)	-.557022E-02	.205293E-02	-2.71330	[.007]
DLGR(-4)	-.183386E-02	.192176E-02	-.954263	[.340]
DLGR(-5)	-.270880E-02	.156641E-02	-1.72930	[.084]
C	.102665E-03	.261750E-03	.392225	[.695]

Table 2B.

Dependent variable: DLGR

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
DLGA(-1)	-1.05291	.523370	-2.01178	[.044]
DLGA(-2)	1.18137	.537517	2.19783	[.028]
DLGA(-3)	.980942	.536228	1.82934	[.068]
DLGA(-4)	.567226	.535608	1.05903	[.290]
DLGA(-5)	.949229	.490026	1.93710	[.053]
DLGR(-1)	-.556078	.029498	-18.8512	[.000]
DLGR(-2)	-.490946	.034559	-14.2059	[.000]
DLGR(-3)	-.241754	.036224	-6.67381	[.000]
DLGR(-4)	-.166644	.033910	-4.91433	[.000]
DLGR(-5)	-.093474	.027640	-3.38187	[.001]
C	.575223E-03	.461863E-02	.124544	[.901]

Table 3A. Impulse Response of Market Price Changes to Choleski Factored Shocks

	In Price Changes	In P/C Ratio Changes
1	0.010134	0.00000
2	0.0034111	-0.0013348
3	-0.00090324	0.00021941
4	-0.00037072	-0.00027709
5	-0.00011338	-0.000061664
6	-0.00025853	-0.000062011
7	-0.00033041	0.00021749
8	-0.000031410	0.000042455
9	0.000041954	-0.000023446
10	0.000033276	-0.000015704

Table 3B. Impulse Response of Put/Call Ratio Changes to Choleski Factored Shocks

	In Price Changes	In P/C Ratio Changes
1	-0.087777	0.15579
2	0.038141	-0.086634
3	0.030265	-0.026906
4	0.00058759	0.018022
5	-0.0013607	-0.0025891
6	0.0053504	-0.0018337
7	-0.0085577	0.0090935
8	-0.0016024	-0.0043305
9	0.0029437	-0.0030128
10	-0.00020546	0.0023451

Table 4. THE S&P 500 Price Appreciation/Depreciation

One-Week Holding Period				Two-Week Holding Period			
Obs	Low	High	Close	obs	Low	High	Close
1	(0.1147)	(0.0442)	(0.1147)	1	(0.0993)	(0.0535)	(0.0535)
2	0.0991	0.1150	0.1085	2	0.1200	0.1316	0.1234
3	(0.0300)	(0.0118)	(0.0165)	3	0.0051	0.0215	0.0215
4	0.0183	0.0362	0.0228	4	0.0577	0.0922	0.0890
5	0.0794	0.1018	0.1018	5	0.1151	0.1351	0.1340
6	0.0588	0.0727	0.0710	6	0.0899	0.1048	0.0956
7	0.0180	0.0303	0.0251	7	0.0578	0.0698	0.0590
8	(0.0035)	0.0243	(0.0023)	8	(0.0197)	0.0090	(0.0186)
9	0.0516	0.1054	0.1054	9	0.0248	0.0625	0.0262
10	(0.0454)	(0.0154)	(0.0207)	10	(0.0360)	(0.0064)	(0.0344)
11	(0.0022)	0.0160	0.0141	11	(0.0306)	(0.0036)	(0.0286)
12	(0.0146)	0.0175	(0.0140)	12	(0.0536)	(0.0157)	(0.0459)
13	0.0195	0.0472	0.0235	13	0.0203	0.0425	0.0273
14	0.0687	0.0933	0.0888	14	0.0950	0.1129	0.1122
15	0.0425	0.0553	0.0486	15	0.0976	0.1083	0.0976
16	(0.0058)	0.0201	0.0140	16	0.0561	0.0651	0.0614
17	(0.0112)	(0.0003)	(0.0009)	17	(0.0317)	0.0239	0.0237
18	0.0139	0.0300	0.0171	18	(0.0008)	0.0160	0.0121
19	(0.0317)	(0.0052)	(0.0287)	19	(0.0065)	0.0196	(0.0018)
20	(0.0061)	0.0112	0.0048	20	(0.0084)	0.0195	(0.0011)
21	0.0256	0.0365	0.0336	21	0.0024	0.0189	0.0189
22	0.0148	0.0223	0.0157	22	(0.0275)	(0.0048)	(0.0241)
23	0.0227	0.0517	0.0232	23	0.0259	0.0357	0.0309
24	(0.0313)	(0.0173)	(0.0298)	24	(0.0009)	0.0103	0.0029
25	0.0188	0.0278	0.0230	25	(0.0076)	0.0145	0.0142
26	0.0276	0.0397	0.0378	26	0.0023	0.0220	0.0029
27	(0.0363)	(0.0061)	(0.0080)	27	(0.0581)	(0.0290)	(0.0570)
28	(0.0630)	(0.0448)	(0.0609)	28	(0.0683)	(0.0280)	(0.0280)
29	0.0150	0.0619	0.0519	29	0.0913	0.1166	0.1137
30	(0.0105)	(0.0057)	(0.0103)	30	(0.0225)	0.0081	0.0081

