Stock Return Predictability And Economic Value Of Market Timing

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ABSTRACT

We examine different models of stock market predictability; namely, the Campbell-Shiller (1998) and the Federal Reserve-type models. We find both models to have similar predictive power. We also study possible economic benefits of these models and the Saletta (2006) Emotion Factor model in timing the market. Our findings show that under a contrarian investment approach, the Federal Reserve-type model fares better, but under a momentum investment strategy, the emotion factor outperforms all others. Our findings suggest that market timing strategies provide better economic benefits than a buy-and-hold strategy; thus, offer considerable implications for investors to attempt to time the market.

JEL Classification: G11, G14
Keywords: Market Timing, Stock Return, Emotion Factor, investment strategy

INTRODUCTION

The finance literature has long assumed that the U.S. stock market is informationally efficient. However, more recent studies [see Jirasakuldech, Emekter, and Lee (2008), Ito and Sugiyama (2009), Hammami (2011), Lim and Luo (2012), Hammami (2013), among others] have questioned the validity of such assumptions and have offered evidence of stock market inefficiency, even in developed markets. Opponents of the theory of market efficiency [see Benjamin Graham (1959), Bondt and Thaler (1985), Bernstein (1985), Schnusenberg and Madura (2001), among others] explain their findings by asserting that investors' behavior outweighs reasoning in investment decisions. They argue that investors tend to over-react to news, which in turn causes stock prices to drift from their fundamental values for a certain period of time. This security mispricing anomaly offers arbitrage opportunities for investors and enables them to time the market for better profits. For instance, the Campbell and Shiller (1998) mean reversion models appear to predict stock returns well, and the Federal Reserve-type models do even better at predicting future returns (Malkiel 2004). This implies that the market may not be efficient and that investors can make abnormal excess returns using market timing strategies.

Malkiel (2004) examines this hypothesis using simulated returns based on recursive regression models and reports a lower Sharpe ratio and a higher total dollar return for the buy and hold strategy compared to other active strategies. The main conclusion of the paper, that is of the superiority of the buy and hold strategy, however, is based on the total dollar return, a naïve measure of performance, instead of the risk-adjusted Sharpe ratio. Thus, the findings of Malkiel (2004) would be different should he use the Sharpe ratio, not the total dollar return. Furthermore, it is plausible, then, that the higher total dollar return of the buy-and-hold strategy may have stemmed from lower transaction costs (assumed to be 0.1%), as well as the higher risk associated with a full investment in S&P500 index (particularly during economic downturns).

In this study, we revisit the performance of the Campbell-Shiller (CS) mean reverting and Federal Reserve-type (FR) models of predicting future stock returns. The objective of this study is twofold. First, to expand Malkiel's study by assessing the stock return predictability of the above two types of models, using selected international equity market indexes. Contrary to Malkiel's findings that the FR-type models have better predictability of stock returns, we find that the FR-type model and the CS models have

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similar predictive power of future returns. This difference in findings could possibly be due to the different time periods used. The second objective is to evaluate the performance of market timing strategies based on the above two types of models and to compare them with a buy-and-hold strategy.

In this endeavor, we extend the work of Malkiel in two ways. First, not only do we allow switching between stocks and bonds using a contrarian investment approach as in Malkiel's study, but we further examine results using a momentum investment approach. A "contrarian" investment strategy is one that switches from investing in stock markets to bond markets if current valuation levels are one standard deviation or more above predicted levels, and switches from bond markets to stock markets if current valuation levels are one standard deviation or more below predicted levels. By contrast, a "momentum" investment strategy is one that follows the flow of markets and switches from investing in stock markets to bond markets if current valuation levels are one standard deviation or more below predicted levels, and switches from bonds to stocks if current valuation levels are one standard deviation or more above predicted levels. Second, we use a different criterion of market timing that detects stock market over- and under-reaction to information. This criterion, referred to by Saletta (2006) as the "emotion factor," takes into account the difference between the long-term growth of the company and its annual stock price range (difference between high and low prices). This factor is important as it detects investor sentiment.

We assume a $100 investment is made every quarter over a ten-year period: 1986 Q1 – 2006 Q4. We use alternative investment strategies based on recursive regression models, as suggested by Malkiel (2004). The findings show that while the FR-type model outperforms all other models under a contrarian investment strategy, the Emotion Factor fares better under a momentum investment approach. Since the Emotion Factor model is calculated as the ratio of the percentage change in quarterly stock price to 5-year expected growth rate, a momentum player who follows the flow of markets will be able to time the market based on the market expectation of a stock's future growth. This result stands robust when a one-time (instead of multiple) investment of $100 is made at the beginning of the ten-year period.

Our research is in line with other studies showing that the mean-reverting component of stock prices implies the existence of predictability of long-horizon returns (Fama and French 1988a, Bekaert and Hodrick 1992, Campbell and Shiller 1998) and that some predictability comes from the tendency of returns to fluctuate with real interest rates (Malkiel 2004). This may have important implications to active investors who attempt to time the market.

RELATED LITERATURE

The concept of market efficiency can be traced to the opening paragraph in Bachelier's (1900) dissertation, "past, present and even discounted future events are reflected in market price, but often show no apparent relation to price changes." The concept of market efficiency has been central to finance for over fifty years, and the debate of market efficiency has been examined by researchers for more than three decades[1]. But only recent studies have offered evidence of stock and bond market inefficiency, even in developed markets.

For instance, Jirasakuldech et al. (2008) find that abnormal returns on low-grade corporate bonds and large- and small-capital markets in the U. S. do exist. The opponents of market efficiency assert that investors' behavior outweighs reasoning; thus, investors tend to under- or over-react to news, which in turn causes stock prices to drift from their fundamental values, at least over a certain period of time. Benjamin Graham (1959) indicates that "the interval required for a substantial undervaluation to correct itself averages 1½ to 2 ½ years." Bondt and Thaler (1985) provide empirical evidence supporting the over-reaction hypothesis. Further, they find that subsequent price reversals are more profound during the second and third years. Bernstein (1985) agrees that the long-term price overshoot and subsequent long-term reversals indicate the long-run market inefficiency. But he argues that the market is fairly efficient in

[1] For a detailed review of market efficiency, see Dimson and Mussavian (1998), A Brief History of Market Efficiency.

the short run. Schnusenberg and Madura (2001) examine the short-term over- and under-reaction of six U.S. stock market indexes and find evidence of a one-day under-reaction following the market index increase or decline for all six indexes and a sixty-day under-reaction for winners. They also find that there is a correction to over-reaction for losers when the subsequent period is extended to sixty days. Contrary to the conventional random-walk theory that stock price changes are not predictable, the under- and over-reaction phenomenon offers arbitrage opportunities for investors to time the market in order to profit from such security mispricing.

