Behavioral Measures of Expected Market Return

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- Abstract-

Investor behavior is an important determinant of individual as well as market-wide equity returns. In this study, I extend the behavioral investing literature by introducing Strategy Market Barometers, that are based on the extent to which investors are currently rewarding one equity strategy over another. I combine US and International Strategy Market Barometers with Baker & Wurgler's (2006) Sentiment Index, and other variables, to explain subsequent S&P 500, Russell 2000, and EAFE returns. The empirical results for January 1981 through December 2011 produce an astonishing 12 month expected equity premium range of 60%, compared to an actual annual equity premium range of 115% over this same time period. The results, which are both economically and statistically significant, cannot be explained by trailing equity premiums nor changing economic fundamentals. The predictive power of the Strategy Market Barometers and the Sentiment Index produce a behavioral measure of expected equity premiums. Thus I provide evidence that expected equity market returns vary widely over time and that investor behavior is a much more important contributor to this variability than are changing economic fundamentals, both results consistent with the predictions of Shefrin's Pricing Kernel Model.

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Behavioral Measures of Expected Market Return

The concept of a rational investor was first proposed by Bernoulli in 1738. Since then, rationality has played a central role in numerous social, economic, and financial theories, including Modern Portfolio Theory. But over the last few decades, rationality has come under attack, with the initial assault made by Kahneman and Tversky (1972, 1973, and 1979). They show that investors (and others) use shortcuts and heuristics in making decisions, particularly those involving risk and long investment horizons. Consequently, investors collectively make poor decisions that, in turn, bias individual security as well as market-wide prices.

The Behavioral Finance and Behavioral Investing literature has grown rapidly in recent years, as Baker and Nofsinger (2010) document in their excellent summary. Montier (2007) shows practitioners how to use behavioral investing in order to improve investment decisions. Shefrin (2008) provides the first systematic analysis of how behavioral assumptions impact the pricing kernel that lies at the heart of modern asset pricing theory, which leads to a unified behavioral treatment of the pricing of equities, options, fixed income securities, and mean-variance portfolios.

Using Shefrin's model as the theoretical foundation, this paper shows that objective measures of investor behavior are predictive of subsequent market returns. Shefrin posits a world in which investors begin with unequal wealth endowments, have different probability assessments of future events (some are pessimistic, some are optimistic, some are overconfident, and some are rational, with probability assessments changing over time), and have different risk preferences. A

"typical" investor does not exist, but instead a "representative" investor can be constructed based on a wealth weighted composite of individual investor probabilities and risk preferences. The result is a composite probability distribution of future events which can be multimodal and differs in important respects from the true probability distribution. The differences between composite and true probabilities leads to the mispricing of individual securities as well as to overall market mispricing. This is captured by Shefrin's Pricing Kernel Model (PKM), which incorporates changes in both fundamentals and composite probabilities. As investment returns redistribute wealth and as individual probability assessments and risk aversion change, the extent of mispricing varies over time. Individual securities, as well as market-wide indices, can go from being undervalued to overvalued and back again as relative wealth weights change across those who are pessimistic, optimistic, overconfident, and rational (i.e. informed investors who hold the true probabilities). One of the model's predictions is that actual prices will fluctuate more than will the underlying fundamentals, because investor behavior driven composite probabilities will fluctuate more than will the fundamentally driven true probabilities. Another prediction of the model is that expected market returns will vary considerably over time. These two model predictions are tested in the empirical tests that follow.

Expected Market Returns

Traditional researchers posit that changing expected market returns are driven by time varying risk premium resulting from ever evolving economic and market conditions. A number of studies have attempted to relate economic variation to changes in expected returns, but not much has come of these efforts. The most successful is the line of research focused on dividend yield/payout (dividends + share repurchase – share issuance) yield which documents a positive relationship between market payout yield and future returns. For example, Boudoukh et. al,

(2007) find that 10% of annual market return variability can be explained by a time varying market payout yield. They also confirm that individual stock payout yields are positively related to subsequent returns. But since both dividend and payout yields involve market prices, which are impacted by investor behavior, it is not possible to say whether these relationships are the consequence of changing fundamentals, risk, or investor irrationality.

In a parallel research stream, behavioralists have identified a number of decision mistakes made by investors. These include prospect theory, disposition effect, representativeness, anchoring, framing, and social validation, among others[1]. Other researchers have attempted to detect equity pricing errors that result from the widespread incidence of these mistakes[2]. In general, the evidence from these "bottom-up" studies has been weak. One of the few exceptions is a study by Frazzini (2006) who, using mutual fund holdings, uncovers strong evidence supporting the disposition effect.

A "top-down" approach is taken by Baker and Wurgler (BW 2006, 2007) who attempt to identify broad measures that capture investor sentiment and thus make it possible to predict future stock returns. They show that their resulting "Sentiment Index", based on 6 individual measures, is predictive of individual stock as well as market-wide returns. So rather than trying to link individual micro decisions to pricing errors, BW link macro variables to future stock returns.

[1] See Baker and Nofsinger (2010) for a comprehensive review of the Behavioral Finance literature.
[2] See, for example, Brown and Cliff (2004,2005), Kent et. al. (1998), Gloshkov (2006), Goetzmann et. al. (2000), Kamstra et. al. (2003), Lee et. al. (1991), Lemmon and Portniaguina (2006), Ljungqvist et. al. (2006), Neal and Wheatley (1998), Qiu and Welch (2006), Whaley (2000), and Zweig (1973).

This paper starts with the BW Sentiment Index and adds three other macro measures, two of which are based on the investment strategy being pursued by active equity managers and a third based on market cap (MC) – book to equity (BE) portfolio ranks (MCBE).

Equity managers in a particular strategy peer group pursue a specific approach to making money that differs from the approach followed by managers in other peer groups. For example, there are managers who focus on finding the best companies in each industry, as measured by management quality, ability to innovate, defensible market position, and strong company fundaments. On the other hand, there are managers who attempt to buy undervalued stocks regardless of the quality of the company. The performance of each approach will vary as investors favor one over the other through time. If the range of strategies span all the return factors driving equity returns, then strategy performance ranks provide a picture of how investors are responding to the full range of return factors. Some factor patterns are favorable for market-wide returns going forward, while other factor patterns are not. The question I address in this paper is whether current strategy performance ranks are predictive of subsequent equity premiums. The empirical tests that follow reveal that they are.

I view MCBE in a similar manner to that of strategy performance ranks. MC and BE were tapped 30 years ago as a way to understand the return factors driving stock prices. If MC and BE proxy for important return factors, then changing performance ranks captured by MCBE might reveal whether the current factor pattern is favorable or unfavorable for future market returns. For example, if small cap value is outperforming mid cap growth which is outperforming large cap blend and so on, is this MCBE favorable or unfavorable for subsequent market returns. The evidence that follows reveals that MCBE is a poor predictor.

The remainder of this paper is organized as follows. In Section I, the BW Sentiment Index is discussed. In Section II, the equity strategy identification and Strategy Market Barometer methodology is introduced. In Section III, the method for estimating MCBE is described. In Section IV, the behavioral measure empirical results are presented and analyzed. Finally, Section V provides conclusions and suggestions for future research.

I. Sentiment Index

The Sentiment Index (SI) was first proposed by BW (2006) and further elaborated upon in BW (2007). Rather than estimate the pricing impact of specific investor behaviors, such as the disposition effect, BW take a top-down approach, which is built on two critical assumptions of behavioral finance: 1) time varying investor sentiment and 2) limits to arbitrage. They use these to explain which stocks are likely to be most affected by investor sentiment.

They view investor sentiment as simply optimism or pessimism about stocks in general, and allow the limits to arbitrage to vary across stocks. As a first step in constructing SI, they consider a range of possible sentiment measures, from surveys to market-wide variables, that are thought to be affected by changing market sentiment. Many of these possible measures were discarded, some because they were believed to be unreliable, such as survey data, and some because of data unavailability over the entire time period they wished to test their concepts (1963-2001).

BW settled on six measures for constructing SI (see BW (2006) for more details):

- closed-end fund discount,
- detrended log of share turnover,
- number of IPO's,
- first-day return on IPO's,

- dividend premium, and
- equity share in new issues.

Each of these six measures are standardized, with the effect of macroeconomic conditions removed. The resulting SI is a weighted, principal component combination of the six proxies. BW hypothesize that a low (high) SI implies low (strong) investor sentiment which leads to stock undervaluation (overvaluation) and in turn is predictive of higher (lower) returns going forward. BW's empirical tests focus on those companies most susceptible to sentiment mispricing (i.e. younger, smaller, more volatile, unprofitable, non–dividend paying, distressed, or extreme growth potential companies). They postulate a "sentiment seesaw" in which the companies opposite from the above (i.e. "bond-like" companies) underperform (outperform) when SI is high and the reverse when SI is low. BW present empirical evidence supporting the sentiment seesaw. BW also provide limited evidence that SI is predictive of overall market returns. I build on this latter result and provide evidence that SI is indeed predictive of future equity premiums.

II. Strategy Market Barometers

Equity strategy is the way an active manager goes about analyzing, buying and selling stocks. Put more succinctly, it is the way a manager goes about earning excess returns. In developing a strategy, a set of return factors are identified that the manager can take advantage of. The return factors focused upon differ from manager to manager. The manager then develops a strategy around the identified return factors and fashions a methodology for implementing the strategy. For example, a manager pursing a Competitive Position strategy (more detail shortly) will develop a methodology for gauging the quality of a company's management team, the defensibility of their product market position, and the level of company adaptability. The fund

company for which the manager works assembles the resources needed to execute this methodology. The equity strategy is at the core of the investment process and shapes the business and investment decisions of the fund company. The consistent pursuit of a narrowly defined equity strategy, along with taking high conviction positions, is the key to earning excess returns.[3]

AthenaInvest has strategy identified 2800 US and International active equity open end mutual funds domiciled in the US. This was accomplished by gathering 50,000 pieces of strategy information from fund prospectuses and organizing this information into strategy elements (the specific things a manager does to implement a strategy, such as determining the quality of the company's management team), grouping this information into 40 elements, and assigning elements to one of 10 equity strategies. The 10 equity strategies are described in Table 1. Each active equity fund is then identified as pursuing a Primary and Secondary strategy and becomes a member of a single strategy peer group.[4]

[Place Table 1 about here]

The resulting peer groups are based on self declared strategy. Many researchers question the reliability and usefulness of such information. To address this issue, a series of statistical reliability strategy peer group tests were conducted and the results are reported in Howard (2010). The three main conclusions:

- Based on cross-fund correlation analysis, funds within a strategy peer group are more alike, on average, than those across strategies.

[3] The importance of consistently pursuing a strategy and taking high conviction positions for earning excess returns is confirmed by a number of studies. See, for example, Howard (2010) and Cohen et. al. (2009).
[4] Designating elements and strategies was accomplished over a 2 year period and a series of iterations involving professional manager input, data gathering, and trial element/strategy combinations. Once the element/strategy framework was decided upon, the data gathering and identification algorithm was built as a computer platform. In 2010 the computer based strategy identification algorithm was granted a US Patent and in 2011 it was granted a Singapore patent. For more details, visit www.athenainvest.com .

- Based on cross-fund correlation cluster analysis, forming fund peer groups based on strategy is statistically superior to forming groups randomly or forming them based on style boxes.
- Each strategy peer group pursues a statistically different set of return factors.

