Asset Pricing: Evidence on Analyst Target Price Forecast

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Abstract

Elton (1999) in his study suggests that reliance on realized returns may bias asset pricing tests. This study contributes to the literature by investigating the importance of using expected returns rather than realized returns in asset pricing model tests within a Fama French (1993) framework. 'IBES mean target price' is used to form expected returns in this study. Specifically, we test the CAPM, the Fama and French 3 factor and the Cahart 4 factor models using expected returns as well as historical returns. The results from the analysis based on expected returns for the period 2002 – 2012 are quite similar to those of Fama and French (1993) except for the loadings on BE/ME, which do not perform as expected. This suggests that reliance on realized returns should not adversely bias asset pricing tests, contrary to the concerns raised by Elton (1999) and Lewellen and Shanken (2002).

Keywords:

Asset pricing, target price, analyst forecast

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1. Introduction

This paper uses IBES mean target price to create a proxy for expected returns in tests of the CAPM, the Fama and French (1993) three-factor model and the Carhart (1997) four-factor model within a Fama and French (1993) framework. To the best of our knowledge this has not been attempted before and is therefore a key contribution of the study. Moreover, IBES mean target price data have not been used in any prior study to form expected returns in asset pricing tests, highlighting another contribution of this study. Analyst target prices are analyst estimates of stock price level over a 12-month forecast horizon (Glushkov 2009). Although market expectations are unobservable, the existing literature suggests that these analyst forecasts represent a significant portion of market expectations (Brav, Lehavy et al. 2005). First, recent US literature documents that the market pays significant attention to target price information (Kerl 2011). Second, researchers and practitioners rely on analyst earnings and growth forecasts as a proxy for market estimates (Brav, Lehavy et al. 2005). Third, Brav and Lehavy (2003) document that target price revisions indeed contain valuable information about the future abnormal returns over and above that conveyed in stock recommendations. Finally the IBES mean target prices that we use in this study is more accurate than Value line forecasts/estimates in terms of forecasting accuracy (Ramnath, Rock et al. 2005).

Asset pricing model tests inevitably rely on ex-post returns (historical data) to capture expectations (Brav, Lehavy et al. 2005). Yet, the capital asset pricing model (CAPM) is an expectations based model. Black (1993) and Brav, Lehavy et al. (2005) note that researchers use realized returns to proxy for expected return, due to lack of information about market expectations. However, there is evidence that using realized returns as a proxy for expected returns could lead to biased results. Blume and Friend (1973) and Sharpe (1978) point out that noise in realized returns is expected to be large and Elton (1999) argues that if information surprises do not cancel out over the period of the study then realized returns may not be a fair proxy for expected returns. Moreover, Lewellen and Shanken (2002) use the concept of rational learning to explain that realized returns appear to be biased estimates of expected returns. Further, Elton (2002) states that on average realized returns for the 1973 – 1984 period, are less than the risk free rate. Similarly, risky long term bond performance for a period 1927 – 1981, on average, is less than the risk free rate. Based on these observations, Elton (2002) states that the use of realized returns as a proxy for expected returns in testing the CAPM may lead to biased results and this could help to explain the plentiful evidence rejecting

CAPM. He suggested that instead of identifying more factors to be added to asset pricing models; it may be more beneficial to look for better proxies of expected return. Brav, Lehavy et al. (2002) conduct cross section regression analysis using value line target forecasts as a proxy of expected returns to test CAPM. They documented a positive relation between beta and expected returns. This differs from the Fama and French (1993) finding of no relation between beta and realized returns.

Further, it has been shown that investors rely on analyst research when making stock buy and sell decisions (Cliff and Denis 2005). An important prediction measure provided by analysts is target prices (Bradshaw and Brown 2012, Kerl 2011, Bilinski and Lyssimachou and Walker 2011). According to Kerl (2011) the year 1997 was the first complete year during which IBES provided analyst target price forecasts and so this study provides a timely analysis of the impact of using expected return measure i.e. 'IBES mean target price[2]' instead of realized returns in asset pricing tests. Analysis draws on the Fama and French (1993) time series framework using US data from the period 2002-2012. The rest of the paper proceeds as follows. Section 2 reviews the related literature. Section 3 discusses the data used in the study. Section 4 details the methodology. Section 5 presents the core results, while the last section concludes.