In order to time the market, investors must identify predictors of future price movements. In this line of study, many researchers use simple efficient-market models and have documented that price earnings (P/E) ratios, dividend yields, short-term interest rates, default spreads, and yields in the term structure of interest rates have explanatory power in forecasting future dividend growth, future earnings growth, and stock returns in equity markets [See Basu (1977), Rozeff(1984), Shiller (1984), Fama & French (1988b), Campbell & Shiller (1988), Hodrick (1992), Breen, Glosten, and Jagannathan(1989), among others]. For example, Basu (1977) shows that P/E ratios may be indicators of future stock returns associated with investors' over-reaction. Fama & French (1988b) find that the dividend-price ratio explains 21.9% of the variance of 4-year real returns. Campbell and Shiller (1988) also show evidence that a long moving average of real earnings is an important predictor in forecasting future real dividends and that the earnings-price ratio can predict stock returns. Bekaert and Hodrick (1992) find that a 1% increase in dividend yields implies a 2-4% per annum increase in expected returns over the following four years.

Using monthly returns for all New York Stock Exchange (NYSE) stocks for the 1926-1985 period, Fama and French (1988a) find a U-shape first-order autocorrelations of stock returns. The autocorrelations become negative for 2-year returns, reach minimum values for 3-5 year returns, and then become insignificant for longer return horizons. This mean-reverting component of stock prices suggests the existence of predictability for long-horizon returns. Bekaert and Hodrick (1992) also find evidence of long-horizon mean reversion in stock prices in the U.S. equity market. Further, CS (1998) show that P/E ratios and dividend-price (D/P) ratios do poorly in forecasting future dividend growth and future earnings growth but are useful in forecasting future stock returns. They assert that with long-term growth rates relatively stable over time, P/E and D/P ratios help predict future stock returns. CS (1998, 2001) propose mean-reversion models implying that if stock prices are pretty high relative to P/E and D/P ratios, then it is expected that stock prices will eventually fall to bring these ratios back to more normal, historical levels. Based on the evidence from their mean-reversion models, they correctly predict a poor long-term outlook for a 10-year period starting in 2000 for the U.S. and some other stock markets.

The various versions of empirical models that reflect the relationship between P/E and the 10-year Treasury interest rate are generally called the FR-type models. The basic FR model regresses earnings-price (E/P) ratios on nominal 10-year Treasury yields. The expanded FR model regresses E/P ratios on nominal 10-year Treasury yields and price-to-cost ratios. As suggested by Mueller (2001), the price-cost ratio may serve as a proxy for expected profit margins. This line of research finds that changes in market interest rates cause changes in P/E and D/P ratios. Thus, predictability comes from the tendency of returns to fluctuate with real interest rates (Malkiel 2004). While CS (1998)'s mean reversion models and the FR-type models show predictability of future returns, Malkiel (2004) finds that the FR type models are "far more effective in predicting both future returns and excess future returns than is the simple Campbell-Shiller mean reversion model." This implies that the market may not be efficient and that investors can make abnormal excess returns by using market timing strategies based on such models.

There exists a certain amount of short-run positive serial correlation and longer run negative serial correlation in stock returns (Malkiel 2004). A momentum investment strategy takes advantage of the short-run positive serial correlation, whereas a mean reversion strategy targets the longer run negative serial correlation. To further examine the stock return predictability and economic value of market timing, we expand the prior study in mainly two ways. First, we incorporate the Emotion Factor model (Saletta 2006), which, to our knowledge, has not been empirically tested. This emotion factor reflects investor sentiments by testing whether changes in stock prices are synchronized with the long-term expected growth rates. Second, we apply not only a contrarian investment strategy but also a momentum strategy to the CS mean reversion models and the FR-type models. Using only one type of investment strategy may not fully capture any potential benefit from the models tested.

METHODOLOGY AND DATA

In this study we test the stock return predictability of two models, namely the CS mean reversion and the FR-type models.

For the CS mean reversion D/P and P/E models, we examine the following relationships:

$$r_{t+n} = f(\frac{D_t}{P_t}) \tag{1}$$

$$r^e{}_{t+n} = f(\frac{D_t}{P_t}) \tag{2}$$

$$r_{t+n} = f(\frac{P_t}{E_t}) \tag{3}$$

$$r^e{}_{t+n} = f(\frac{P_t}{E_t}) \tag{4}$$

where, r_{t+n} is the future return with $n = 3,4,5$, where $r^e{}_{t+n}$ is the future excess return defined as $r^e{}_{t+n} = r_{t+n} - r_{f,t+n}$ and $r_{f,t+n}$ is the future risk-free rate, $\frac{D_t}{P_t}$ is the dividend yield, and $\frac{P_t}{E_t}$ is the price-earnings ratio. The R-squares of the above equations are used as the measure of return predictability of such models.

For the FR-type model, we examine the following relationships:

$$r_{t+n} = f(\varepsilon_t) \tag{5}$$

$$r^e{}_{t+n} = f(\varepsilon_t) \tag{6}$$

where ε_t is the residual from estimating the P/E ratio using an interest rate model (hence the FR-type model) as follows:

$$\frac{P_t}{E_t} = f(i_{10}, \frac{PPI_f}{PPI_r}) \tag{7}$$

where i_{10} is the real 10-year Treasury yield and where $\frac{PPI_f}{PPI_r}$ is the price-cost ratio, measured as the producer price index of finished goods to the producer price index of raw material and used as a proxy for expected profit margin as in Mueller's work (2001).

First, we test the stock return predictability of these two types of models in the U.S. market, using the S&P500 index. We also examine the predictability of the CS mean reversion models, using selected international stock indexes. Such indexes, namely Latin America Index, Asia Index, Europe Index, and Middle East and Africa Index, are constructed by using multiple local country indexes. Each international stock index includes a different number of local country indexes. For instance, Latin America Index includes indexes of Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela. Since there is no readily available information on risk-free rates based on multiple countries, we test the FR-type model only in the case of the U.S. market.