Note: Negative numbers are in parentheses.

Table 4. THE S&P 500 Price Appreciation/Depreciation (Continue)

Three-Week Holding Period

obs	Low	High	Close
1	(0.0554)	(0.0401)	(0.0403)
2	0.1394	0.1581	0.1528
3	0.0239	0.0332	0.0267
4	0.0691	0.0985	0.0979
5	0.1349	0.1601	0.1555
6	0.1118	0.1246	0.1240
7	0.0666	0.0795	0.0770
8	(0.0759)	(0.0538)	(0.0720)
9	0.0973	0.1172	0.1113
10	(0.0952)	(0.0705)	(0.0940)
11	(0.0883)	(0.0434)	(0.0465)
12	(0.0394)	0.0050	(0.0045)
13	0.0423	0.0707	0.0469
14	0.0954	0.1342	0.1342
15	0.1054	0.1193	0.1162
16	0.0179	0.0468	0.0405
17	(0.0223)	(0.0019)	(0.0023)
18	0.0198	0.0333	0.0241
19	(0.0548)	(0.0328)	(0.0451)
20	(0.0181)	(0.0009)	(0.0084)
21	0.0375	0.0467	0.0406
22	(0.1064)	(0.0609)	(0.1052)
23	0.0046	0.0210	0.0067
24	(0.0350)	(0.0174)	(0.0211)
25	0.0182	0.0374	0.0252
26	0.0269	0.0406	0.0269
27	(0.1270)	(0.0867)	(0.1029)
28	(0.1065)	(0.0728)	(0.0846)
29	0.1044	0.1305	0.1304

Four-Week Holding Period

obs	Low	High	Close
1	(0.0549)	(0.0438)	(0.0478)
2	0.1869	0.1975	0.1972
3	0.0562	0.0704	0.0663
4	0.0934	0.1244	0.0939
5	0.1191	0.1384	0.1363
6	0.1037	0.1246	0.1239
7	0.0770	0.0847	0.0814
8	(0.1800)	(0.1475)	(0.1783)
9	0.1401	0.1696	0.1690
10	(0.0013)	0.0210	0.0031
11	0.0227	0.0501	0.0428
12	0.0328	0.0567	0.0540
13	0.0291	0.0488	0.0488
14	0.0806	0.1160	0.0820
15	0.1285	0.1337	0.1303
16	0.0184	0.0364	0.0198
17	0.0084	0.0276	0.0240
18	0.0243	0.0354	0.0336
19	0.0042	0.0233	0.0091
20	0.0189	0.0393	0.0387
21	0.0110	0.0328	0.0129
22	(0.1647)	(0.1314)	(0.1357)
23	0.0405	0.0702	0.0599
24	(0.0041)	0.0166	0.0166
25	0.0578	0.0764	0.0741
26	0.0676	0.0837	0.0740
27	(0.0560)	(0.0259)	(0.0537)
28	(0.0284)	0.0102	0.0100
29	0.1053	0.1377	0.1346

Note: Negative numbers are in parentheses.