2. Review of Related Literature

Since the inception of CAPM, researchers have sought empirical support for the model. There is a general consensus that CAPM is theoretically strong but falls short on empirical support (Fama and French 1992). Several asset pricing models were introduced in an attempt to better explain the variation in the cross section of returns. For example, Merton (1973) developed the Inter-temporal CAPM (ICAPM). Breeden (1979) introduced the Consumption CAPM (CCAPM). Amihud and Mendelson (1986) added a liquidity factor to the CAPM. Fama and French (1993) proposed a three factor model including size and book to market value stating that the size and book to market ratio have significant explanatory power in explaining the cross section of returns when compared to the CAPM. Their sample included US non-financial firm data for a period from 1962-1989. These stocks were sorted on the basis of size and book to market, creating 25 portfolios. The regression results using these portfolios revealed that size and book to market factors had

[2] Price target forecast reflects the analyst's estimate of the firm's stock price level with a specific time horizon, usually a 12-month horizon. Glushkov, D. (2009). Overview of I/B/E/S on WRDS : Research and Data Issues, Wharton: University of Pennsylvania.

significant explanatory power for stock returns. Carhart (1997) proposed a four factor model, using the Fama and French (1993) three factor model plus an additional factor capturing Jegadeesh and Titman (1993) one-year momentum effect. Carhart (1997) established that in addition to SMB and HML, the momentum factor also contains substantial explanatory power for stock returns. The CAPM, the Fama and French (1993) three factor and the Cahart (1997) four factor models are tested in this study.

Asset pricing studies generally use historical returns as an expected return proxy. However, there is enough evidence in the literature to establish that realized returns may not be a fair proxy for expectations in asset pricing tests. For instance, Blume and Friend (1973) study the empirical relationship between risk and rate of return relationship implied by the CAPM and points out that realized returns for individual stocks is a poor estimate for expected returns. Similarly Elton (1999) argue that rationale for using realized returns in asset pricing tests is based on a biased belief i.e. information surprises tend to cancel each other over the period under study. Expected return estimates have more recently been based on published forecast resources.

2.1 Data Sources of Analyst Target Price

Data sources compiling analyst forecasts information includes but are not limited to IBES, Value Line, Investext and Zack Investment Research. The Thompson Financial Corporation International Brokerage Estimate System (IBES) provides detailed consensus estimates of measures including GAAP Pro-forma EPS, revenue/sales, net income, price targets, analyst recommendations, pre-tax profit and operating profit (Glushkov 2007). IBES covers over 70,000 companies, out of which 24,310 (34.3%) are US firms (Glushkov 2009). An alternative source of target price estimates is the Value Line Investment survey issued by Arnold Bernhard and Co, which encompasses 91 industries and 1,700 stocks listed on numerous stock exchanges and the over-the-counter markets (Philbrick and Ricks 1991). Value line database is established on the basis of a single forecaster perspective, whereas IBES database offers consensus forecasts. Brown and Kim (1991) suggest that consensus forecasts (which takes in to account the aggregation principle) reduces the analyst specific error and hence improves the predictive accuracy of forecasts. Similarly, Brown (1991) compares the relative predictive accuracy of four forecasts composites i.e. average of all forecasts (regardless of age of forecasts), most recent single forecast, average of most recent three forecasts and 30-

day average of forecasts. Brown (1991) concludes that 30-day average forecasts released by analysts during the last 30 days is more accurate than single most recent forecast; signifying aggregation as well as timeliness improves forecast accuracy.

Ramnath, Rock et al. (2005) compare the Value line and IBES analyst earnings forecasts in terms of precision, reliability and the extent to which the respective forecasts proxy for market expectations. In their study, Ramnath, Rock et al. (2005) document two possible reasons for the greater accuracy of IBES over Value Line forecasts. First, IBES has timing advantage in terms that analysts can update the information any time until the earnings announcement, while, Value Line publishes quarterly forecast for each firm it follows. Second, IBES moderates analyst specific errors by using aggregation principle, whereas, Value Line forecasts do not cater for aggregation i.e. only reflects single analyst forecaster's perspective in its forecasts. Overall, Ramnath, Rock et al. (2005) conclude that IBES forecasts tend to be less biased and more precise.