Second, given the stock return predictability both models provide, we examine these models to determine whether they offer any significant economic value to investors through two market timing strategies: contrarian investment strategy and momentum investment strategy. In this regard, we compare the performance of the two market-timing strategies based on the predictability of the CS models and the FR-type model with that of a buy-and-hold strategy. We assume multiple investments of $100 each quarter in a major stock index and allow reallocation of funds into 10-year Treasury bonds in case there is evidence of security mispricing. For a contrarian investment strategy, we follow the common practice in the literature and switch funds from stocks to bonds if actual returns are one standard deviation or more above the predicted returns, and switch funds from bonds to stocks if actual returns are one standard deviation or more below the predicted returns[2]. In other words, we switch to bonds when stocks are overpriced and switch back to stocks when stocks are underpriced. Conversely, for a momentum investment strategy, we chase the winners by switching funds from bonds to stocks when actual valuations are one standard deviation or more above the predicted valuations and switch funds back to bond markets when actual valuations are one standard deviation or more below the predicted valuations[3].

In addition, we apply contrarian and momentum investment approaches to a third model, the Emotion Factor, and then compare the performance of both market timing strategies to that of the CS, the FR, and a buy-and-hold strategy. The emotion factor measures a stock's movement variation with respect to its expected growth rate (Saletta 2006.) The deviation from its foundational value reflects investors' behavior that is driven mostly by emotions and not by reasoning. That is, if a company's stock price rises, then this should reflect the growth in the business itself. Thus, growth in the stock price, over a period of time, say one year, should be synchronized with the expected long-term growth of the underlying company. If this condition does not hold, then we can assume over-reaction by investors. Therefore, this alternative market timing strategy calls for switching funds when the emotion factor is relatively high. This factor, E_f, is simply measured as the ratio of the percentage change in quarterly stock price, $\%\Delta P$, to 5-year expected growth rate, g_5, as follows:

$$E_f = \frac{\%\Delta P}{g_5} \tag{8}$$

where the 5-year expected growth rate, g_5, is estimated as follows:

$$g_5 = \sqrt[20]{(1+G_5)} - 1 \tag{9}$$

where G_5 is the aggregate 5-year growth rate. The magnitude of growth in the stock price should also match the magnitude of the expected growth of the company. Therefore, the emotion factor should have a value of unity. Any changes in stock prices that are not justified by a corresponding change in growth expectations should reflect mispricing and is associated with an emotion factor different from unity.

The best forecast of the future is the past. Therefore, we use historical growth rates as proxies for future growth rates. Sharpe (2005) argues that analysts' forecasts of future growth rates are "not only upward biased…" but they also appear to be "extreme." Also, Harris (1999) argues that the accuracy of analysts' forecasts is "extremely low" and that zero future growth rates represent better assumptions about the future direction of earnings. Moreover, he finds that 88% of forecast error is random, thereby, supporting the conclusion that analysts cannot significantly improve their forecasts by merely using alternative empirical techniques. In other words, historical growth rates may be better forecasts of future growth rates than forecasts estimated by security analysts.

Figure I depicts quarterly stock returns along with expected 5-year growth rates for the S&P 500 index over 1991, Q1 – 2006, Q4 period. We note here that stock returns fluctuate significantly around the more stable long-term growth forecast. This shows that stock price movements may not necessarily be driven only by changes in long-term growth of businesses, but also by short-term hype created by unexpected economic news as well as idiosyncratic news. When changes in stock prices are not completely justified by long-term growth forecasts, the emotion factor, by definition, drifts from its

2 See Figure IV.a
3 See Figure IV.b

theoretically correct value of unity as shown in Figure II. In fact, the emotion factor has an average value of 0.98 with a standard deviation of 2.2 until June 2001, prior to September 11 attacks. In addition, the emotion factor takes an average value of 1.43 with a standard deviation of 1.84 until early 1996, reflecting the positive hype in the financial market during the 1990s economic expansion. However, the emotion factor reaches a low of -541 on September 2003, about six months into the Iraq war and later hovers around a wide range of 7 to -54, reflecting instability in investors' emotions. A better picture on the fluctuations of the emotion factor is depicted in Figure III after removing the extreme observation of September 2003 of -541.

The above market timing strategies are determined by using recursive estimations to reflect the fact that investors use only the information available to them up to a certain time. That is, we estimate models using data up to, say, March 1996 to allow the investor to make a decision about allocation of funds for April 1996. Then we use a rolling window approach and recursively estimate the model by expanding the time period one quarter at a time, in order to make decisions for the subsequent time periods.

Following the previous contrarian strategy adopted in the CS and the FR-type models, we switch between stocks to bonds based on the emotion factor. The emotion factor is measured as the ratio of the percentage change in quarterly stock price to 5-year expected growth rate. Since the magnitude of growth in stock price should match the magnitude of the expected growth of the company then, theoretically, the emotion factor should have a value of unity. We switch from stocks to bonds when the emotion factor exceeds the theoretically correct average of unity because a high emotion factor reflects over-reaction, or simply that the current quarterly stock return is significantly higher than the long-term average future growth rate. We switch from bonds back to stocks if the emotion factor falls below unity, reflecting under-pricing, thereby allowing a good opportunity to buy stock. By contrast, for a momentum strategy, we switch from stocks to bonds when the emotion factor is below the theoretically correct average of unity, and switch from bonds to stocks when the emotion factor is greater than the theoretically correct average of unity.

The time period of the study spans 1986, Q3, to 2006, Q4. Quarterly data on the above variables come from various sources, including the S&P Emerging Markets database (formerly known as International Finance Corporation or IFC), the Frank Russell Corporation database, and the Robert Shiller's Irrational Exuberance textbook website (http://www.irrationalexuberance.com/). Expected profit margin comes from the U.S. Department of Labor. Interest rate information comes from the Federal Reserve Bank of St. Louis, and the seasonally adjusted GDP Deflator comes from the US Department of Commerce.

EMPIRICAL FINDINGS

First, we examine the predictability of the CS type models using 3-, 4-, and 5-year future returns and excess returns across a number of world stock indexes. As shown in the first column of Table 1, the R-square statistics pertaining to the P/E model exceed those related to the D/P model for 3-year and 4-year future returns measured by the S&P500 index for the U.S. market. However, the R-square statistics related to the P/E and D/P models are relatively similar for 5-year future returns. This implies that, at least in the case of the U.S. stock market, investors tend to pay more attention to the value of stock, relative to its earnings potential than to dividends paid. That is, the investment culture among the U.S. stock market participants tends to be more value driven than it is dividend driven. This notion also seems to be prevalent among European stock markets, where investors take a valuation approach to investing and mainly look for cheaper stock to purchase than to focusing on dividend-paying habits of European corporations.