Figure 1.

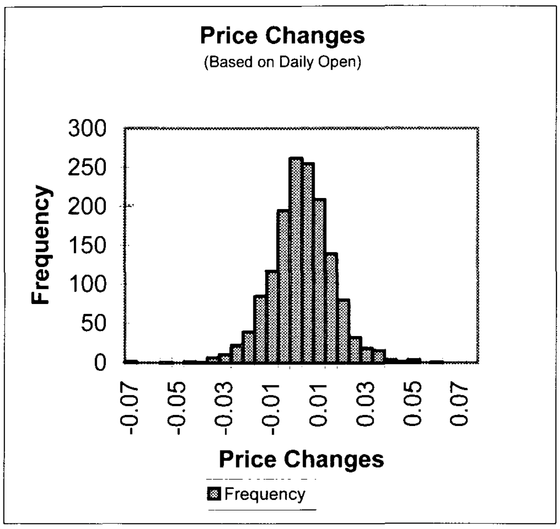


Figure 2.

Figure 3.

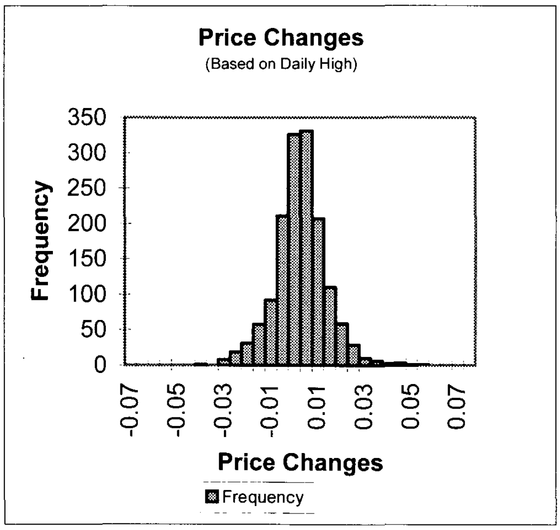
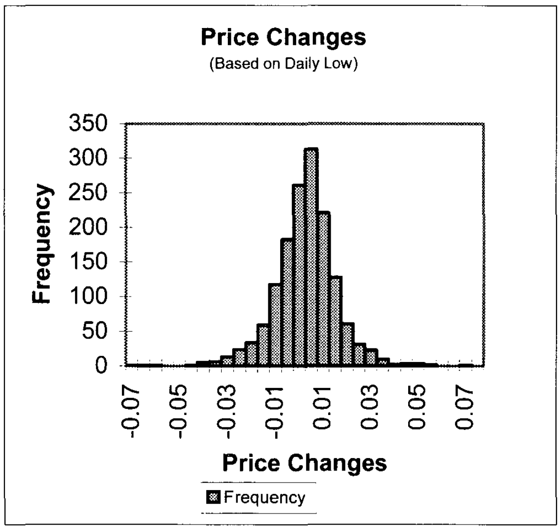


Figure 4.