Figure 1 is a representation of which strategy investors are rewarding, with the darker arrows signifying greater returns. Strategies are arranged (from the top of Figure 1 clockwise) in their long-term performance order (based on 1988 through 2007 returns). [5] That is, Future Growth is the top performing long-term strategy, Competitive Position is the next, and so forth on down to Risk, which is the worst long-term performer. Figure 1 presents the situation in which relative strategy performance, as represented by varying arrow shades, matches long-term strategy performance. Strategy performance fluctuates over time, resulting in time periods in which strategies in the lower left of Figure 1 are favored by investors. The empirical question addressed in this paper is whether the ever changing pattern of strategy performance ranks are predictive of equity premiums.

[Place Figure 1 about here]

Several relationships must hold for this to be the case. First, the set of strategies must span the full set of factors driving individual and overall market returns. Second, each return factor should be associated, to the greatest extent possible, with a specific strategy, with as few multiple strategy associations as possible. Finally, managers should pursue the same strategy and not

[5] Strategy performance is calculated as the simple average return across all funds in that strategy that month.

change strategies over time.[6,7] If these relationships hold, strategy performance ranks will be reliably associated with the return factors driving market returns.

In order to capture investor's overall response to the 10 equity strategies, a Strategy Market Barometer (SMB) for both US and International Markets is calculated. The US Strategy Market Barometer (US SMB) and International Strategy Market Barometer (Intl SMB) are a scaled sum of the absolute difference of each strategy's trailing one year return rank from its long-term (i.e. 1988-2007) return rank.[8,9] The resulting US SMB and Intl SMB behavioral measures are included in the empirical tests that follow.

III. MCBE Portfolio Ranks

The final behavioral measure is based on the stock characteristics of market capitalization (MC) and book to equity (BE). These have been used for years as a way to think about the time dynamics of stock returns. It is not unusual to hear market participants say things like "Small cap stocks are expected to outperform large cap stocks over the coming months" or "Value (high BE) stocks are expected to outperform growth stocks over the next year". In fact, MC and BE are two of the best known stock market "factors". The supposition is that MC and BE proxy for underlying, but unobservable stock market return factors.[10] This begs the question of whether the

[6] Each manager has selected a specific strategy to pursue, most often because they believe that it will allow them to earn excess returns. The fund company then assembles the considerable resources needed to implement this strategy. Over time the portfolio managers and analysts devote consider time to refining the investment process. Given the large investment of time and money by the manager and the fund company, it is unlikely that the fund will incur the cost of switching to a new strategy.

[7] Note that it is not necessary to assume active equity managers are superior stock pickers. It is only important that they consistently pursue the same strategy over time, successful or not.

[8] The out-of-sample (before 1988 and after 2007) SMB prediction performance is better than is the in-sample performance. This supports the supposition that SMB's predictive power is not unique to the long-term estimation period.

[9] An obvious alternative to ranking strategies based on recent returns is to rank them based on recent fund flows. I have not tested this alternative ranking methodology to determine if it improves on the return ranking methodology.

[10] MC, BE, and other stock characteristics are often referred to as return factors and, in fact, the current four and six factor risk models are based on this convention. But this is technically incorrect. The premise is that observable

relative performance of MCBE portfolios is predictive of future market returns. If portfolios comprised of various levels and combinations of MC and BE stocks capture the full range of return factors, then changing MCBE may help in determining whether the current set of return factors driving market returns is favorable or unfavorable.

Based on these ideas, a set of 9 MC and BE portfolios are created. I began with the 5x5 MC and BE portfolios created by Fama and French, which are available on Ken French's website, and then eliminated the 16 portfolios based on the 2nd and 4th MC and BE quintiles. The remaining 9 portfolios are the 4 corner portfolios, the 4 outside middle portfolios, and the very center portfolio. These 9 portfolios provide the broadest cross-section of possible MC and BE portfolios. I used 9 portfolios since this number is close to the number of equity strategies underlying the US and International SMBs, which is each 10. The first step in estimating the MCBE behavior measure was to calculate the long term (1988-2007) performance ranks for the 9 MCBE portfolios.[11] Similar to the SMB methodology, the month beginning MCBE measure was calculated by averaging, over the trailing 12 months, the monthly sum of the absolute current, long term portfolio rank deviations. The resulting average monthly sum is scaled to obtain MCBE.

VI. Empirical Tests

An Initial Eyeball Test

In order to understand the time pattern of behavioral measures, the beginning of the month trailing 6 month average for each is graphed for June 1981 through December 2011 in Figure 2.

stock characteristics proxy for important but unobservable return factors. It is clear that stock characteristics are not the return factors themselves. Thus the technically correct designation is "factor proxy model".

[11] For 1988-2007, "small cap value" was the top MCBE performing portfolio, while "small cap growth" was the worst.

Red shaded time periods represent major S&P 500 bear markets and green shaded time periods represent major bull markets. There were three major bear markets (Jun 81-Jul 82, Aug 00- Sep 02, Nov 07-Feb 09) for a total of 60 (16%) of the 372 months over this time period, while there were three major bull markets (Aug 82-Jul 00, Oct 02-Oct 07, Mar 09-Dec 11) for a total of 312 (84%) of the months.

[Place Figure 2 about here]

[Place Table 2 about here]

An eyeball test of the predictive power of each behavioral measure is conducted by examining the level of each during the three major bull and three major bear markets.[12] The results are presented in Table 2 and reveal that US SMB and SI are the two best predictors of S&P 500 returns, while MCBE is the worst. Intl SMB falls somewhere in between. Of great interest to many market participants is the ability to predict painful events, such as the 2008 market crash. The only behavioral measure that successfully predicted this crash was US SMB. On the other hand, SI was a better predictor of the August 2000 – September 2002 bear market. The conclusion based on the eyeball test is that both US SMB and SI are good predictors of subsequent S&P 500 market returns, while MCBE is a very poor predictor. Intl SMB falls somewhere in between.

Figure 3 provides a comparison of US SMBs calculated in two different ways over the May 1998 through December 2012 time period. The first is the fund based US SMB already introduced. The second series is a stock based US SMB, in which the monthly strategy index return is a dollar weighted average return of the stocks held by all funds within a strategy that month. This approach to calculating US SMB captures the fund's equity returns, while excluding other

[12] Baker and Wurgler (2007) provide their own SI eyeball test over a time period extending back to 1963.

holding returns (such as cash and bonds) and management fees. Examining Figure 3 reveals that this "stripped down" US SMB is a better predictor of future market returns. In particular, relative to the fund based US SMB, it predicts the high returns of 1998 and 1999, signals the three years of negative returns from 2000 through 2002, turns up sharply in early 2003, warns in late 2007 of the 2008 crash (as did the fund based US SMB), and predicts the 2011 return doldrums. It seems investor response to the equity only holdings of a portfolio is an improved predictor of future equity market returns.[13]

A striking feature of Figure 2 is that behavioral measures vary widely over time. US SMB ranges from a high of 22% to a low of -2%. SI's ranges from a high of 18% to a low of -4%. We will see in the regression tests that follow that indeed these wide ranges are confirmed in the regression tests that follow. Thus it appears that the equity premiums vary widely over time as is predicted by the PKM.

The eyeball test just presented involves considerable judgment that might very well be called into question. To provide greater rigor, I now present time series regression results. In spite of the subjective nature of the eyeball test, the regressions produce the same general conclusions: US SMB and SI are best at predicting subsequent equity premiums, while MCBE has little or no predictive power, with Intl SMB falling somewhere in between.

Regression Tests of Behavioral Measures

The PKM model predicts that expected market returns will vary over time more than dictated by changing fundamentals. The behavioral return component of expected returns will vary over time as investment returns redistribute wealth and as individual probability assessments and risk

[13] Because our fund data is available over a longer time period, the empirical tests that follow use the fund based US SMB and Intl SMB rather stock based measures. However Figure 3 raises the possibility that equity only holdings might prove to be a superior SMB methodology.

aversion change. As a result, market indices experience heightened volatility as relative wealth weights constantly change across those who are pessimistic, optimistic, overconfident, and rational. In order to test these PKM predictions, both behavioral and fundamental measures are included in the regressions that follow.

Including the four behavioral measures of US SMB, Intl SMB, SI, and MCBE in a single regression allows for determining the relative predictive power of each. For each SMB, two monthly indicator variables are calculated. The indicator variable US SMB 1 is set equal to 1 if the monthly US SMB is one of the smallest 16% (i.e. one standard deviation below the US SMB mean) and is 0 otherwise, while US SMB 4 is set equal to 1 if the US SMB is among the largest 16%. Intl SMB 1 and 4 indicator variables are calculated similarly. Using monthly indicator variables, rather the actual SMB values, enhances the power of the following statistical tests.

Two SI indicator variables are created. SI 1 is set equal to 1 if the month beginning SI is among the largest 16% of all monthly values, zero otherwise, and SI 4 is set equal to 1 if the month beginning SI is among the smallest 16%, zero otherwise.[14]

Similarly, MCBE 1 (4) is set equal to 1 if the monthly value is one of the highest 16% (largest differences from long term ranks), zero otherwise, and MCBE 4 is set equal to 1 if it is one of the lowest 16%, zero otherwise.[15]

The next set included is comprised of four variables: trailing 1, 3, 6, and 12 month compound, non-annualized equity premiums. These account for the well documented behavioral patterns of

[14] Recall that a large SI implies that investors are overly optimistic, which leads to overpriced securities and lower future returns according to BW (2006).

[15] There is not an obvious way to determine if larger (i.e. current ranks differ from long term ranks) or smaller values are predictive of higher returns. The approach above (i.e. the closer the current ranks are to long term ranks the better) was selected since in most regressions it produced a positive relationship between MCBE and subsequent market returns.

short-term momentum, longer-term mean reversion of market returns and are included to ensure that the other variables are not proxying for these behavioral return patterns. In addition, including trailing equity premiums helps reduce the estimation problem, resulting from imperfect predictors, highlighted by Pástor and Stambaugh (2009).[16]

To account for fundamental changes, four US economic variables are included. Following the suggestion of BW (2006), trailing annual growth in US Industrial Production, US total civilian employment growth, and real US Personal Consumption Expenditures[17] along with the current month NBER Recession Indicator (1 if in recession) are included.

Time series regressions are run to test the ability of US SMB, Intl SMB, SI, and MCBE to predict subsequent equity premiums for the US stock market, the US small cap stock market, and the developed (non-US) international stock markets. The predictive relationships are then used for estimating expected equity premiums.

Monthly total returns, January 1981 through December 2011, are gathered for the S&P 500, the Russell 2000, and the Morgan Stanley Capital International's Europe, Australia and Far East index (US$ EAFE). Each return is converted into an equity premium (EP) by subtracting the monthly 3 month US T-bill rate. The four behavioral measures are included as month beginning

[16] Pástor and Stambaugh (2009) argue that if predictors of equity premiums are imperfect, the resulting parameter estimates may be upward biased. Including trailing returns helps alleviate this potential estimation problem.

[17] Savov (2011) presents evidence that municipal waste (i.e. garbage) is a superior measure of consumption than is NIPA Personal Consumption Expenditures (PCE), because it is more accurately measured and is more responsive to short term changes in personal consumption. Savov shows that the annual garbage series is more highly correlated with US and other country equity premiums and yields more plausible estimates of relative risk aversion. I tested the predictive power of both annual PCE and annual garbage over 1990 through 2010 and found just the opposite: PCE was more highly correlated with the equity premium than was garbage (0.63 vs. 0.57 based on beginning-of-the-year timing). Since I focus on predicting equity premiums and not on estimating relative risk aversion, and since the regressions that follow are monthly not annual (monthly garbage data is not available), monthly PCE is used as the measure of consumption in the regressions that follow.

values. Compound, subsequent EPs are calculated for 1, 3, 6, 12, 18, 24, and 36 month time periods. The first three EPs are un-annualized while the latter 4 are annualized.