On the other hand, the investment practice prevalent among investors in other world markets, namely Asia, Middle East, Africa, and Latin America, is more dividend-income oriented. This contention arises from the fact that the R-square statistics for the D/P models are significantly higher than those related to the P/E models in all three markets across all future projection periods, with one exception. A possible explanation of this phenomenon is that there is less transparency in international stock markets compared to highly developed U.S. and European markets. Since investors feel they are kept in the dark regarding updates about their domestic corporations, they do not feel comfortable with their own assessment of the true value of their stocks. Therefore, they tend to focus on more practical evidence of a company's performance manifested through corporate dividend policies.

In the longer term, however, the R-square statistics related to the 5-year future returns, as explained by the P/E models, are higher than those pertaining to the D/P models in Latin America. This may be explained by the contention that, although investors seek dividend income in the short-run, they do eventually focus on valuation in the longer-run. Also, the R-square statistics for predicting future returns are always larger than those for predicting future excess returns in the examples of the U.S. and the Latin American stock markets. This implies, as Malkiel (2004) suggests, that part of the predictability of the CS mean reversion models reflects interest rate changes. However, this is not the case for the rest of the international indexes, where, in most cases, the predictability of future returns and future excess returns tend to be similar. This may be explained by the fact that we use a common U.S. risk-free rate for all international indexes, because there is no common risk-free rate available for Europe, Asia, Middle East, and Africa.

Second, we then examine the predictability of the FR-type model using 3-, 4-, and 5-year future returns and future excess returns for the U.S. market only. We do not apply the FR-type model to international markets because international interest rates and profit margins are unavailable for separate continental stock indexes and are hard to construct. As seen in Table 2 for the U.S. market, R-squares are almost as high as those from the CS models, suggesting that both the FR-type model and the CS models have similar predictive power of future returns. Further, the predictive potential of the FR-type model is similar for both future returns and for future excess returns. These results differ from those of Malkiel (2004), who finds that the FR-type models fare better than the CS type models. However, it is important to note that a different time period (1970-2003) is used in the Malkiel's study (2004).

Finally, we examine these three models – the CS, the FR-type, and the Emotion Factor – to determine whether they offer useful information to market participants and whether they ultimately yield economic benefits. Following Malkiel's study (2004), we assume recurring investments of $100 each quarter, starting in 1996 Q1, and transaction costs of 0.1% of the value of the portfolio. We follow a contrarian investment strategy as depicted in Figure IV. That is, we sell stock and buy bonds when actual valuations are one standard deviation or more above the predicted valuations based on the CS and the FR-type models, or when the emotion factor exceeds the theoretically correct average of unity.

Results from Table 3 show that the FR-type model outperforms all other models, both in terms of ending portfolio value of $5,975 and in terms of the risk-adjusted measure of performance, the Sharpe ratio of 0.124, in line with Malkiel's findings (2004). In other words, the FR-type model demonstrates better predictability of future returns than the CS P/E and D/P models. Furthermore, we find that the CS P/E model outperforms the CS D/P model, supporting our previous contention that U.S. investors tend to be value driven rather than being dividend oriented. The Sharpe ratio of 0.065 from the P/E model shows that there are significantly more economic benefits gained from the P/E model over the D/P model that has a Sharpe ratio of only 0.012. However, although the CS D/P model underperforms the stock buy-and-hold strategy with $5,747 total portfolio value compared to $5,750 for the buy-and-hold strategy, the D/P model actually performs better according to risk-adjusted returns with the Sharpe ratio being only 0.007 for the buy-and-hold portfolio.

This has two possible interpretations. First, the lower total-dollar value of the portfolio based on the CS D/P model may be due to the higher transaction costs associated with frequent trading activities compared with the buy-and-hold strategy. However, this doesn't imply a better model. Second, the lower Sharpe ratio of the buy-and-hold strategy may be due to the higher risk associated with it, arising from the slow action to rebalance the portfolio under bad economic conditions. That is, it is not prudent to take no action when the stock market is continually underperforming. The more proactive approach dictated by the FR and the CS models, however, may provide lower risk and therefore higher risk-adjusted performance.

Market timing using a contrarian strategy based on the Emotion Factor model clearly underperforms the buy-and-hold strategy, not only for stocks, but also for bonds. The findings show that the total dollar value is only $4,906, much lower than that of a buy-and-hold strategy for bonds, which shows returns below the risk-free rate. The Sharpe ratio of the Emotion Factor model with a contrarian investment strategy is negative, a result that may be partially due to transaction costs. A contrarian investment strategy based on the Emotion Factor model dictates selling stock when stocks are overpriced (high emotion factor) and buying stock when stocks are underpriced (low emotion factor). Our findings suggest that this investment tactic does not represent an adequate market-timing strategy.

This begs the question: why does this contrarian strategy underperform? Isn't there a solid theory behind it? The answer to these two questions lies in reversing the tactic (see Figure IV.b). That is, when we buy stock at the time positive emotions are high (emotion factor exceeds unity) and sell stock at the time negative emotions are high (emotion factor less than unity), we find that a momentum strategy significantly outperforms all other strategies, including the FR-type model and the buy-and-hold strategy, by a considerable margin. The findings show that the Emotion Factor model with a momentum investment strategy results in a total value of $6,429 and a significantly higher Sharpe ratios of 0.361 compared with only 0.197 for the second highest performer, the CS P/E model. In other words, the best way to go is with the flow. When people over-react to good news, investors should ride the market despite the inflated prices. On the other hand, when stock prices incorrectly plummet, reflecting significant under-valuation, investors should follow the trend and sell stock to limit any further losses. This theory agrees with common financial analysts' advice to use stop-loss orders in order to limit losses to a certain percentage of the portfolio value. On the upside, however, momentum investing leads to investors' taking advantage of the overall direction of the market. Also, it should be noted that the FR-type model which performs the best under the contrarian investment approach underperforms with a negative Sharpe ratio if a momentum investment approach is taken.