Investext database and Zack Investment research are other sources used by prior studies to extract target price information. Investext provides in-depth and timely reports for more than 630 investment banks, brokerage firms and research firms globally (Asquith, Mikhail et al. 2005). Zack Investment research produces data feeds for estimates, ratings, earnings report and data investment research reports for US and Canadian traded equities. As compared to IBES, Investext database coverage is limited, while access to Zack Investment research was limited to 100 global companies. In sum it would appear that the literature favors, the IBES data source, and therefore the IBES price target information is used in estimating expected returns in this study.

2.2 Accuracy of Target Prices

Analyst recommendations assist investors in valuing company assets (Jegadeesh, Kim et al. 2004). A review of the literature suggests that, compared to earnings forecasts and stock recommendations, target price forecasts have not received much attention (Bilinski, Lyssimachou et al. 2011). According to Bradshaw (2011) only a handful of studies explore target price forecasts. In his study, he conducts a literature search on articles dealing with analyst target prices and reveals only 3 published studies that explore the target price measure. A possible explanation for this limited research could be due to limited access to this data (Kerl

2011)[3]. Studies including analyst recommendations include Womack (1996), Asquith, Mikhail et al. (2005), Bilinski, Lyssimachou et al. (2011) and Gleason, Bruce Johnson et al. (2012).

Womack (1996) shows stock prices are significantly influenced by the revisions in analyst recommendations not only at the time of revision but also for subsequent months. Bilinski, Lyssimachou et al. (2011) study the determinants of analyst target price (constructed from First Call and IBES database) accuracy across 16 countries including the US, 12 European countries, Japan, Australia and Hong Kong, over a sample period of 2002-2009. Their study focuses on two measures of target price. One, a binary variable which is equal to 1 if the target price forecast equals or exceeds the actual stock price anytime during the 12 month period after the target price forecast is issued. Two, measures of absolute difference between the target price forecast and the actual stock price at the end of 12 month forecast horizon are used. Target price accuracy is then compared with the simple price forecasts formed by the investors (referred as naive price forecast) on the basis of the information available at the date of the target price issue. Their study documents that during the 12-month forecast period, in 59.1% of cases, the target price reaches the actual stock price with absolute target price error of 44.7%. Moreover, they conclude that target price accuracy achieves or exceeds the naive price forecast in 74.5% of cases and target price forecast error is 9.8% lower compared to the absolute naive price forecast error. Lastly, it is found that the accuracy of target price forecasts is superior to price forecasts formed on the basis of industry price-to-earnings ratio and the market return.

Investors appear to value price targets published in stock research reports (Gleason, Bruce Johnson et al. 2012). Sell side analysts have recently (mid 1990s) started including price target information in their research reports (Gleason, Bruce Johnson et al. 2012). Analyst target price reflects the analyst's estimate of stock price level over a specific period, generally a 12-month horizon (Glushkov 2009). The price target information conveys the analyst's opinion about the worth of the stock and forms the basis of buy and sell recommendations. Asquith, Mikhail et al. (2005) study the association between market returns and the content of analyst reports specific to the US market. They show that 1) during 1997-1999, 54.3% of the stocks achieved target prices recommended by US analysts and 2) market reaction to target price revisions is

[3] For example, the Thompson Financial Corporation's International Brokerage Estimate System (IBES) provides target price data from March 1997.

stronger than that of an equal percentage change in earnings forecast. Asquith, Mikhail et al. (2005) conclude that target price revisions contain new information over and above communicated by the earnings forecasts revisions and stock recommendations. Gleason, Bruce Johnson et al. (2012) argue that although price target information is gaining popularity among investors, the evidence on the quality of the analyst forecast is limited.