Overlapping observations in a regression induce serially correlated residuals. Such regressions produce unbiased coefficient estimates but lead to downward biased standard errors, which in turn overstates R^2 and tests of statistical significance. The traditional approach for dealing with this problem is to apply the techniques of Hansen and Hodrick (1980) or Newey and West (1987). Instead, I use the transformed data approach of Britten-Jones, Neuberger, and Nolte (B-JNN, 2011). They propose regressing T single period (one month in my case) returns on the transformed **Z** matrix of explanatory variables, which is given by (equation 5 in B-JNN):

$$\mathbf{Z} = \mathbf{A'X(X'AAX')^{-1}X'X}, \text{ where,} \quad (1)$$

X = the (T-k+1) x J matrix of explanatory variables, with the first column comprised of 1's,
T = number of time periods (months) in the sample,
k = the length in months of the subsequent return time period (e.g. 12 if subsequent time period is 12 months),
J = number of explanatory variables, and
A = the (T −k+1) x T matrix that has entries $a_{ij} = 1$ if $i \le j \le i+k-1$ and 0's otherwise, with i = 1, . . . , T −k+1, thus A is the transformation matrix with 1's on the main diagonal and the first k−1 right off-diagonals and 0's otherwise.

Equation 1 transforms a k period, overlapping return OLS regression on J single period explanatory variables into a single period regression on a transformed set of k period, overlapping explanatory variables. By aggregating the matrix of explanatory variables in this simple way, B-JNN transforms the original regression into an equivalent representation in which the dependent variables are non-overlapping. This removes that part of the autocorrelation in the residuals which is induced by the overlapping scheme. B-JNN show that the resulting coefficient estimates are identical to those produced by an OLS k period regression. But the advantage is

that the resulting R^2 and tests of statistical significance are no longer overstated. Through Monte Carlo analysis, B-JNN show that their method performs better in finite samples than the methods applied to the original OLS regression that are in common usage.

A total of 21 B-JNN regressions are run, seven each for S&P 500, Russell 2000, and EAFE. The regressions are intended to test whether the extreme values of the four behavioral measures are predictive of subsequent EP. The resulting R^2s ranged from a low of 0.041 to a high of 0.102 with 9 of the 21 regressions significant at the 0.05 level. The trailing 12 month EP coefficient, which captures longer term mean reversion, is negative in 20 of 21 regressions and is often significant, while shorter term trialing EP coefficients vary in sign and are rarely significant. This implies consistent longer term mean reversion with little evidence of short term momentum during the sample period. The four economic variables did not provide much explanatory power, with US Personal Consumption Expenditures the best with 6 of 21 coefficients significant. This is consistent with other studies that find the market to be a leading economic indicator rather than a coincident indicator.

The tests that follow focus on the difference between the estimated 4 coefficient (the subsequent average EP associated with the largest 16% behavioral measures) and the estimated 1 coefficient (associated with the smallest 16%). This difference is designated EPD (equity premium difference). There are 84 estimated EPDs, four for each from the 21 regressions. The primary focus will be on whether these EPDs are economically and/or statistically significant. But before addressing these questions, several potential econometric problems are explored.

Stambaugh (1999) demonstrates that the coefficients from a predictive regression will be biased upward if the innovations of the lagged explanatory variables are correlated with the regression

residuals. He focuses on regressions where future market returns are regressed on lagged dividend yield, where innovation-residual correlations are high. There is little reason to believe that the B-JNN regressions suffer from a similar residual - innovation bias. But to make sure this is not a problem, I estimated the same month explanatory variable innovation - residual correlations for the 1 month S&P 500, Russell 2000 and EFAE regressions. The results are reported in Table 3. An approximate estimate of the correlation standard error is $(1-\rho^2)/\text{sqrt}(T-1)$ or 0.052, based on the 372 monthly observations in the sample. Examination of the correlations reveals that none are statistically significant. Thus there seems to be no evidence of the innovation-residual bias.

Pástor and Stambaugh (2009) argue that if predictors of equity premiums are imperfect, the resulting parameter estimates may be upward biased. Including trailing returns, as was done in the regressions, helps alleviate this potential estimation problem. A further test of this potential bias, as proposed by Pástor and Stambaugh, is to determine if the regression residuals are serially correlated. I estimated the residual serial correlations for up to a 48 month lag and found only 1% of them statistically significant (based on a 0.052 SE) and those were just barely significant. Thus the potential imperfect predictor bias does not seem to be of concern here.

The EPD results are reported in Tables 4 through 6 for the S&P 500, Russell 2000, and US$ EAFE, respectively. The primary question is whether the EPDs are economically and statistically significant. While there is an agreed upon standard for statistical significance, there is no such standard for economic significance. In a number of situations faced by corporate financial and investment managers, differences of 1% to 2% are economically important. That is, a change in the equity premium of 1% to 2% may cause management to alter their previous capital budgeting decisions or to restructure an investment portfolio's asset allocation. But to be conservative, I

will use 5% as the economically significant difference in order to account for the normal slippage when implementing a strategy that is based on empirical results. Statistical significance, on the other hand, is determined using the standard test of the difference in means between two equal size samples. The SE for such a test is the square root of: 1) sum of the two squared B-JNN coefficient SEs and 2) minus two times the covariance of the two coefficients. The resulting t-statistic is said to be significant if the p-value is less than 0.05.

[Place Tables 4 through 6 about here]

If behavioral measures are predictive of subsequent EPs, we would expect the estimated EPD's to be positive. Examining Tables 4 through 6 reveals that indeed this is the case, with 76 of 84 positive EPDs. Furthermore, nearly as many EPDs are also economically significant, with 73 of 84 exceeding the 5% threshold, with 21 exceeding 20%. The two largest EPDs are 39.7% and 35.1% for the one month SI on EAFE and US SMB on S&P 500, respectively. To obtain further insight, EPDs are plotted in Figures 3 through 5. EPDs generally decline over longer time horizons, but remain economically significant at both 24 month and 36 month time horizons. Thus the predictive power of behavioral measures persists for many months into the future. These results support the contention that behavioral measures are predictive of future equity premiums and that the differences are economically meaningful.

[Place Figures 3 through 5 about here]

Since both trailing returns and current economic variables are included in each regression, it appears that the predictive power of the four behavioral measures cannot be explained by return momentum or mean reversion, nor can it be explained by changing current economic fundamentals. The lack of economic variable explanatory power is consistent with a number of

other studies that find the stock market returns are little impacted by current economic conditions, but instead returns are predictive of future economic conditions.

This raises the question of how much of the behavioral measure predictive power is explained by future economic activity. In other words, to what extent are the behavioral measures a proxy for future economic activity. To test this, I reran the one month regressions using three month to 15 month ahead growth in US Industrial Production, US total civilian employment growth, and real US Personal Consumption Expenditures, along with the 6 month ahead NBER recession indicator. The results are reported in Table 7. Comparing these to the results in the first column of Tables 4-6 reveals that, while on average EPD decreased (a few actually increased), the general pattern remains the same: SI is both economically and statistically significant and US SMB is economically and sometimes statistically significant, while both Intl SMB and MCBE results are mixed and generally weaker than the other two. Thus it appears that the behavioral measures are capturing something beyond current as well as future economic conditions. This provides further support for the PKM prediction that return volatility exceeds the volatility induced by changing economic fundamentals.

[Place Table 7 about here]

Statistical significance is measured by means of the B-JNN p-value reported below each EPD in Tables 4 through 6. Bold p-values are statistically significant at the 0.05 level. Based on EPD and statistical significance, the behavioral measures rank as SI being the best, US and Intl SMB next, and MCBE last. But each predicts best in different markets and over different time horizons. In fact, the four measures are largely independent of one another, as is evident in the behavioral measure correlations reported in Table 8. Thus US SMB, Intl SMB, SI, and MCBE

are complementary and the best EP predictions are obtained when all four are included in the prediction equation.

I have just shown that explained EP variation is mostly due to changes in behavioral measures and, to a much lesser extent, changes in fundamentals. Using these predictive relationships, expected EPs can be estimated. Figures 7-9 present both expected and subsequent annual EPs for the S&P 500, Russell 2000, and EAFE, respectively. Expected 12 month EPs are estimated based on beginning of the month US SMB, Intl SMB, SI, MCBE; the four trailing EPs; and the three trailing economic variables along with the current NBER recession indicator. The resulting range of expected and actual EPs are reported in Table 9. On average, the range of expected EPs is 60%, while the range of actual EPs is 115% over these three markets. The range of expected EPs is stunningly large. But even with these wide ranges, the subsequent EP range is nearly twice as wide in each of the three markets. An inspection of Figures 7-9 reveal expected EPs pick up the general pattern of subsequent EPs, but not the extremes, such as those in the early 1980's, late 1990's, early 2000's, and 2008-09. Some would argue that picking up such extreme returns (i.e. tail events or "black swans") is not possible or even desirable. The overall conclusion is that expected EPs vary dramatically over time and that behavioral measures are important drivers of this variability.

[Place Table 9 about here]

[Place Figures 7-9 about here]

The predictive power of the behavioral measures can be used in a number of ways. Such predictions might be used to time among the four markets: large stocks, small stocks, international stocks, and cash. They could be used to determine the extent of long or short

leverage in each of these markets. In the corporate finance area, they could be used to help estimate the firm's cost of capital for determining the profitability of capital budgeting projects.

To test the potential usefulness of these predictions, Table 10 reports the results of simple prediction and trading rules, in which the market portfolio is held over the subsequent 12 months if the predicted EP is positive or 3 month T-bills are held if it is negative. Examination of the economic variable only predictions in Table 10 shows that they are much less accurate and at times do worse than a coin flip. On the other hand, the 12 month and 36 month predictions based on both economic and behavioral variables correctly predict the sign of the subsequent EP between 64% and 82% of the time. For example, the S&P 500 12 month EP predictions are 83% correct when predicting a positive EP, 68% correct when predicating a negative EP, and 80% correct overall. Adding the trailing return and behavioral variables substantially improves prediction accuracy in all three markets.

[Place Table 10 about here]

Table 10 reports the average subsequent EPs for three investment strategies: 1) buy & hold, 2) investing in the market when the economic variable only beginning of month EP prediction is positive and investing in 3 month T-bills if negative, and 3) the same strategy based on adding behavior measures to the prediction equation. These subsequent EP improvements are also summarized in Figure 10 (12 month EPs) and Figure 11 (36 month EPs). The results are consistent with the prediction accuracy just reported. The economic only prediction sometimes improves subsequent EPs and sometimes not. In those cases where there are improvements, the gain is small. On the other hand, adding trailing returns and behavioral variables improves subsequent EPs in each situation, anywhere from 20bp (36 month Russell 2000 EPs) to as much as 313bp (12 month EAFE EPs). So a simple prediction and trading rule, which does not take

full advantage of the range of timing/instrument opportunities, generates higher subsequent returns. Most of these gains are driven by changing behavioral measures and not by changes in economic fundamentals.