For robustness check, the above simulation results are replicated once more with the assumption that an initial one-time $100 investment is made in 1996 Q1. The results shown in Table 4 indicate that when a contrarian approach is used, the stock buy-and-hold strategy outperforms all other strategies, both in terms of dollar value ($218.68) and risk-adjusted return with Sharpe ratio being 0.314. On the other hand, and consistent with previous findings from Table 3, when a momentum approach is used, it is again the Emotion Factor model that outperforms all other models with a final portfolio value of $239.11 and a considerably higher Sharpe ratio of 0.88. Classical theories in finance do not always explain the ups and downs in the stock market. This may be due in part to irrational behavior of investors that leads to over-reaction. In fact, our study does find that investors' emotions play an important role in stock market variations. As such, we contend that the best investment strategies should seriously consider investors' psychology.

SUMMARY AND CONCLUSION

In this study, we examine stock return predictability and economic value of market timing. First, we revisit the debate regarding market efficiency by examining different models of stock market predictability; namely the Campbell-Shiller (1998) mean reversion models and the Federal Reserve-type models, using broad based market indexes that include the S&P 500 index, as well as selected international equity market indexes. Contrary to Malkiel's findings (2004), we find both models to have similar predictive power. Although we find that investors in the U.S. stock market seem to be value driven, investors in international markets tend to be dividend driven.

Second, given the stock return predictability both models provide, we examine their possible economic benefits through two market timing strategies: a contrarian as well as a momentum investment strategy. We assume multiple investments of $100 each quarter in a major stock index and allow reallocation of funds into 10-year Treasury bonds when one of the models shows that actual valuations are 1 standard deviation or more above the predicted valuations if a contrarian strategy is applied. By contrast, we reallocate funds from a major stock index to bonds when one of the models shows actual valuations are 1 standard deviation or more below the predicted valuations if a momentum strategy is applied. We also apply contrarian and momentum investment strategies to a third model, the Emotion Factor model (Saletta 2006). We switch from stocks to bonds when the emotion factor exceeds the theoretically correct average of unity if a contrarian strategy is applied. By contrast, we switch from stocks to bonds when the emotion factor is below the theoretically correct average of unity if a momentum strategy is applied. Our findings show that under a contrarian investment approach, the Federal Reserve-type models fare better than all other models in predicting stock returns. However, under a momentum investment strategy, the emotion factor outperforms all other models. Finally, we compare the performances of these models to that of a buy-and-hold strategy. Contrary to Malkiel's findings (2004) that returns from a buy-and-hold approach exceed returns from most market-timing tactics, our findings suggest that market-timing strategies based on these prediction models do provide better economic benefits than a simple buy-and-hold policy.

In conclusion, this study improves Malkiel's study (2004) in two ways. First, we incorporate the Emotion Factor model, which, to our knowledge, has never been empirically tested. Second, in addition to applying a contrarian investment strategy to all models as in Malkiel (2004), we also employ a momentum approach. The results of this study support prior empirical research [See Fama and French (1988a), Bekaert and Hodrick (1992), Campbell and Shiller (1998), Malkiel 2004, among others] that (1) markets are not a perfect random walk, (2) that short-run serial correlation and long-run mean-reverting components of stock prices suggest the existence of predictability, and (3) that some predictability comes from the tendency of returns to fluctuate with real interest rates. Our findings also suggest that market-timing strategies based on these prediction models do provide better economic benefits than a simple buy-and-hold approach, a fact which may have important implications for active investors who time the market. Furthermore, for momentum players, our study provides empirical evidence that stock return predictability based on the Emotion Factor model is better than those based on Campbell-Shiller D/P and P/E models as well as the Federal Reserve-type model.

Figure I. Quarterly Stock Return versus Expected 5-Year Growth Rate
S&P 500 (1991 Q1 - 2006 Q4)

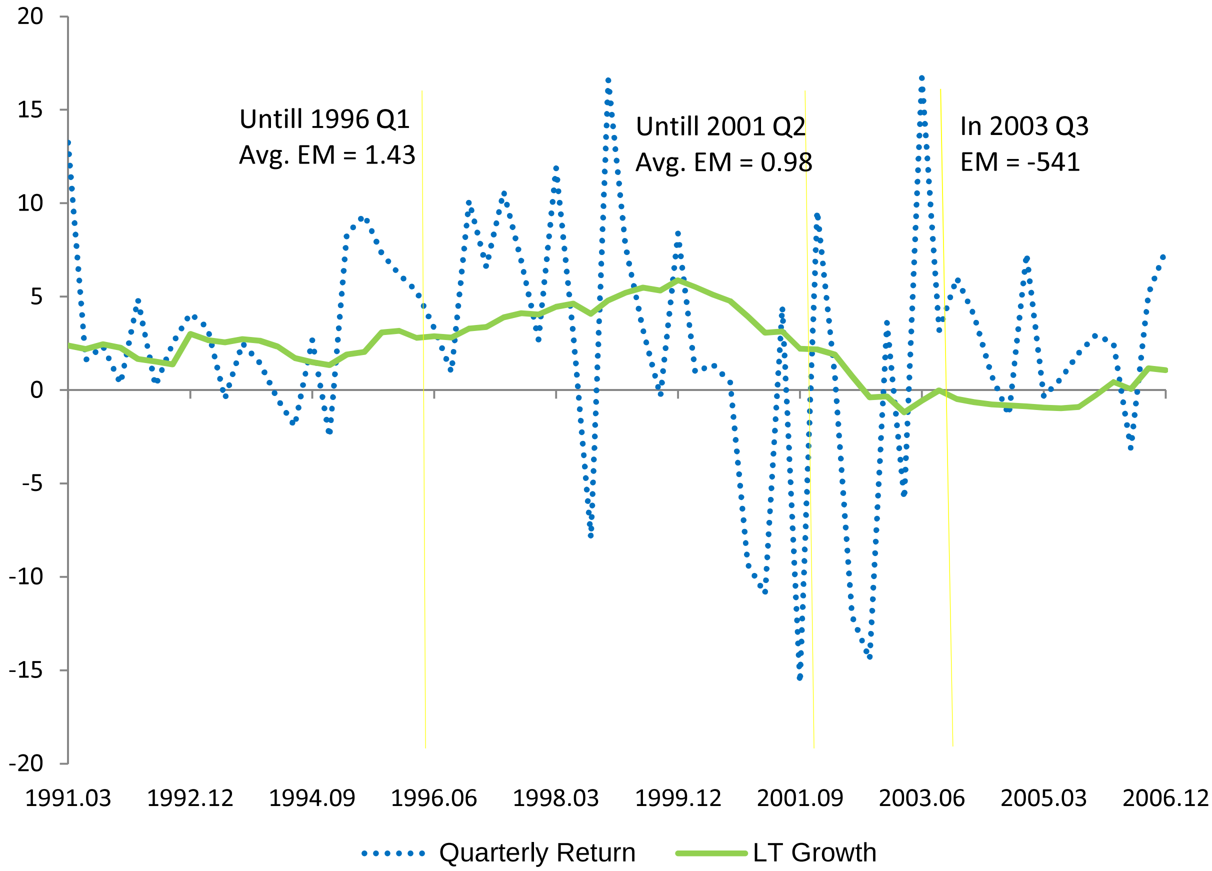

Figure II. Quarterly Observations of Emotion Factor (1991 Q1 - 2006 Q4)