Brav and Lehavy (2003) study value line target price data over a period 1997-1997 to examine short term market reactions to target price revisions as well as long-term co-movement of target prices and concurrent share prices. They find that target price revisions contain information about future abnormal returns over and above conveyed by the stock recommendations. Brav and Lehavy (2003) argue that as target price forecasts are forward looking, therefore, they must be linked with underlying fundamental value of firm as much as concurrent stock prices. They conclude that when the ratio of target prices to concurrent stock prices is higher (lower) than long-term estimated ratio (mean of target price to concurrent stock ratio), the analysts revise their target prices down (up) to an extent that two ratios become equal. Brav and Lehavy (2003) also document that on average, over a 12-month target price forecast horizon, target prices are 28 percent higher than concurrent market prices; indicating a long term relation between the two price systems. Overall, they document that in the long term (12 month period) the two set of prices (target prices and concurrent market prices) converge validating that market understands the role of analysts in correcting prices errors. This suggests that as ratio of target-to-market prices can be used as a proxy for constructing ex-ante expected return, it would be worthwhile to use this measure in asset pricing tests (Brav and Lehavy 2003).

2.3 Studies using Expectations Data in an Asset Pricing Framework

As stated above, it has been claimed that expectations measures should be used in asset pricing tests (Elton 2002). Yet, only handful studies use expected return proxies to study the relation between expected returns and firm characteristics. Examples include Ang and Peterson (1985), Shefrin and Statman (2002) and Brav, Lehavy et al. (2005). Ang and Peterson (1985) were the first to study the relation between expected return and dividend yield using expected return data constructed from Value Line forecasts for a period 1973-1983. They document a negative relation between expected return and firm size and a positive relation between expected return and beta. Shefrin and Statman (2002) study the relation between expected return with firm specific factors i.e. book to market and market capitalization using ordinal ranking of recommendations as a proxy of expected returns. They report that firms with buy recommendations are generally large stocks and more likely to have low book to market values. Brav, Lehavy et al. (2002) use value line forecasts as a proxy for expected price to study the relation between expected returns and firm characteristics within a cross section framework. Their findings are consistent with Ang and Peterson (1985). They report a positive relation between expected return and beta.

The review of the literature suggests that an expectations based proxy should be used in asset pricing tests. One possible measure for constructing expected returns is analyst forecasts and the various sources of this data were surveyed above. Moreover, within the analyst forecast alternatives, analyst target price is identified as a superior forecast in terms of accurately predicting future stock prices. Finally IBES is recognized as a reliable data source for collecting target price information and so IBES target price is used in calculation of expected returns in this study.

3. Data

3.1 The IBES Database

Analyst forecasts are used to construct the expected return estimates. In this study the historical data from the IBES database is available from March 1999. The initial sample consists of all the monthly price target data for listed US Companies available from the IBES Summary History tape is for the period from Mar 1999 - Dec 2012. The Summary History tape is comprised of a US file and an international file. The current study focuses on US firms. The variables available from the files include company ticker, IBES ticker, cusip number, company name, currency identifier, price target (mean, median, high, low, standard deviation), number of price target down one month ago, number of price target up four weeks ago and IBES Statistical Period. The mean price target reflects the analyst consensus estimate of firm stock price at the end of a rolling 12-month forecast horizon. For example, the price target for the March 1999 is a prediction of the price for March 2000. Similarly the price target for April 1999 forecasts the price for April 2000. Thus, every monthly observation covers a 12-month forecast horizon i.e. the forecasts are overlapping. Brav, Lehavy et al. (2005) used analyst target prices from value line and their data set also comprises of overlapping observations for expected returns. In their study, Brav, Lehavy et al. (2005) argue that the problem of overlapping observations is not a problem for expected returns; as the expectations are reformed at time t and t+1; therefore expected returns are independent of future realizations. Figure 1 presents the organization of the forecast[4].

[Figure I about here]

The price target data is adjusted for capitalization changes like stock splits and dividends. For price target estimates, IBES specifies the date when the estimate is calculated (IBES Statistical Period) and we use this data for return calculations[5]. IBES provides four forms of price target data. First, the mean price target is the consensus estimate or the arithmetic average of all the price target recommendations given by the analysts individually for a given fiscal period. The second is the median price target and this represents the middle value of price target estimates, when the data is arranged in an ascending or a descending order. The third is the price target low, which is the smallest value in the range of price target estimates. The fourth is the price target high, which is the highest value within the range of price target estimates. We use the consensus price target in calculation of expected returns. For a given firm, the consensus target price is the mean of all the forecasts provided by the analysts for the firm for the month. IBES updates the data on the Thursday just before the third Friday of every month.