[Place Figures 10 and 11 about here]

V. Concluding Remarks

I test two PKM predictions: expected equity premiums vary considerably over time and are driven by both behavioral and fundamental variables. I test these by examining the predictive power of Baker and Wurgler's (2006) Sentiment Index, which they hypothesize captures the extent to which investors are either optimistic or pessimistic and the predictive power of Strategy Market Barometers, which capture performance ranks for various equity strategies. Also included as a behavioral measure are market cap – book to equity portfolio ranks (MCBE), which provide a direct test of the return factor capturing ability of these popular stock characteristics. In addition, trailing equity premiums (EP), which account for the well documented short term momentum, long term mean reversion features of the market and economic variables, to account for changing fundaments, are included. The resulting S&P 500, Russell 2000, and EAFE EP regression R^2s range from a low of 0.041 to a high of 0.102, with 9 of the 21 regressions significant at the 0.05 level. The Sentiment Index provides the greatest predictive power, US and International Strategy Market Barometers are next, and MCBE is least predictive. The four behavioral measures are largely uncorrelated, so their predictive contributions are additive.

The equity premium differences (EPDs, highest behavioral measure EPs minus low behavioral measure EPs) are economically highly significant (reaching 40% annually) and are often statistically significant. Since behavioral measures are predictive of subsequent EPs, they are

important measures of expected market returns. I find that the range of expected annual EPs averages 60% over the three markets over the January 1981 through December 2012 time period. Behavioral measures account for the vast majority of the explained variability, while fundamentals account for very little. Thus my results are consistent with the two PKM predictions that expected market returns vary widely over time and both fundamental and behavioral variables contribute to this variability.

The fact that the Barometers add significant predictive power to that of the Sentiment Index raises the question of whether there are other investor based measures that, if included, could improve predictive power. The Sentiment Index is based on 6 objective measures which are thought to capture the level of optimism/pessimism among equity investors. The open question is whether there are other measures, behavioral or fundamental, capable of further enhancing predictive power. Obvious candidates are the payout yield as proposed by Boudoukh et. al, (2007) and improved predictions of future economic activity.

The measured EPD magnitudes are hard to ignore, with many exceeding 20% annually. For corporate finance, this means firms face dramatically different equity capital costs over time and it seems important to consider such wide variations when making business investment decisions. In addition, the equity premium, which is part of the standard firm level cost of equity calculation, is far from constant and thus frequent re-estimation is required.

For investment management, there is a case to be made for market timing. This study suggests the possibility of superior returns when markets are timed on a monthly basis. The combination of superior stock picking skill, as documented by Cohen (2009) and others, and Sentiment and Barometer based market timing could lead to superior portfolios. The question always asked in

such situations is whether skill/timing portfolios can continue to generate superior returns going forward. For those who believe in informationally efficient markets, this statement would be summarily dismissed as there is a belief that rational investors will quickly arbitrage away such opportunities. But in view of the growing body of behavioral and fund manager skill research, it is harder to dismiss such possibilities out of hand. Whether investor arbitrage is sufficient or whether such opportunities will persist over extended periods will be a hotly debated for years to come.

So why do market expected returns vary dramatically over time? The traditional response is that they change due to time varying risk premiums. But with the introduction of investor behavior, it is increasingly difficult to identify and measure the separate impact of risk on expected returns. Breaking the market return premium into the separate components driven by risk, investor behavior, and economic fundamentals remains an open and challenging research question, made more so by the lack of a credible model of risk.[18]

Finally, this study focuses on equity markets, since this is the only market for which the strategy being pursued by active managers has been identified and, in turn, used to form strategy peer groups, the basis for Market Barometers. But there is no reason why we have to limit ourselves to equity markets, as the strategy identification and peer group formation process is applicable to any asset class in which active managers are attempting to beat a market index. Once completed, Barometers unique to each asset class can be constructed and then tested to determine if they are useful for predicting market returns. Thus investment strategy can become the unifying concept across all markets in which active managers operate and the resulting Barometers may make it

[18] See, for example, Fama and French (2004) for a dreary assessment of the usefulness of the CAPM as a risk model.

possible to anticipate expected returns within each of these markets. Much remains to be done before such a structure emerges.

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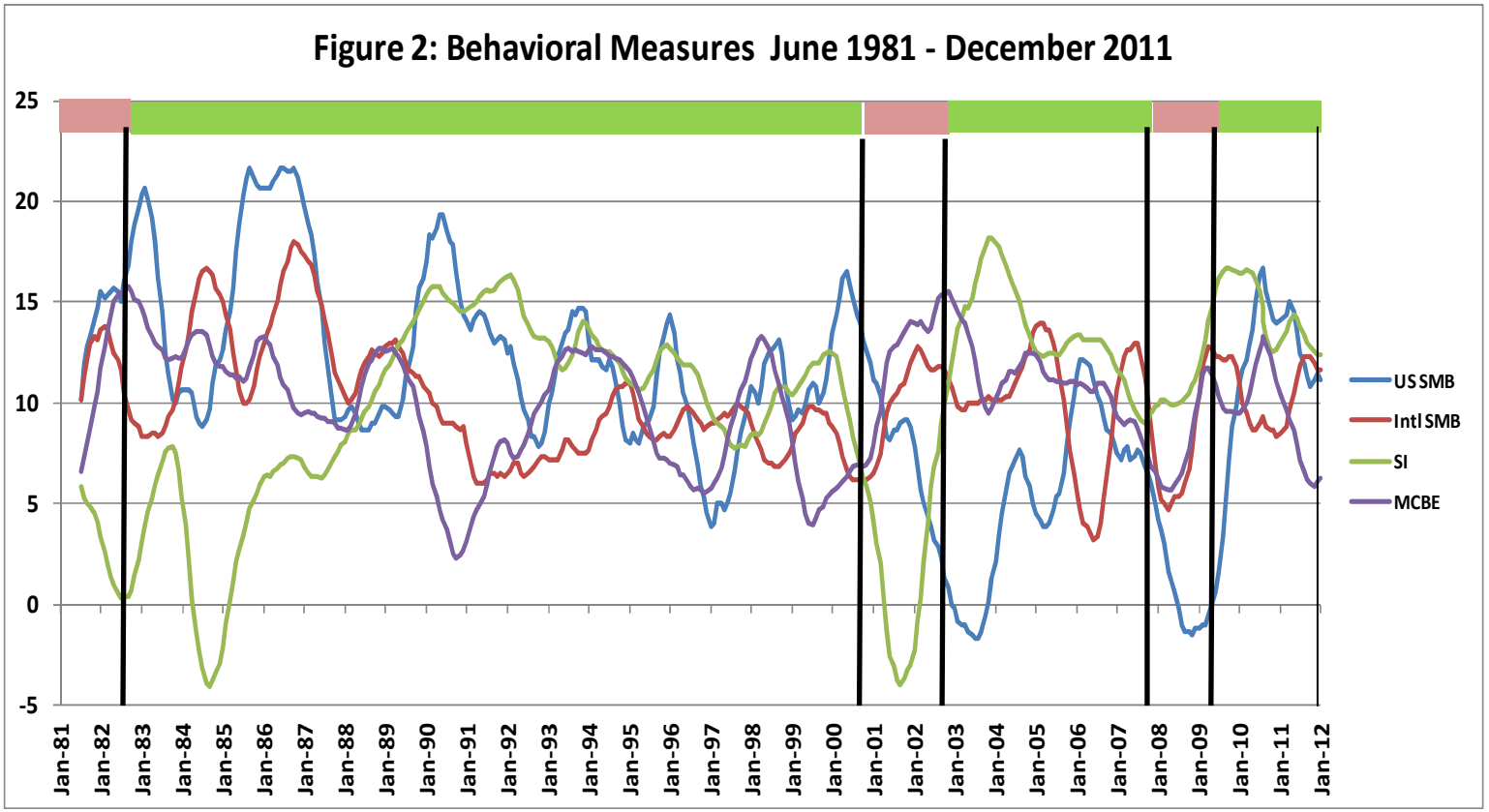
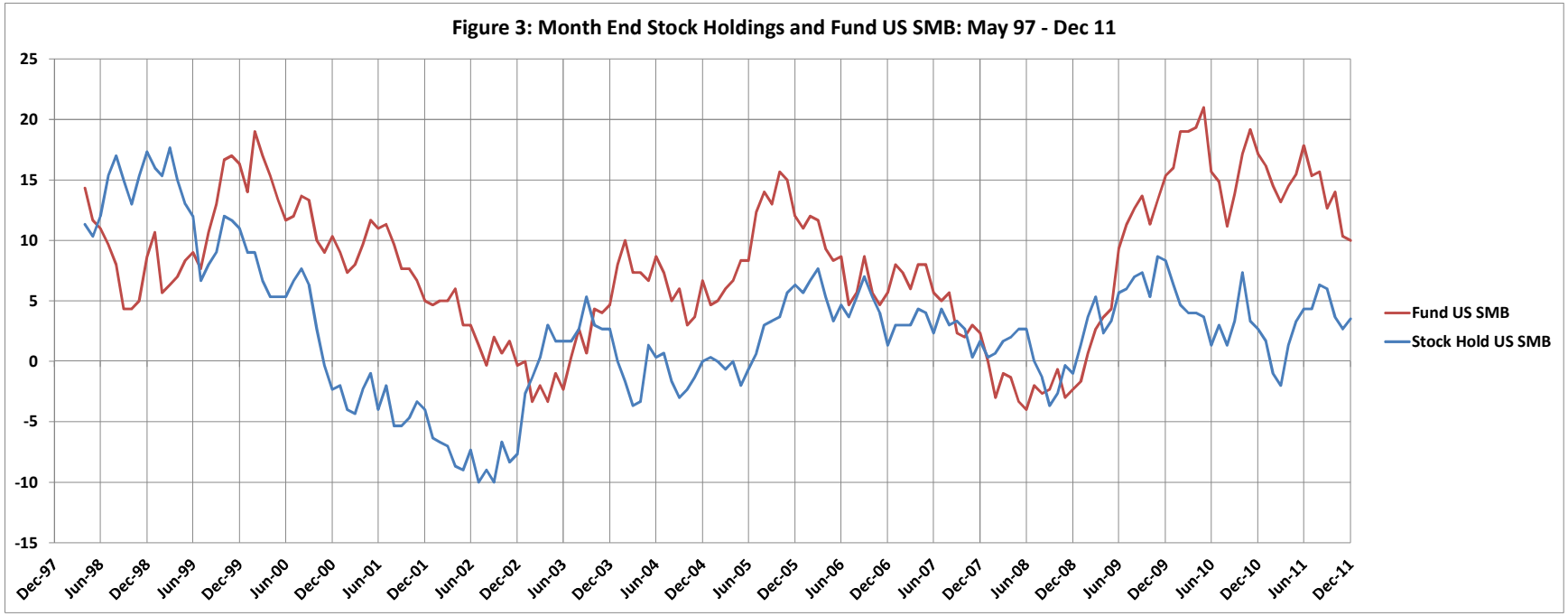
Figure 1: Investor Strategy Demand Dynamics