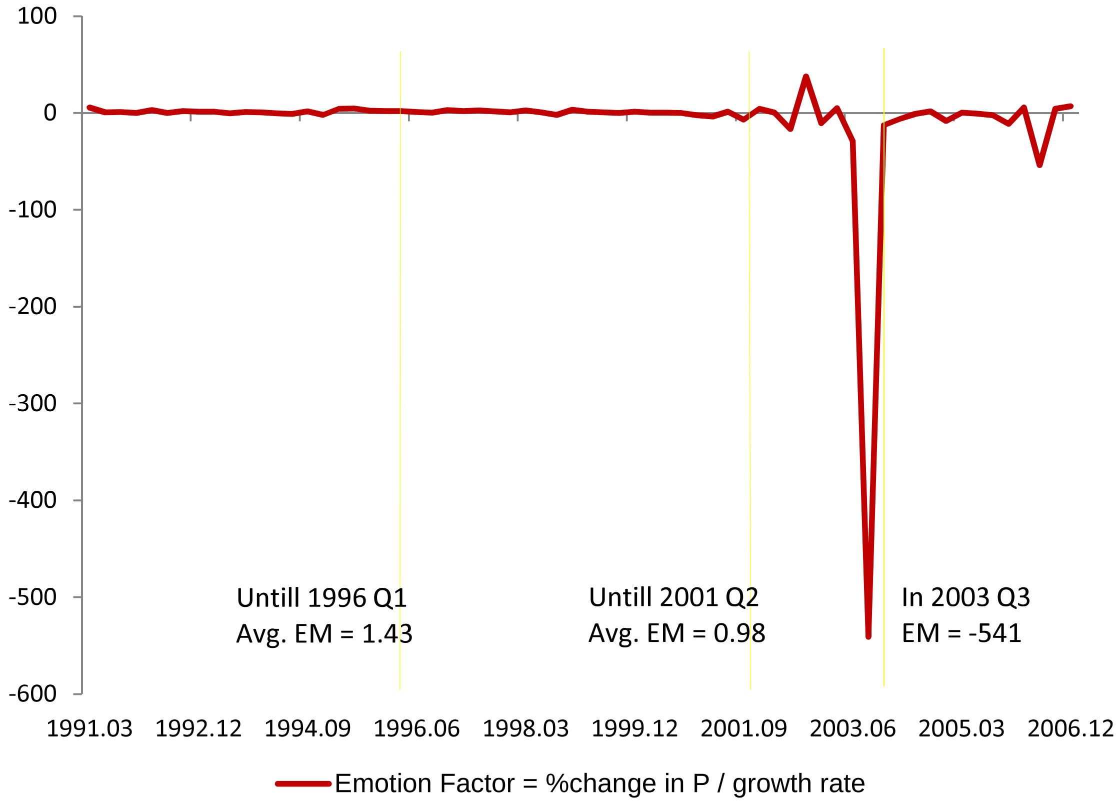

Figure III. Emotion Factor with Extreme observation in 2003 Q1 omitted

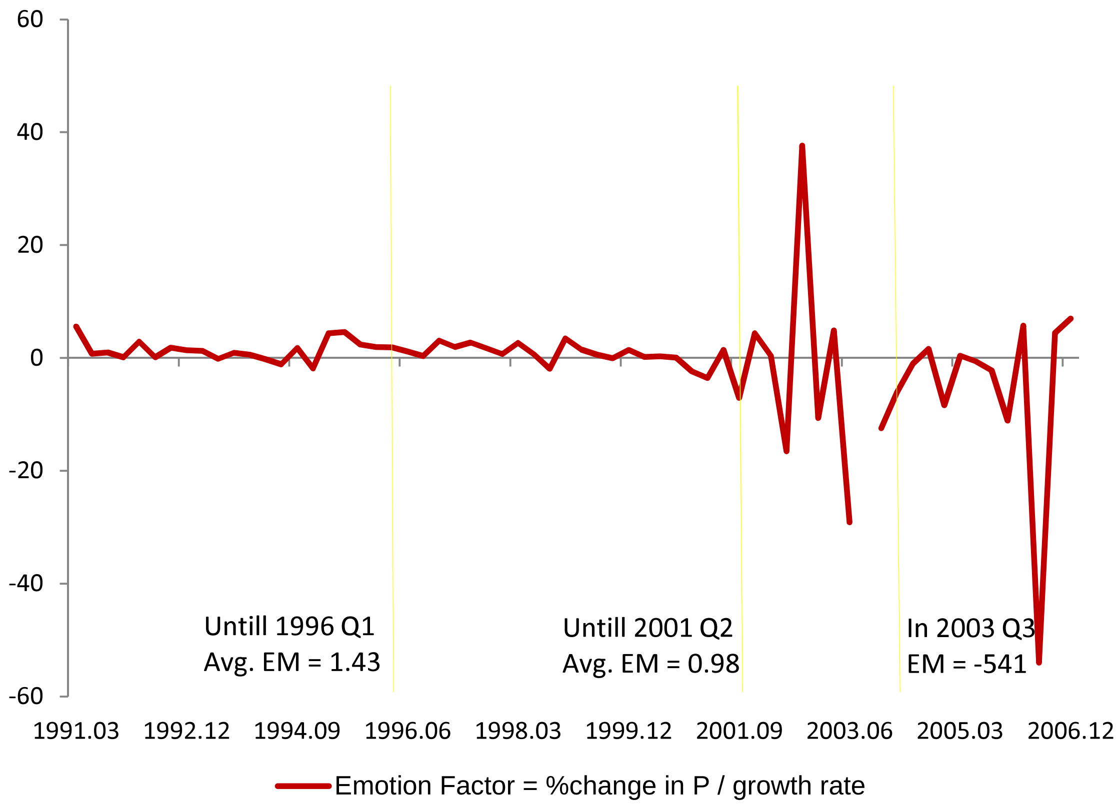

Figure IV.a Contrarian Investment Strategy

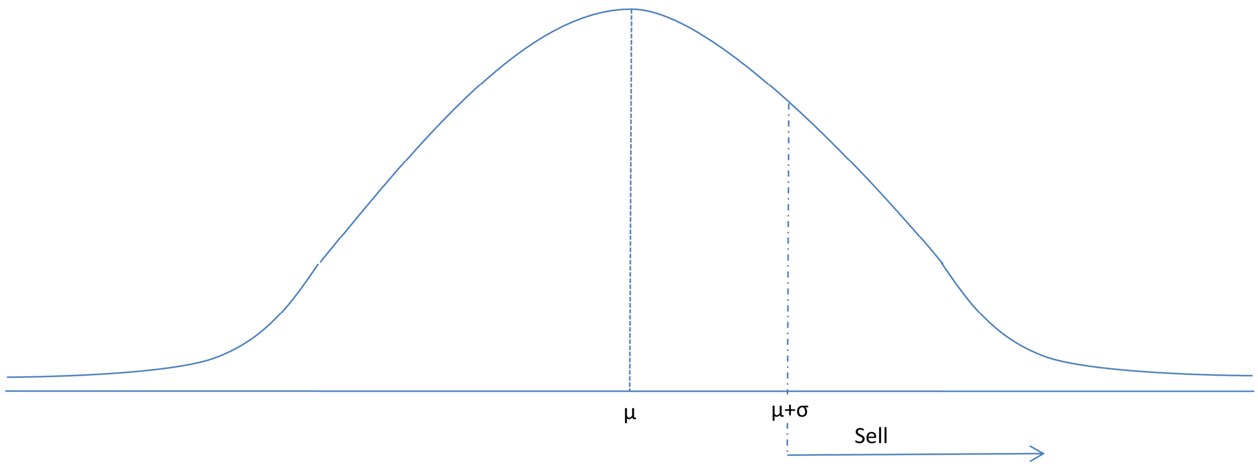

Figure IV.b Momentum Investment Strategy

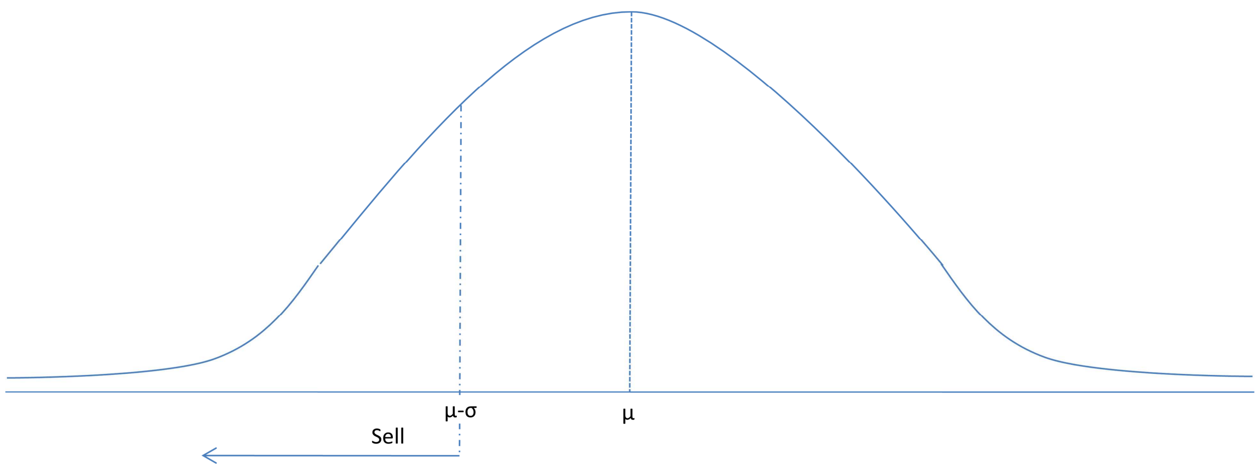

Table 1. Predictability of Long-Term Future Returns of Campbell-Shiller Type Models: 1986 Q1 to 2006 Q4.

Model	S&P500	Latin America	Asia	Europe	Middle East & Africa
3-year future return vs. D/P	0.16	0.26	0.49	0.00	0.27
3-year future excess return vs. D/P	0.09	0.22	0.49	0.00	0.27
3-year future return vs. P/E	0.35	0.15	0.003	0.15	0.00
3-year future excess return vs. P/E	0.26	0.11	0.003	0.15	0.00
4-year future return vs. D/P	0.22	0.49	0.35	0.001	0.66
4-year future excess return vs. D/P	0.13	0.45	0.31	0.000	0.66
4-year future return vs. P/E	0.34	0.23	0.00	0.13	0.01
4-year future excess return vs. P/E	0.25	0.18	0.001	0.13	0.01
5-year future return vs. D/P	0.31	0.38	0.23	0.05	0.83
5-year future excess return vs. D/P	0.21	0.36	0.18	0.05	0.83
5-year future return vs. P/E	0.29	0.56	0.00	0.08	0.12
5-year future excess return vs. P/E	0.21	0.50	0.00	0.08	0.11

Note: All figures are R^2 statistics; D/P = dividend/price ratio; P/E = price/earnings ratio.

Table 2. Predictability of Long-Term Future Returns of Federal Reserve Type Model: 1986 Q1 to 2006 Q4.

Model	S&P500
3-year future return vs. residual	0.33
3-year future excess return vs. residual	0.28
4-year future return vs. residual	0.32
4-year future excess return vs. residual	0.28
5-year future return vs. residual	0.33
5-year future excess return vs. residual	0.27

Note: All figures are R^2 statistics.

Table 3. Results from Market Timing Strategies: 1996 Q1 to 2006 Q4.
$100 invested every quarter starting in 1996 Q1.