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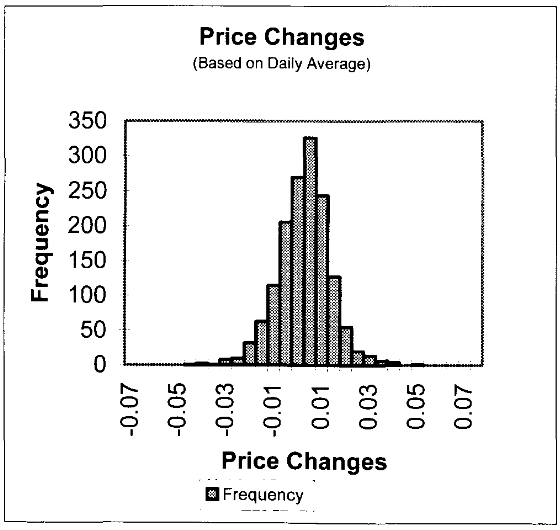
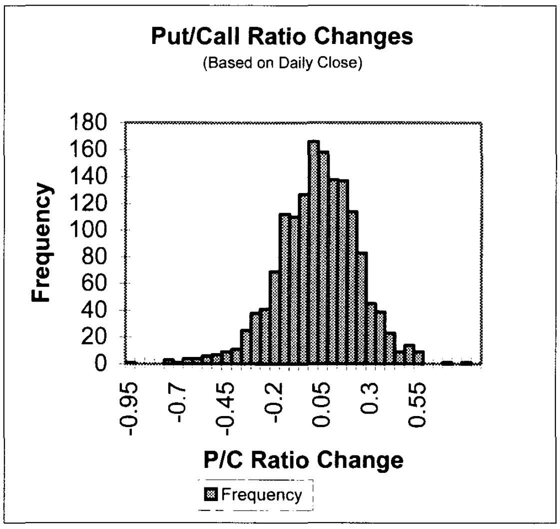


Figure 6.



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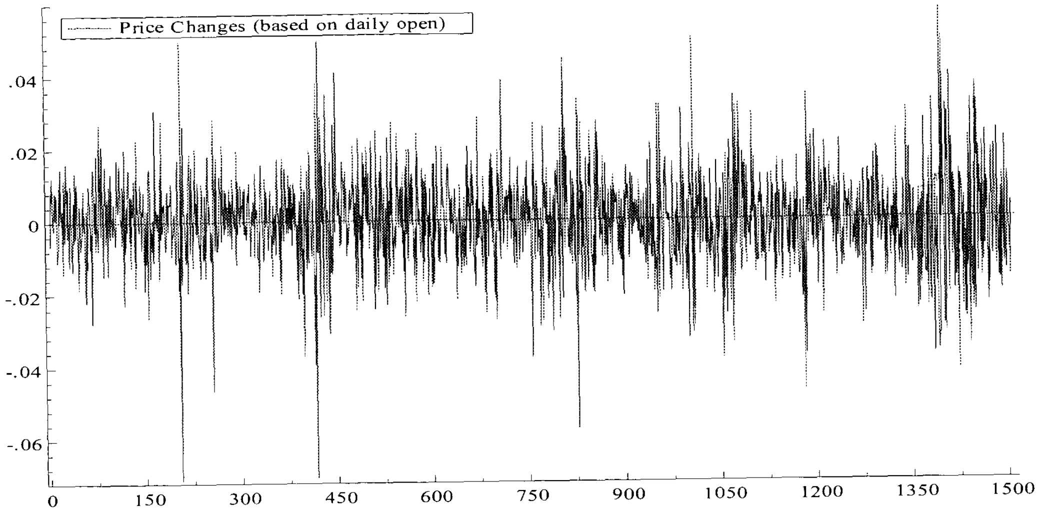


Figure 8.