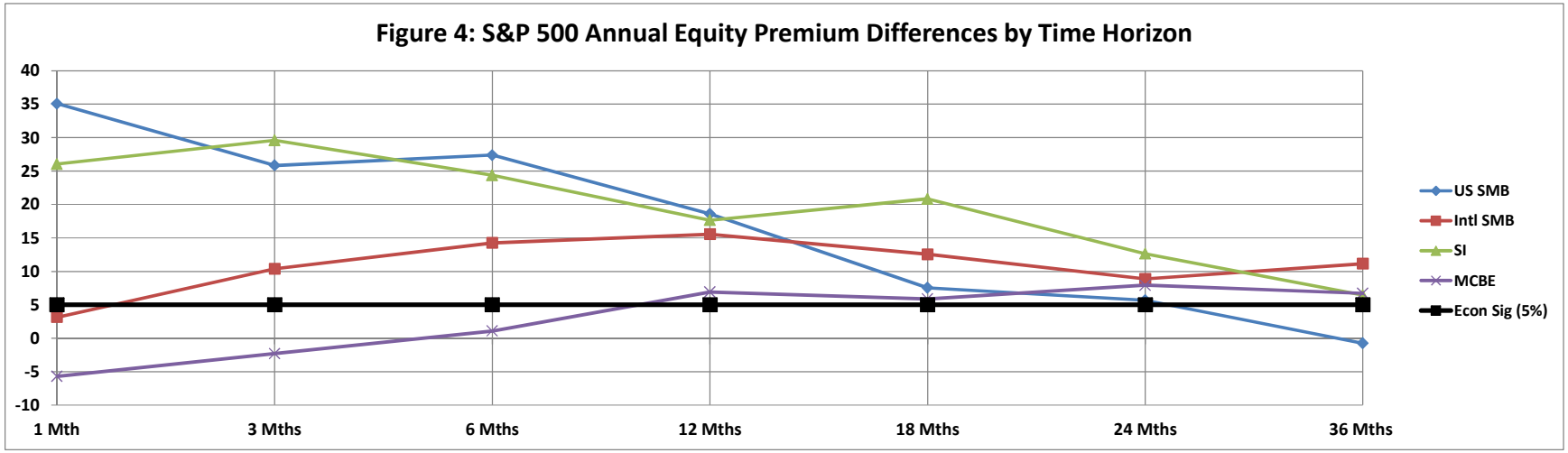
This figure reports the beginning of month, trailing 6 month average for the four behavioral measures US Strategic Market Barometer (US SMB), International Strategy Market Barometer (Intl SMB), Sentiment Index (SI), and market cap – book to equity portfolio rank (MCBE). The US SMB and Intl SMB are based on the trailing 12 month performance ranks for the 10 US and International strategies, respectively. SI is the inverse of the Baker & Wurgler's (2006) sentiment index and, for comparison purposes, is scaled to a mean of 10% and standard deviation of 5%, similar to the corresponding values for US SMB. MCBE is based on the 12 month trailing performance ranks of nine market cap – book to equity portfolios as created by Fama & French and, for comparison purposes, is scaled to a mean of 10% and standard deviation of 3%, similar to the corresponding values for Intl SMB. The green shaded time periods represent major S&P 500 bull markets while the red shaded time periods represent major bear markets.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.



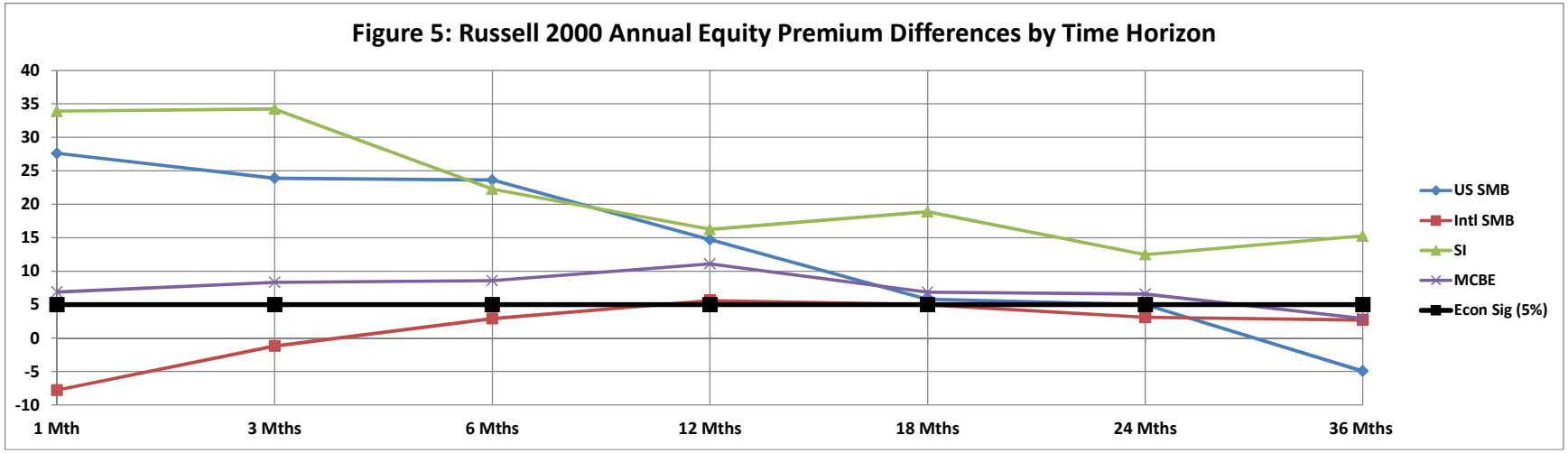
This figure compares the month ending US SMBs, over the time period May 1997 to December 2011, based on the fund returns methodology described previously and the dollar weighted returns for those stocks held by the funds in each strategy. Both the stock holding and fund US SMBs are based on the trailing 12 month performance ranks for the 10 US strategies versus the 1988-2007 fund strategy performance ranks.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.



This figure reports the annualized equity premium differences derived from the January 1981 - December 2011, one month S&P 500 LN equity premiums (net of 3 month T-bills), B-JNN (Britten-Jones, Neuberger, and Nolte, 2011) transformed regressions, which include eight behavioral indicator variables, four trailing equity premiums, and four economic measures as explanatory variables. Two indicator variables are created for each behavioral measure. US (Intl) SMB 1 (4) is equal to 1 if the US (International) Strategy Market Barometer was in the lowest (highest) 16% at the beginning of the month, zero otherwise. SI 1 (4) is 1 if the Baker & Wurgler (2006) unadjusted Sentiment Index was in the highest (lowest) 16% at the beginning of the month, zero otherwise. MCBE are beginning of the month trailing 12 month average sum of absolute rank differences, versus 1988-2007 performance ranks, for nine market cap - book to equity portfolios. MCBE 1 (4) is equal to 1 if the average absolute sum was in the highest (lowest) 16% at the beginning of the month, zero otherwise. One, three, six, and twelve month trailing S&P 500 equity premiums are beginning of the month trailing unannnualized compound returns. The four economic variables are beginning of the month, trailing annual growth in US Industrial Production Index, total US civilian employment, and real US Personal Consumption Expenditure, as well as the current month NBER US recession index. The equity premium difference is the 4 (i.e. high behavioral measure) indicator variable coefficient minus the 1 coefficient.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.



This figure reports the annualized equity premium differences derived from the January 1981 - December 2011, one month Russell 2000 LN equity premiums (net of 3 month T-bills), B-JNN (Britten-Jones, Neuberger, and Nolte, 2011) transformed regressions, which include eight behavioral indicator variables, four trailing equity premiums, and four economic measures as explanatory variables. Two indicator variables are created for each behavioral measure. US (Intl) SMB 1 (4) is equal to 1 if the US (International) Strategy Market Barometer was in the lowest (highest) 16% at the beginning of the month, zero otherwise. SI 1 (4) is 1 if the Baker & Wurgler (2006) unadjusted Sentiment Index was in the highest (lowest) 16% at the beginning of the month, zero otherwise. MCBE are beginning of the month trailing 12 month average sum of absolute rank differences, versus 1988-2007 performance ranks, for nine market cap - book to equity portfolios. MCBE 1 (4) is equal to 1 if the average absolute sum was in the highest (lowest) 16% at the beginning of the month, zero otherwise. One, three, six, and twelve month trailing S&P 500 equity premiums are beginning of the month trailing unannnualized compound returns. The four economic variables are beginning of the month, trailing annual growth in US Industrial Production Index, total US civilian employment, and real US Personal Consumption Expenditure, as well as the current month NBER US recession index. The equity premium difference is the 4 (i.e. high behavioral measure) indicator variable coefficient minus the 1 coefficient.

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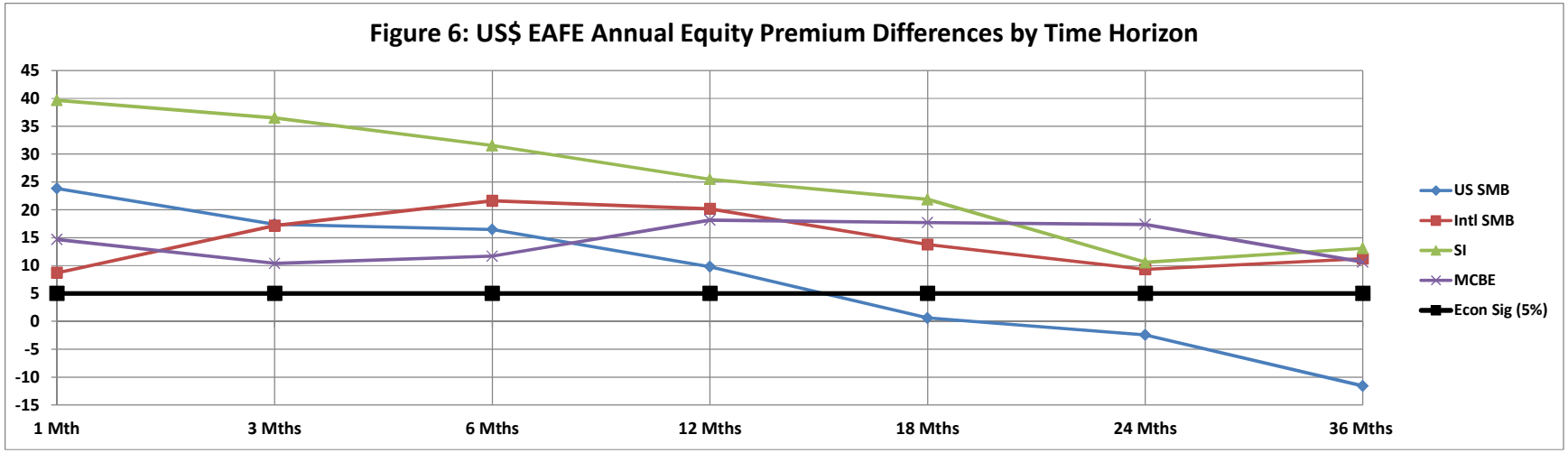

This figure reports the annualized equity premium differences derived from the January 1981 - December 2011, one month US$ EAFE LN equity premiums (net of 3 month T-bills), B-JNN (Britten-Jones, Neuberger, and Nolte, 2011) transformed regressions, which include eight behavioral indicator variables, four trailing equity premiums, and four economic measures as explanatory variables. Two indicator variables are created for each behavioral measure. US (Intl) SMB 1 (4) is equal to 1 if the US (International) Strategy Market Barometer was in the lowest (highest) 16% at the beginning of the month, zero otherwise. SI 1 (4) is 1 if the Baker & Wurgler (2006) unadjusted Sentiment Index was in the highest (lowest) 16% at the beginning of the month, zero otherwise. MCBE are beginning of the month trailing 12 month average sum of absolute rank differences, versus 1988-2007 performance ranks, for nine market cap - book to equity portfolios. MCBE 1 (4) is equal to 1 if the average absolute sum was in the highest (lowest) 16% at the beginning of the month, zero otherwise. One, three, six, and twelve month trailing S&P 500 equity premiums are beginning of the month trailing unannnualized compound returns. The four economic variables are beginning of the month, trailing annual growth in US Industrial Production Index, total US civilian employment, and real US Personal Consumption Expenditure, as well as the current month NBER US recession index. The equity premium difference is the 4 (i.e. high behavioral measure) indicator variable coefficient minus the 1 coefficient.