		Contrarian Strategy		Momentum Strategy	
Model	R^2	Portfolio Value	Sharpe Ratio	Portfolio Value	Sharpe Ratio
Campbell-Shiller (P/E)	0.29	$5,910	0.065	$6,135	0.197
Campbell-Shiller (D/P)	0.31	$5,747	0.012	$6,089	0.130
Federal Reserve	**0.33**	**$5,975**	**0.124**	$5,149	-0.202
Emotion Factor	--	$4,906	-0.387	**$6,429**	**0.361**
Stocks (Buy & Hold)	--	$5,750	0.007	$5,750	0.007
Bonds (Buy & Hold)	--	$5,609	--	$5,609	--

Note: Campbell-Shiller Models pertain to 5-year future returns; D/P = dividend/price ratio; P/E = price/earnings ratio. Emotion Factor is computed by dividing quarterly stock return by quarterly expected 5-year growth rate. A transaction cost of 0.1% is assumed. Neither a contrarian nor a momentum strategy is applied to buy and hold models.

Table 4. Results from Market Timing Strategies: 1996 Q1 to 2006 Q4.
$100 invested in 1996 Q1.

		Contrarian Strategy		Momentum Strategy	
Model	R^2	Portfolio Value	Sharpe Ratio	Portfolio Value	Sharpe Ratio
Campbell-Shiller (P/E)	0.29	$208.54	0.313	$205.96	0.479
Campbell-Shiller (D/P)	0.31	$173.27	0.032	$228.37	0.520
Federal Reserve	**0.33**	$191.24	0.240	$181.89	0.098
Emotion Factor	--	$149.60	-0.268	**$239.11**	**0.880**
Stocks (Buy & Hold)	--	**$218.68**	**0.314**	$218.68	0.314
Bonds (Buy & Hold)	--	$170.77		$170.77	

Note: Campbell-Shiller Models pertain to 5-year future returns; D/P = dividend/price ratio; P/E = price/earnings ratio. Emotion Factor is computed by dividing quarterly stock return by quarterly expected 5-year growth rate. A transaction cost of 0.1% is assumed. Neither a contrarian nor a momentum strategy is applied to buy and hold models.

REFERENCES

Bachelier, L., 1900, trans. James Boness, Theory of Speculation, in P. Cootner, eds.: *The Random Character of Stock Market Prices* (MIT Press, Cambridge, MA), 17-78.

Basu, S., 1977, Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis, *Journal of Finance* 32, 663-682.

Bekaert, G. and R. J. Hodrick, 1992, Characterizing Predictable Components in Excess Returns on Equity and Foreign Exchange Markets, *Journal of Finance* 47, 467-509.

Bernstein, P. L., 1985, Discussion, *Journal of Finance* 40, 806-807.

Breen, W., L. R. Glosten, and R. Jagannathan, 1989, Economic Significance of Predicable Variations in Stock Index Returns, *Journal of Finance* 44, 1177-1190.

Bondt, W. F. M. De and R. Thaler, 1985, Does the Stock Market Overreact?, *Journal of Finance* 40, 793-805.

Campbell, J.Y. and R.J. Shiller, 1988, Stock Prices, Earnings, and Expected Dividends, *Journal of Finance* 43, 661-676.

Campbell, J.Y. and R.J. Shiller, 1998, Valuation Ratios and the Long-run Stock Market Outlook, *Journal of Portfolio Management* 24, 11-26.

Campbell, J.Y. and R.J. Shiller, 2001, Valuation Ratios and the Long-run Stock Market Outlook: An Update, *Cowles Foundation discussion paper* No. 1295, 1-31.

Cootner, P., 1964, *The Random Character of Stock Market Prices* (MIT Press, Cambridge, MA).

Dimson, E. and M. Mussavian, 1998, A Brief History of Market Efficiency, *European Financial Management* 4, No. 1, 180-193.

Fama, E. and K. French, 1988a, Permanent and Temporary Components of Stock Prices, *Journal of Political Economy* 96, 246-273.

Fama, E. and K. French, 1988b, Dividend yields and expected stock returns, *Journal of Financial Economics* 22, 3-26.

Graham, B., 1959, *The Intelligent Investor: A Book of Practical Counsel* (Harper & Brothers Publishers, New York, NY).

Hammami, Y., 2011, Is the Stock Market Efficient in bad times and inefficient in good times? *Applied Financial Economics* 21(12), 905-915.Hammami, Y., 2013, Momentum Investing across Economic States: Evidence of Market Inefficiency in Good Times. *Applied Financial Economics* 23(1), 51-56.

Harris, R.D.F, 1999, The Accuracy, Bias and Efficiency of Analysts' Long Run Earnings Growth Forecasts, *Journal of Business Finance and Accounting* 26, 725-755.

Hodrick, R. J., 1992, Dividend Yields and Expected Stock Returns: Alternative Procedures for Inference and measurement, *The Review of Financial Studies* 5, 357-386.

Ito, M. and S. Sugiyama, 2009, Measuring the Degree of Time Varying Market Inefficiency, *Economics Letters* 103 (1), 62-64.

Jirasakuldech, B., R. Emekter, and U. Lee, 2008, Business Conditions and Nonrandom Walk Behaviour of US Stocks and Bonds Return, *Applied Financial Economics* 18, 659-672.

Lim, K. and W. Luo, 2012, The Weak-form Efficiency of Asian Stock Markets: New Evidence from Generalized Spectral Martingale Test, *Applied Economics Letters* 19, 905-908.

Malkiel, B.G., 2004, Models of Stock Market Predictability, *Journal of Financial Research* 17, 449-459.

Mueller, J., 2001, "Driving the Market, Looking for a Rational Theory of P/E Ratios," *Barron's*, June 25, 2001.

Rozeff, M., 1984, Dividend yields are equity risk premiums, *Journal of Portfolio Management*, 68-75.

Saletta, Chuck, "Pessimism's Potent Profits," July 10, 2006, available at http://www.fool.com/investing/value/2006/07/10/pessimisms-potent-profits.aspx (accessed June 20, 2008).

Schnusenberg, O. and J. Madura, 2001, Do U.S. Stock Market Indexes Over- or Underreact? *Journal of Financial Research* 24, 179-204.

Sharpe, S.A., 2005, How Does the Market Interpret Analysts' Long-Term Growth Forecasts? *Journal of Accounting, Auditing and Finance* 20, 147-166.

Shiller, R. J., 1984, Stock Prices and Social Dynamics, *Brookings Papers on Economic Activity* 2, 457-510.