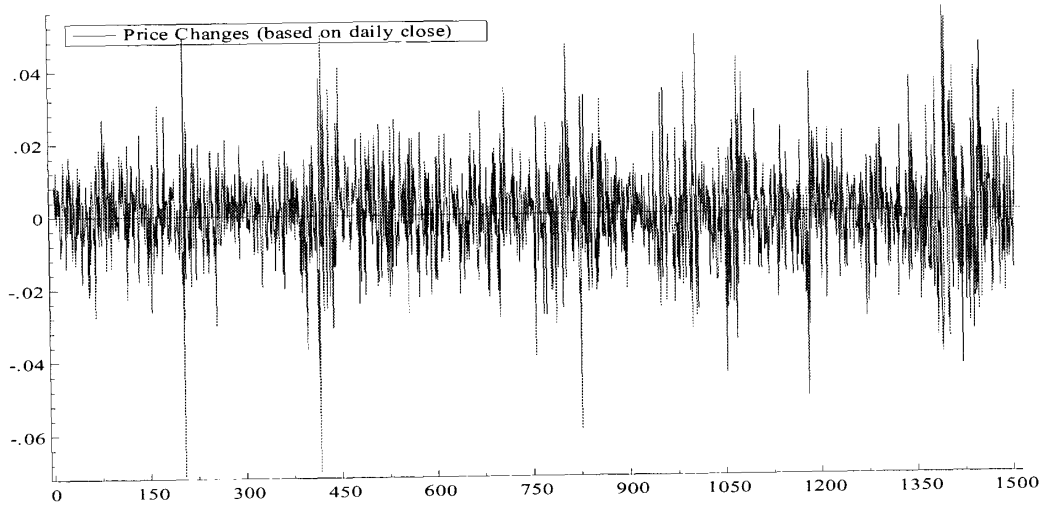


Figure 9.

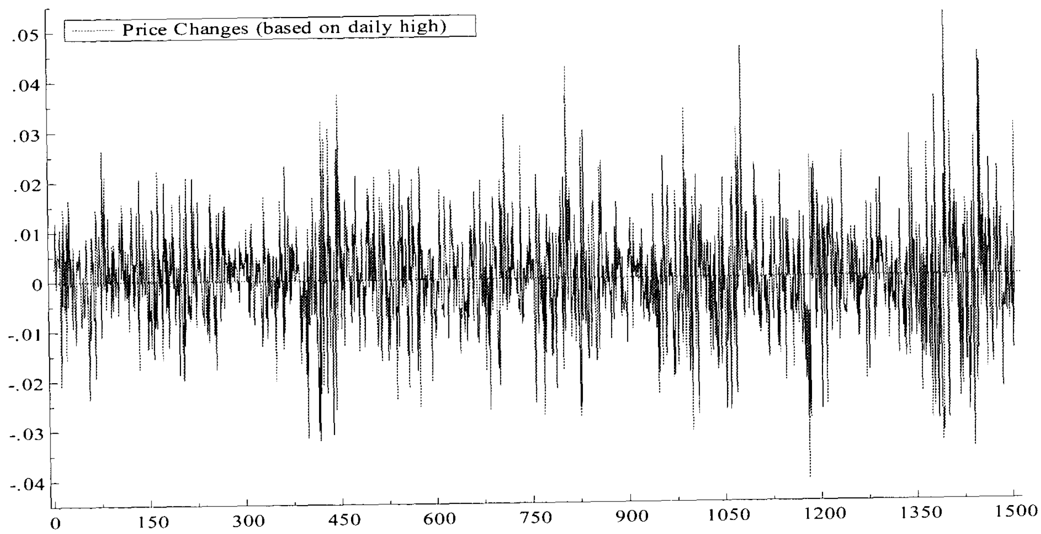


Figure 10.

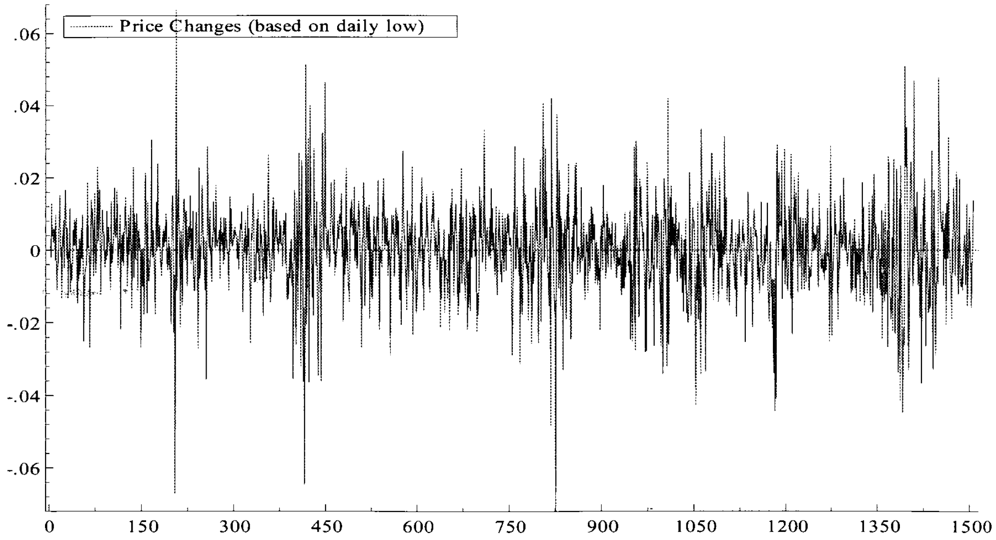


Figure 11.