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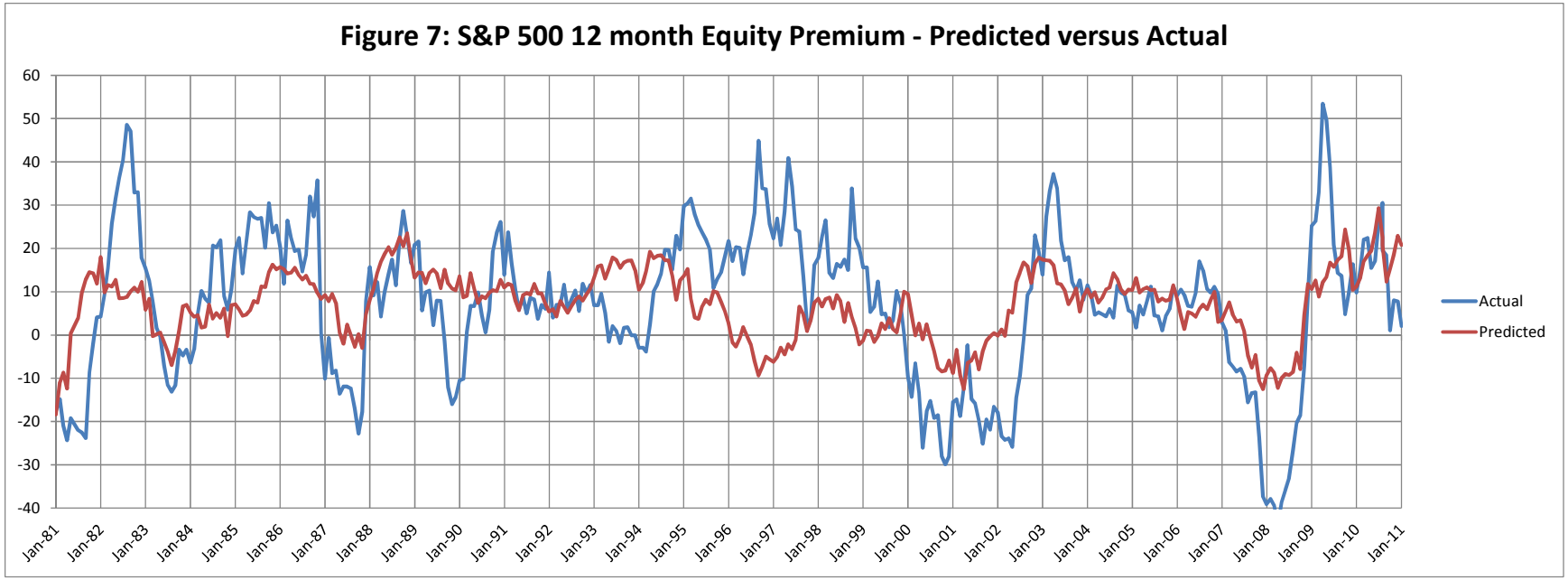
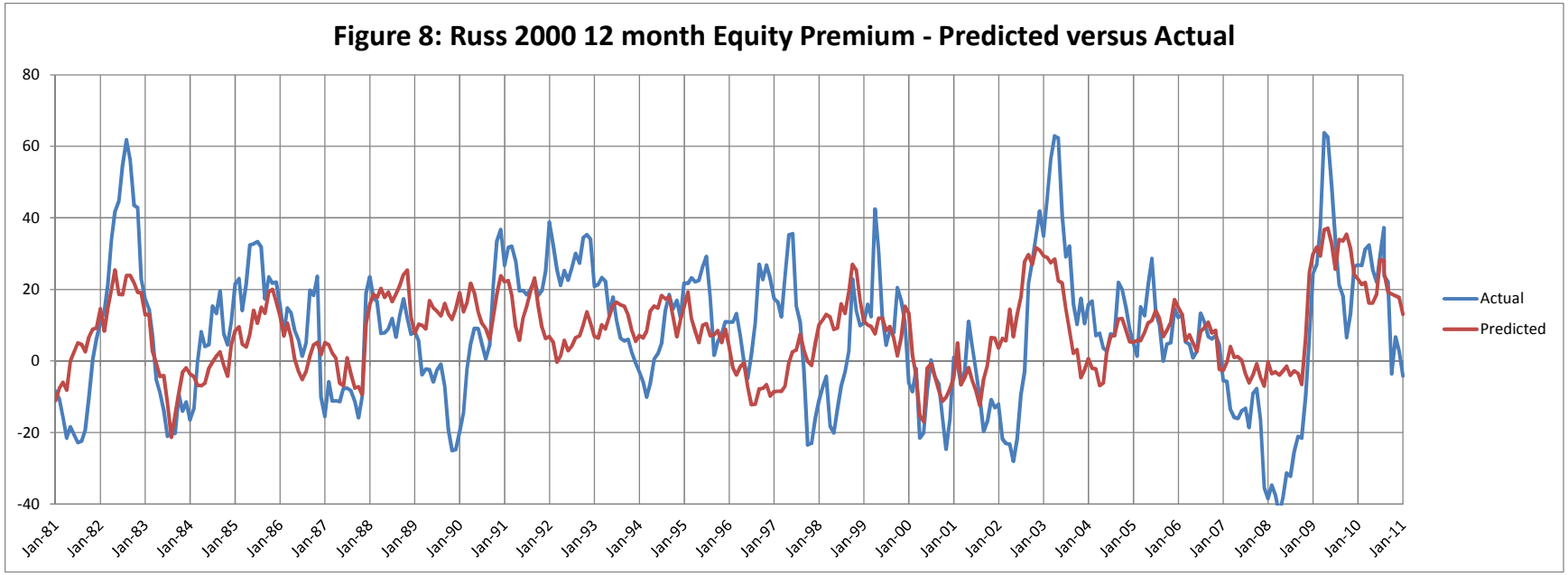


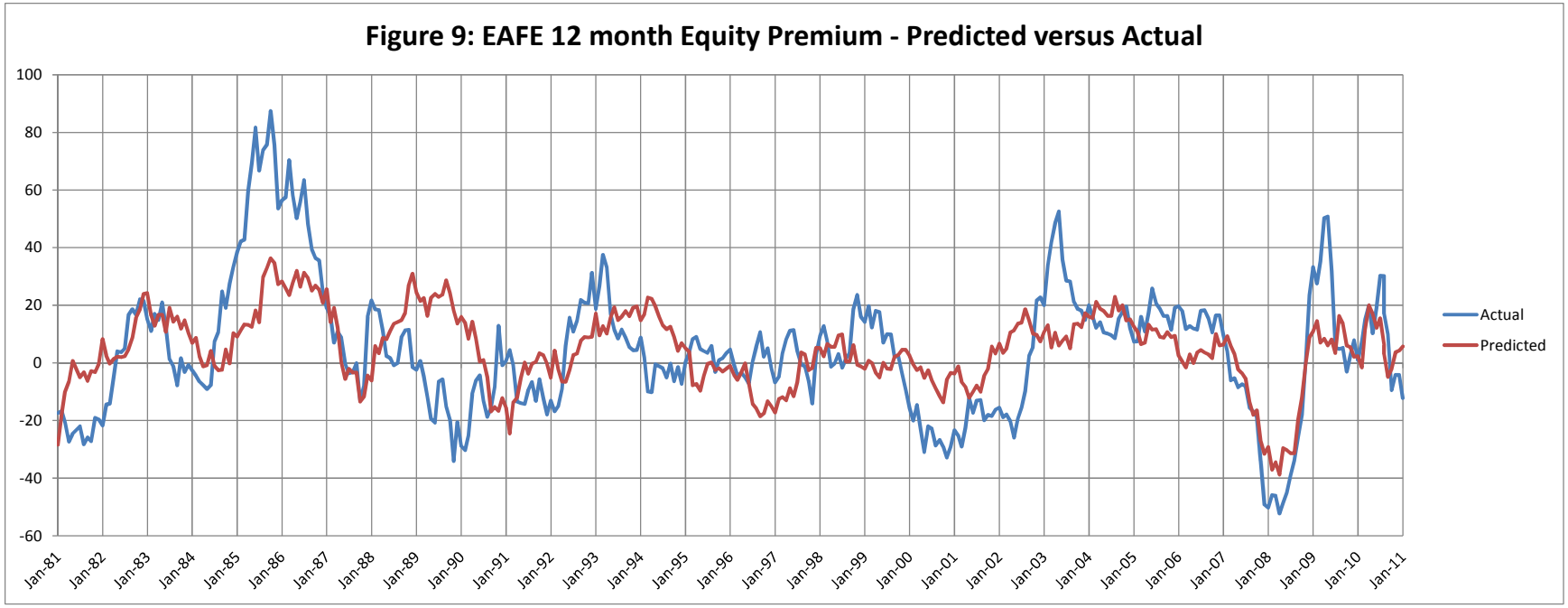
The predicted 12 month, annual S&P 500 equity premium is based on beginning of the month US Strategic Market Barometer (US SMB), International Strategy Market Barometer (Intl SMB), negative Sentiment Index (SI), and MCBE, as well as the four trailing equity premiums (1, 3,6 and 12 month) and the four trailing US economic variables (annual growth in Industrial Production, Total Employment, and Personal Consumption Expenditures, along with the current month NBER US recession index), using the coefficients from a B-JNN transformed regression on subsequent month LN of the S&P 500 equity premium (net of 3 month T-bill. See footnotes to Figure 4 for an explanation of how each variable is calculated.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.



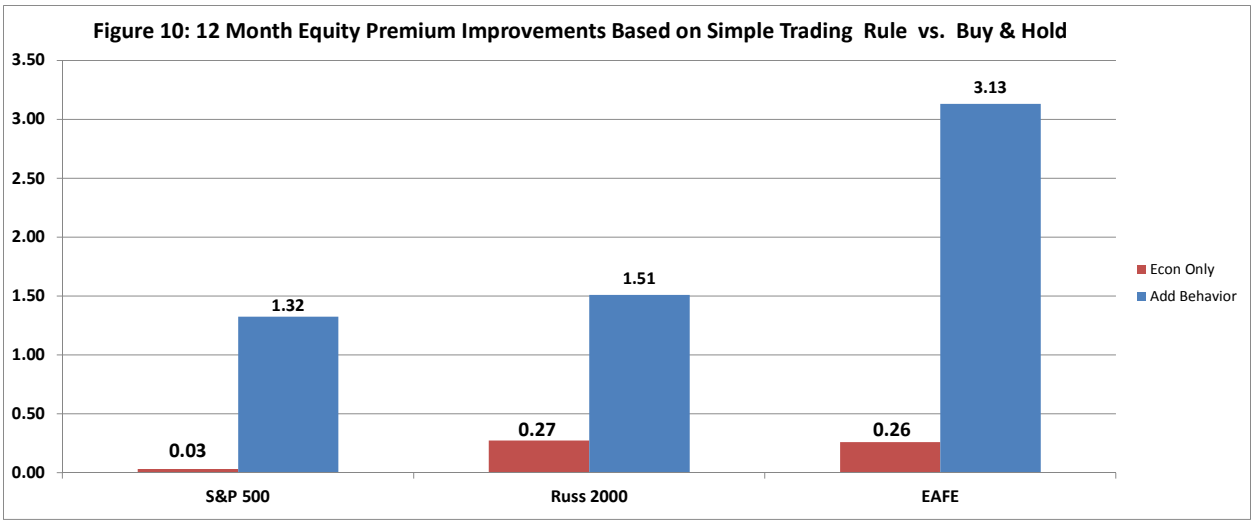
The predicted 12 month, annual Russell 2000 equity premium is based on beginning of the month US Strategic Market Barometer (US SMB), International Strategy Market Barometer (Intl SMB), negative Sentiment Index (SI), and MCBE, as well as the four trailing equity premiums (1, 3, 6 and 12 month) and the four trailing US economic variables (annual growth in Industrial Production, Total Employment, and Personal Consumption Expenditures, along with the current month NBER US recession index), using the coefficients from a B-JNN transformed regression on subsequent month LN of the Russell 2000 equity premium (net of 3 month T-bill). See footnotes to Figure 5 for an explanation of how each variable is calculated.