The monthly data for number of shares outstanding, dividend per share, value weighted return index (including dividends) and return on S&P composite Index for all the listed US firms is collected from the CRSP Annual Update file for the period Mar 1999 – Dec 2012. The book equity value (Compustat, item CEQ – Balance Sheet Data) and exchange code for all the US listed firms for a period 1999-2012 is extracted from Compustat monthly update (North America) files. The Fama French factor monthly data i.e. SML (Small minus Big) and HML (High minus Low) for the period 2002-2012 is downloaded from

4 This is a problem for 12 month realized holding period returns and we correct for this using Hansen and Hodrick (1980) see section 4 below.

5 IBES does not provide the date on which the analysts complete the forecast though it is assumed that the forecasts is publically available once it is calculated.

Kenneth R. French Data Library[6]. The risk free returns (i.e. one year US Treasury Constant Maturity rate (FRTCM1Y)) are obtained from Data Stream. The data obtained from IBES and CRSP is merged in order to ensure that each firm/observation has closing price data and consensus target price data. There are 4,150 firms generating 296,874 monthly firm observations spanning the period from Mar 1999 till Dec 2012.

3.2 Constructing Annual Expected and Realized Returns

The 12 month expected holding period return at month t is calculated as

$$E_{t,t+12} = \frac{E_t\,(P_{t+12}) + D_{t+12} - P_t}{P_t} \quad [1]$$

where
$E_{t,t+12}$ = Expected return based on expected price at the time t+12 from IBES.
$E_t\ (P_{t+12})$ = Expected Price at time t+12, observed at time t
P_t = Actual price observed at time t
D_{t+12} = Expected dividend at time t+12, observed at time t

The expected price at time t+12, observed at time t is the IBES consensus target price. The initial price P_t observed at time t is obtained from CRSP. The, $E_{t,t+12}$ is calculated for each month for all the firms for the entire sample period. D_{t+12} is calculated as the sum of monthly dividends over a period of twelve months assuming dividends will grow at a constant rate over the sample period. The 12 month realized holding returns for each month t are calculated as:

$$R_{t,t+12} = \prod_{i=1}^{12}[1 + R_{t+i}] - 1 \quad [2]$$

$$R_{t+1} = (P_{t+1} - P_t)/P_t$$

The monthly realized SML and HML returns are also converted to 12 month returns using equation [2].

3.3 Constructing SMB, HML and MOM factors

SMB and HML mimicking portfolios are constructed following Fama and French (1993) methodology, while MOM factor is constructed using Carhart (1997) approach. SMB factor is constructed to mimic the risk factor in returns related to size. To construct SMB mimicking portfolio, the NYSE stocks are ranked on size each month for the period 2002-2012. The median NYSE size is then used to split all the NYSE, AMEX and NASDAQ stock in two groups i.e. small (S) and Big (B). Value weighted expected returns are calculated for all the stocks in small and big groups. Finally monthly value weighted expected

[6] For details please refer to http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

returns are calculated for small and big portfolios. SMB is the difference between the value weighted expected returns on small and big stock portfolios. The HML factor is constructed to mimic the risk factor in returns related to book-to-market equity. To construct HML mimicking portfolio, the NYSE stocks are ranked on the basis of breakpoints for the bottom 30% (Low) middle 40% (Medium) and top 30% (High) BE/ME values. The NYSE BE/ME ranking is then used to allocate all the NYSE, AMEX and NASDAQ stocks to low, medium and high groups. Value weighted expected returns are calculated for all the stocks in low and high groups. Finally monthly value weighted expected returns are calculated for low and high portfolios. HML is the difference between the value weighted expected returns on high and low stock portfolios. To construct the MOM mimicking portfolio, all the stocks are ranked in to three groups on the basis of top 30% (winners) medium 40% and lowest 30% (losers) realized return values. The equal weighted eleven month returns is calculated for winners and losers portfolios. The portfolios are reformed monthly. The MOM factor[7] is the difference between the eleven month winners and losers portfolio returns lagged one month. As the first eleven month values of the sample period are used for the calculation of MOM factor, there are 115 monthly MOM factor values (2003-2012) for the final analysis.