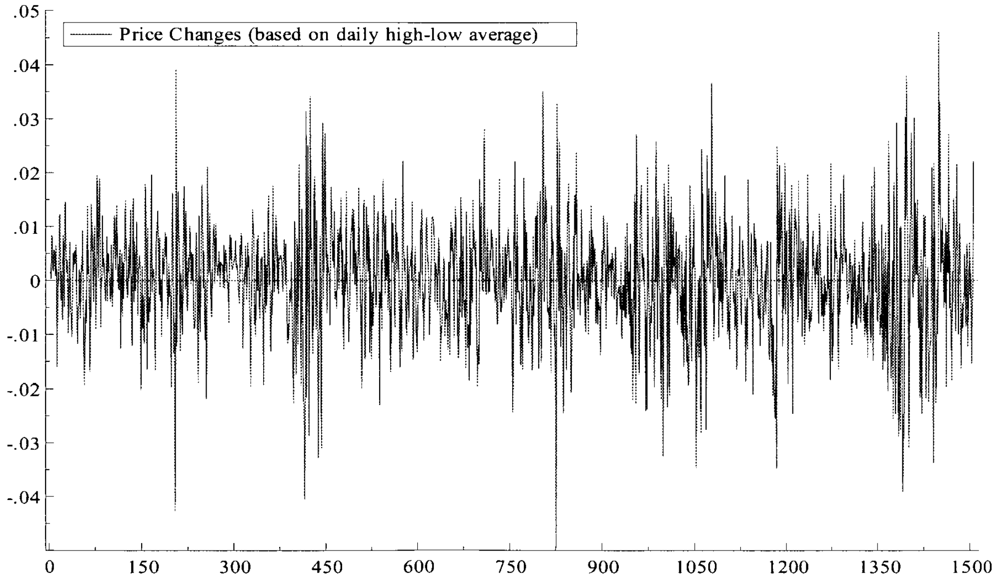
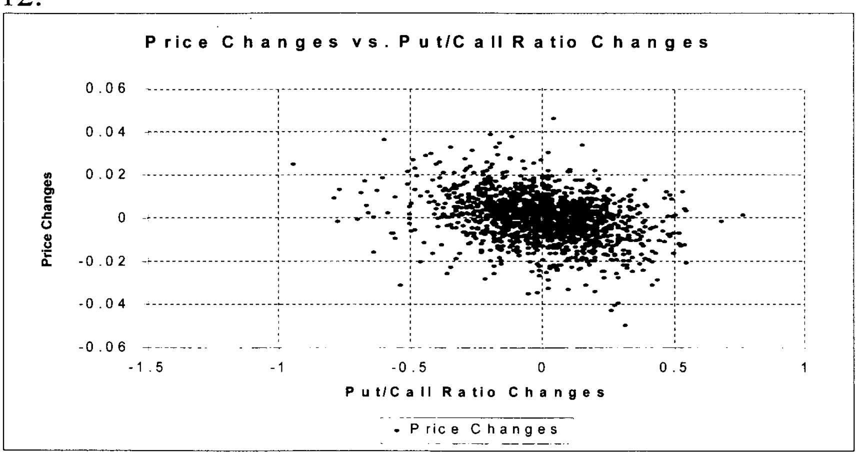


Figure 12.



Abstract

The purpose of this short paper is to test the hypothesis that put/call ratios help forecast stock market movement, and to evaluate a contrarian trading strategy based on put/call ratios. My tests indicate that put/call ratios as a contrarian sentiment indicator contain little valuable information about the direction of the stock market, and are an ineffective market-timing device.