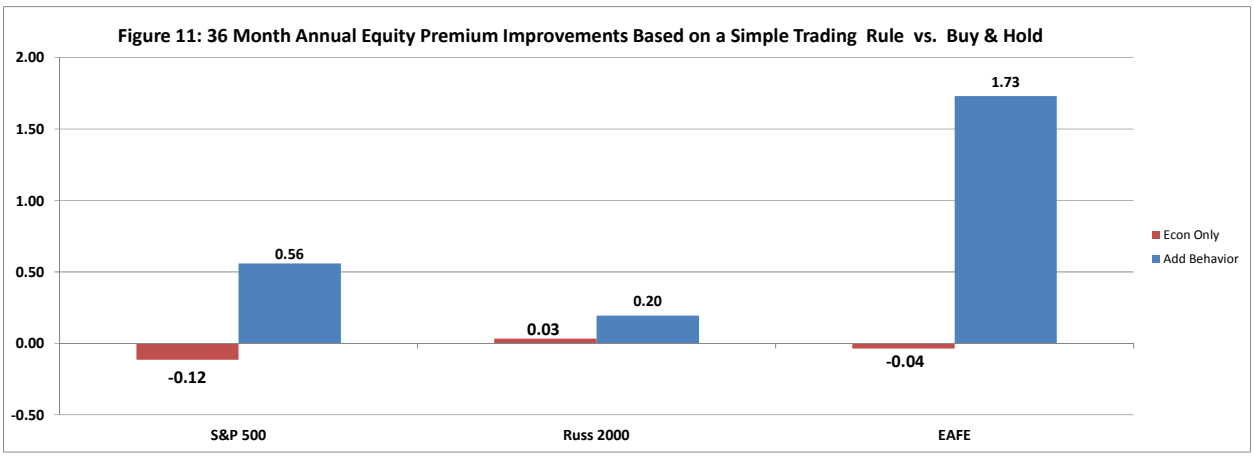
Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.



The predicted 12 month, annual EAFE equity premium is based on beginning of the month US Strategic Market Barometer (US SMB), International Strategy Market Barometer (Intl SMB), negative Sentiment Index (SI), and MCBE, as well as the four trailing equity premiums (1, 3, 6 and 12 month) and the four trailing US economic variables (annual growth in Industrial Production, Total Employment, and Personal Consumption Expenditures, along with the current month NBER US recession index), using the coefficients from a B-JNN transformed regression on subsequent month LN of the EAFE equity premium (net of 3 month T-bill. See footnotes to Figure 6 for an explanation of how each variable is calculated.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.





These figures report the gain, versus a buy and hold strategy, in realized equity premium (EP) using a simple trading rule of investing in the market when the beginning of the month prediction is positive and in T-bills when it is negative. The equity premium predictions are based on the January 1981 - December 2011, B-JNN (Britten-Jones, Neuberger, and Nolte, 2011) regression of LN monthly equity premiums (net of 3 month T-bills) on transformed beginning of the month behavioral variables, trailing equity premiums, and economic measures. The four behavioral measures are US Strategy Market Barometer (US SMB), International Strategy Market Barometer (Intl SMB), the negative of the Baker & Wurgler (2006) unadjusted Sentiment Index (SI), and market cap – book to equity portfolio ranks (MCBE). The one, three, six, and twelve month trailing EPs are beginning of the month trailing unannualized compound EPs. The four economic variables are beginning of the month, trailing annual growth in US Industrial Production Index, total US civilian employment, and real US Personal Consumption Expenditure, as well as the current month NBER US recession index. The Econ Only results are based on the four economic variables only, while the Add Behavior results are based on all 12 variables.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.

Table 1: US and International Equity Strategies

Competitive Position: Business principles, including quality of management, market power, product reputation, and competitive advantage. Considers the sustainability of the business model and history of adapting to market changes.

Economic Conditions: Top down approach based on economic fundamentals; can include employment, productivity, inflation, and industrial output. Gauges where overall economy is in business cycle, the resulting supply and demand situations in various industries, and the best stocks to purchase as a result.

Future Growth: Companies poised to grow rapidly relative to others. The Future Growth and Valuation strategies are not mutually exclusive and can both be deemed important in the investment process.

Market Conditions: Consideration of stock's recent price and volume history relative to the market and similar stocks as well as the overall stock market conditions.

Opportunity: Unique opportunities that may exist for a small number of stocks or at different points in time. May involve combining stocks and derivatives and may involve use of considerable leverage. Many hedge fund managers follow this strategy, but a mutual fund manager may also be so classified.

Profitability: Company profitability, such as gross margin, operating margin, net margin and return on equity.

Quantitative: Mathematical and statistical inefficiencies in market and individual stock pricing. Involves mathematical and statistical modeling with little or no regard to company and market fundamentals.

Risk: Control overall risk, with increasing returns a secondary consideration. Risk measures considered may include beta, volatility, company financials, industry and sector exposures, country exposures, and economic and market risk factors.

Social Considerations: Company's ethical, environmental, and business practices as well as an evaluation of the company's business lines in light of the current social and political climate. A manager can look for these criteria or the lack of in selecting an stock.

Valuation: Stocks selling cheaply compared to peer stocks based on accounting ratios and valuation techniques. The Valuation and Future Growth strategies are not mutually exclusive and can both be deemed important in the investment process.

Table 2: Eyeball Test of Behavioral Measure Prediction of S&P 500				
Bull/Bear	**US SMB**	**Intl SMB**	**SI**	**MCBE**
Bear: Jan81-Jul82	Poor	Poor	Good	Poor
Bull: Aug82-Jul00	Good	Poor	Good	Poor
Bear: Aug00-Sep02	Good	Poor	Good	Poor
Bull: Oct02-Oct07	Poor	Good	Good	Good
Bear: Nov07-Feb09	Good	Good	Poor	Good
Bull: Mar09-Dec11	Good	Good	Good	Poor

This table reports the ability, as judged by examining Figure 2, to predict the S&P 500 for the four behavioral measures US Strategic Market Barometer (US SMB), International Strategy Market Barometer (Intl SMB), Sentiment Index (SI), and market cap – book to equity portfolio rank (MCBE). The US SMB and Intl SMB are based on the trailing 12 month performance ranks for the 10 US and International strategies, respectively. SI is the inverse of the Baker & Wurgler's (2006) sentiment index and, for comparison purposes, is scaled to a mean of 10% and standard deviation of 5%, similar to the corresponding values for US SMB. MCBE is based on the 12 month trailing performance ranks of nine market cap – book to equity portfolios as created by Fama & French and, for comparison purposes, is scaled to a mean of 10% and standard deviation of 3%, similar to the corresponding values for Intl SMB. The green shaded time periods in Figure 2 represent major S&P 500 bull markets while the red shaded time periods represent major bear markets.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.

	Table 3: Correlations of 1 month B-JNN Regression Residuals and Explanatory Innovations													
	US SMB 1	US SMB 4	Intl SMB 1	Intl SMB 4	SI SMB 1	SI SMB 4	MCBE 1	MCBE 4	tr 1 Mth	tr 3 Mth	tr 6 Mth	tr 12 Mth	IP G	Employ G
S&P 500	0.012	0.012	0.038	-0.039	0.035	-0.020	0.021	-0.028	0.022	0.011	-0.014	0.011	-0.087	-0.036
Russ 2000	0.002	-0.002	0.069	-0.019	-0.007	-0.059	0.027	-0.023	0.016	0.005	-0.010	0.028	-0.068	0.007
EAFE	0.044	-0.038	0.028	-0.059	-0.043	0.015	0.043	0.025	0.050	-0.020	0.037	0.019	-0.103	-0.027

This table reports the January 1981 - December 2011 correlations of one month B-JNN (Britten-Jones, Neuberger, and Nolte, 2011) transformed regression residuals and same month explanatory variable innovations. The correlations provide a test of potential bias in the coefficient estimates as demonstrated by Stambaugh (1999). The 16 explanatory variables are comprised of eight behavioral indicator variables, four trailing equity premiums, and four economic measures. Two indicator variables are created for each behavioral measure. US (Intl) SMB 1 (4) is equal to 1 if the US (International) Strategy Market Barometer was in the lowest (highest) 16% at the beginning of the month, zero otherwise. SI 1 (4) is 1 if the Baker & Wurgler (2006) unadjusted Sentiment Index was in the highest (lowest) 16% at the beginning of the month, zero otherwise. MCBE are beginning of the month trailing 12 month average sum of absolute rank differences, versus 1988-2007 performance ranks, for nine market cap - book to equity portfolios. MCBE 1 (4) is equal to 1 if the average absolute sum was in the highest (lowest) 16% at the beginning of the month, zero otherwise. One, three, six, and twelve month trailing S&P 500 equity premiums are beginning of the month trailing unannnualized compound returns. The four economic variables are beginning of the month, trailing annual growth in US Industrial Production Index, total US civilian employment, and real US Personal Consumption Expenditure, as well as the current month NBER US recession index.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.

Table 4: S&P 500 Annual Equity Premium Differences

	1 Mth	3 Mths	6 Mths	12 Mths	18 Mths	24 Mths	36 Mths
US SMB	***35.1***	***25.8***	***27.4***	***18.6***	7.5	5.7	-0.7
B-JNN p-value	***0.004***	***0.011***	***0.004***	***0.020***	0.174	0.219	0.542
Intl SMB	3.2	10.4	14.3	***15.5***	***12.5***	8.9	11.1
B-JNN p-value	0.399	0.164	0.062	***0.026***	***0.038***	0.081	0.025
SI	***26.0***	***29.6***	***24.4***	17.7	***20.8***	12.6	6.5
B-JNN p-value	***0.032***	***0.012***	***0.025***	0.059	***0.021***	0.089	0.222
MCBE	-5.7	-2.3	1.1	6.9	5.9	7.9	6.7
B-JNN p-value	0.667	0.581	0.455	0.186	0.180	0.079	0.055

This table reports the annualized equity premium differences (EPD) derived from the January 1981 - December 2011, one month S&P 500 LN equity premiums (net of 3 month T-bills), B-JNN (Britten-Jones, Neuberger, and Nolte, 2011) transformed regressions, which include eight behavioral indicator variables, four trailing equity premiums returns, and four economic measures as explanatory variables. Two indicator variables are created for each behavioral measure. US (Intl) SMB 1 (4) is equal to 1 if the US (International) Strategy Market Barometer was in the lowest (highest) 16% at the beginning of the month, zero otherwise. SI 1 (4) is 1 if the Baker & Wurgler (2006) unadjusted Sentiment Index was in the highest (lowest) 16% at the beginning of the month, zero otherwise. MCBE are beginning of the month trailing 12 month average sum of absolute rank differences, versus 1988-2007 performance ranks, for nine market cap - book to equity portfolios. MCBE 1 (4) is equal to 1 if the average absolute sum was in the highest (lowest) 16% at the beginning of the month, zero otherwise. One, three, six, and twelve month trailing S&P 500 equity premiums are beginning of the month trailing unannnualized compound returns. The four economic variables are beginning of the month, trailing annual growth in US Industrial Production Index, total US civilian employment, and real US Personal Consumption Expenditure, as well as the current month NBER US recession index. The equity premium difference is the 4 (i.e. high behavioral measure) indicator variable coefficient minus the 1 coefficient. The B-JNN p-values (bold significant at 5%) are based on the standard error of the difference, calculated as the square root of the sum of the squared B-JNN SE's for the two coefficients, minus the 4,1 index correlation times the product of the two SE's.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.

Table 5: Russell 2000 Annual Equity Premium Differences

	1 Mth	3 Mths	6 Mths	12 Mths	18 Mths	24 Mths	36 Mths
US SMB	***27.6***	***23.9***	***23.6***	14.7	5.8	5.0	-4.9
B-JNNN p-value	***0.036***	***0.038***	***0.028***	0.087	0.274	0.288	0.731
Intl SMB	-7.8	-1.2	2.9	5.6	5.0	3.1	2.7
B-JNNN p-value	0.702	0.537	0.398	0.279	0.279	0.347	0.334
SI	***33.9***	***34.2***	22.3	16.3	18.9	12.5	15.3
B-JNNN p-value	***0.021***	***0.014***	0.068	0.117	0.065	0.139	0.058
MCBE	6.9	8.3	8.6	11.1	6.9	6.6	2.9
B-JNNN p-value	0.331	0.267	0.228	0.117	0.189	0.170	0.278

This table reports the annualized equity premium differences (EPD) derived from the January 1981 - December 2011, one month Russell 2000 LN equity premiums (net of 3 month T-bills), B-JNN (Britten-Jones, Neuberger, and Nolte, 2011) transformed regressions, which include eight behavioral indicator variables, four trailing equity premiums, and four economic measures as explanatory variables. Two indicator variables are created for each behavioral measure. US (Intl) SMB 1 (4) is equal to 1 if the US (International) Strategy Market Barometer was in the lowest (highest) 16% at the beginning of the month, zero otherwise. SI 1 (4) is 1 if the Baker & Wurgler (2006) unadjusted Sentiment Index was in the highest (lowest) 16% at the beginning of the month, zero otherwise. MCBE are beginning of the month trailing 12 month average sum of absolute rank differences, versus 1988-2007 performance ranks, for nine market cap - book to equity portfolios. MCBE 1 (4) is equal to 1 if the average absolute sum was in the highest (lowest) 16% at the beginning of the month, zero otherwise. One, three, six, and twelve month trailing S&P 500 equity premiums are beginning of the month trailing unannnualized compound returns. The four economic variables are beginning of the month, trailing annual growth in US Industrial Production Index, total US civilian employment, and real US Personal Consumption Expenditure, as well as the current month NBER US recession index. The equity premium difference is the 4 (i.e. high behavioral measure) indicator variable coefficient minus the 1 coefficient. The B-JNN p-values (bold significant at 5%) are based on the standard error of the difference, calculated as the square root of the sum of the squared B-JNN SE's for the two coefficients, minus the 4,1 index correlation times the product of the two SE's.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.

Table 6: US$ EAFE Annual Equity Premium Differences

	1 Mth	3 Mths	6 Mths	12 Mths	18 Mths	24 Mths	36 Mths
US SMB	23.8	17.4	16.5	9.8	0.6	-2.4	-11.6
B-JN p-value	0.051	0.084	0.074	0.158	0.471	0.632	0.963
Intl SMB	8.7	17.2	***21.6***	***20.2***	***13.8***	9.3	***11.2***
B-JN p-value	0.272	0.080	***0.020***	***0.011***	***0.043***	0.101	***0.034***
SI	***39.7***	***36.5***	***31.5***	***25.5***	***21.9***	10.6	13.1
B-JN p-value	***0.007***	***0.008***	***0.014***	***0.024***	***0.028***	0.151	0.087
MCBE	14.7	10.4	11.7	***18.1***	***17.7***	***17.4***	***10.6***
B-JN p-value	0.160	0.204	0.138	***0.019***	***0.006***	***0.002***	***0.008***

This table reports the annualized equity premium differences (EPD) derived from the January 1981 - December 2011, one month US$ EAFE LN equity premiums (net of 3 month T-bills), B-JNN (Britten-Jones, Neuberger, and Nolte, 2011) transformed regressions, which include eight behavioral indicator variables, four trailing equity premiums, and four economic measures as explanatory variables. Two indicator variables are created for each behavioral measure. US (Intl) SMB 1 (4) is equal to 1 if the US (International) Strategy Market Barometer was in the lowest (highest) 16% at the beginning of the month, zero otherwise. SI 1 (4) is 1 if the Baker & Wurgler (2006) unadjusted Sentiment Index was in the highest (lowest) 16% at the beginning of the month, zero otherwise. MCBE are beginning of the month trailing 12 month average sum of absolute rank differences, versus 1988-2007 performance ranks, for nine market cap - book to equity portfolios. MCBE 1 (4) is equal to 1 if the average absolute sum was in the highest (lowest) 16% at the beginning of the month, zero otherwise. One, three, six, and twelve month trailing S&P 500 equity premiums are beginning of the month trailing unannnualized compound returns. The four economic variables are beginning of the month, trailing annual growth in US Industrial Production Index, total US civilian employment, and real US Personal Consumption Expenditure, as well as the current month NBER US recession index. The equity premium difference is the 4 (i.e. high behavioral measure) indicator variable coefficient minus the 1 coefficient. The B-JNN p-values (bold significant at 5%) are based on the standard error of the difference, calculated as the square root of the sum of the squared B-JNN SE's for the two coefficients, minus the 4,1 index correlation times the product of the two SE's.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.

Table 7: Regression of LN 1mth Return on Lead Econ, Tr R, and Behavior						
	S&P 500		Russ 2000		EAFE	
	EPD	t-value	EPD	t-value	EPD	t-value
US SMB	18.3	0.05	13.3	0.17	12.62	0.17
Intl SMB	-8.3	-	-21.9	-	-0.42	-
SI	27.3	0.01	34.4	0.01	30.02	0.02
MCBE	-15.6	-	3.2	0.69	3.43	0.40

This table reports the annualized equity premium differences (EPD) derived from the January 1981 - December 2011, LN one month equity premiums (net of 3 month T-bills) regressions, which include eight behavioral indicator variables, four trailing equity premiums, and four leading economic measures as explanatory variables. Two indicator variables are created for each behavioral measure. US (Intl) SMB 1 (4) is equal to 1 if the US (International) Strategy Market Barometer was in the lowest (highest) 16% at the beginning of the month, zero otherwise. SI 1 (4) is 1 if the Baker & Wurgler (2006) unadjusted Sentiment Index was in the highest (lowest) 16% at the beginning of the month, zero otherwise. MCBE are beginning of the month trailing 12 month average sum of absolute rank differences, versus 1988-2007 performance ranks, for nine market cap - book to equity portfolios. MCBE 1 (4) is equal to 1 if the average absolute sum was in the highest (lowest) 16% at the beginning of the month, zero otherwise. One, three, six, and twelve month trailing S&P 500 equity premiums are beginning of the month trailing unannualized compound returns. The four economic variables are three to fifteen month ahead annual growth in US Industrial Production Index, total US civilian employment, and real US Personal Consumption Expenditure, along with the 6 month ahead NBER recession indicator. The equity premium difference is the 4 (i.e. high behavioral measure) indicator variable coefficient minus the 1 coefficient. The p-values (significant at 5%) are based on the standard error of the difference, calculated as the square root of the sum of the squared SE's for the two coefficients.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.

Table 8: Behaviorial Measure Correlations				
	US SMB	**Intl SMB**	**SI**	**MCBE**
US SMB	1.00			
Intl SMB	0.08	1.00		
SI	-0.18	-0.36	1.00	
MCBE	-0.03	0.30	-0.37	1.00

This table reports the monthly correlations over January 1981 through December 2011 for the four behavioral measures US Strategic Market Barometer (US SMB), International Strategy Market Barometer (Intl SMB), Sentiment Index (SI), and market cap – book to equity portfolio rank (MCBE). The US SMB and Intl SMB are based on the trailing 12 month performance ranks for the 10 US and International strategies, respectively. SI is Baker & Wurgler's (2006) sentiment index. MCBE is based the 12 month trailing performance ranks of nine market cap – book to equity portfolios as created by Fama & French.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.

Table 9: Expected versus Actual Annual Equity Premium (EP) Ranges
January 1981-January 2011

	Expected EP			Actual EP		
Market	Min	Max	Range	Min	Max	Range
S&P 500	-18.4	29.4	47.8	-43.9	53.4	97.3
Russ 2000	-21.3	37.1	58.5	-43.0	63.8	106.7
EAFE	-38.8	36.3	75.1	-52.3	87.4	139.8
Average	**-26.2**	**34.3**	**60.5**	**-46.4**	**68.2**	**114.6**

Same data and methodology as used for creating Figures 7-9, see explanatory notes for details.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.

Table 10: Equity Premium Improvements Based on a Simple Trading Rule												
	12 Month Equity Premium						36 Month Equity Premium					
			Correct?			Traded			Correct?			Traded
	Pred Pos	Act Pos	Pos/Pos	Neg/Neg	Overall	Ave EP	Pred Pos	Act Pos	Pos/Pos	Neg/Neg	Overall	Ave EP
S&P 500												
Buy & Hold						7.17						6.02
Econ Only	100%	73%	73%	100%	73%	7.20	99%	77%	77%	0%	76%	5.90
Add Behavior	80%	73%	83%	68%	80%	8.50	87%	77%	84%	64%	81%	6.58
Russ 2000												
Buy & Hold						8.14						6.33
Econ Only	91%	67%	69%	56%	68%	8.41	98%	81%	81%	29%	80%	6.36
Add Behavior	74%	67%	78%	63%	74%	9.65	95%	81%	83%	61%	82%	6.52
EAFE												
Buy & Hold						4.68						3.50
Econ Only	74%	57%	59%	49%	56%	4.95	84%	57%	59%	51%	58%	3.46
Add Behavior	65%	57%	69%	67%	69%	7.81	67%	57%	65%	59%	64%	5.23

This table reports the improved realized equity premium (EP) using a simple trading rule of investing in the market when the beginning of the month prediction is positive and in T-bills when it is negative. The equity premium predictions are based on the January 1981 - December 2011, B-JNN (Britten-Jones, Neuberger, and Nolte, 2011) regression of LN monthly equity premiums (net of 3 month T-bills) on transformed beginning of the month behavioral variables, trailing equity premiums, and economic measures. The four behavioral measures are US Strategy Market Barometer (US SMB), International Strategy Market Barometer (Intl SMB), the negative of the Baker & Wurgler (2006) unadjusted Sentiment Index (SI), and market cap – book to equity portfolio ranks (MCBE). The one, three, six, and twelve month trailing EPs are beginning of the month trailing unannualized compound EPs. The four economic variables are beginning of the month, trailing annual growth in US Industrial Production Index, total US civilian employment, and real US Personal Consumption Expenditure, as well as the current month NBER US recession index. The Econ Only results are based on the four economic variables only, while the Add Behavior results are based on all 12 variables. Pos/Pos is the percent of correct positive predictions, while Neg/Neg is the percent of correct negative predictions.

Data Sources: AthenaInvest, Thomson-Reuters, CRSP, Ken French's web site, and St. Louis Federal Reserve Bank FRED data base. I would like to thank Jeffery Wurgler for providing the BW Sentiment Index data and Jay Ritter for providing the IPO data.