Two filters are used to remove extreme observations from the data set. First, the outer 1% of the tails of the expected returns distributions is deleted. Second, a three standard deviation filter is used.

3.4 Constructing Market Returns

Individual returns and market return data should be consistently calculated. For example, Fama and MacBeth (1973) use monthly data for all common stocks traded on the NYSE exchange as a proxy for expected returns and Fisher's arithmetic index (an equally weighted average of all the returns on all the stocks listed on NYSE) as a proxy market return. In this paper, two different proxies used for market returns are 1) the value weighted realized market return based on the 12 month realized holding returns for all the stocks in the sample, and 2) the value weighted market return based on the 12-month expected holding returns for all available stocks.

The value weighted market return based on the 12 month realized returns for all available stocks, at month t, $R_{mt,t+12}$, is given by:

[7] MOM factor is calculated using monthly realized returns data from CRSP as well as expected returns constructed using target price data from IBES.

$$R_{mt,t+12} = \sum_{i=1}^{n} w_{it} \left(R_{it,t+12}\right) \quad [3]$$

where:
w_{it} = weight of a security i at time t and defined as: $w_{it} = \frac{P_{it}N_{it}}{\sum_{i=1}^{n} P_{it}N_{it}}$
$R_{it,t+12}$ = the 12 month realized return at month t for security i.

Using market value weights, the value weighted market return based on the 12 month expected return for all available stocks, at month t, $E_{mt,t+12}$, is defined as follows:

$$E_{mt,t+12} = \sum_{i=1}^{n} w_{it} \, E_{it,t+12} \quad [4]$$

where:
w_{it} = weight of a security i at time t
N_{it} = No of shares outstanding for a security i at time t
$E_{it,t+12}$ = The 12-month expected return at month t for security i

3.5 Calculating Book Equity and Market Equity Values for constructing 25 ME and BEME Portfolios

After constructing the annual stock returns and market returns, the data set is merged with the Compustat data file to obtain the book equity (BE), market equity (ME) and BE/ME Equity for each stock. A firm is included in the final sample only if it has CRSP stock prices for December of year t-1 and June of t and Compustat book common equity value for the year t-1. This ensures that ME can be calculated for June in period t and BE/ME can be calculated for the year t-1. The market value at time t is calculated as:

$$ME_t = P_{it} * N_{it} \quad [5]$$

The BE/ME is calculated as:

$$BE/_{ME} = \frac{BE_{t-1}}{ME_{t-1}} \quad [6]$$

Where:
$BE/_{ME}$ = Book to Market Equity at time t-1
BE_{t-1} = Book Equity for the period t-1

The 25 portfolios formed on the basis of ME and BE/ME are used in this study. To form the 25 portfolios, we sort, the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December in the prior year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles.

The 25 ME and BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. For example, the first portfolio comprises of all stocks assigned to quintile 1 for ME and quintile 1 for BE/ME. Quintile 1 contains the smallest stocks while quintile 5 has biggest stocks. The value weighted returns for these portfolios is calculated each year for the period from July t to June t+1. This results in a final sample consisting of 126 monthly observations for the period 2002-2012 for each of the 25 ME and BE/ME portfolios.

4. Methodology

The basic asset pricing question tested in this study is how do expected returns perform in explaining the cross sectional variation in returns. The tests are conducted for the CAPM and three-factor over a period of 2002 – 2012 and tests for the four factor model are conducted over a period of 2003-2013. Following Fama and French (1993), we use the time-series regression to test the CAPM, Fama and French (1993) three factor model and Carhart (1997) four factor models using expected returns measures. In their study, Fama and French (1993) construct two mimicking portfolios SMB and HML. To measure the association of returns, we use mimicking portfolios for SMB and HML along with market risk premium and MOM factors as explanatory variables in times series regressions. CAPM proposes a linear relationship between the risk and the return of an asset. Moreover, it measures the risk of an asset as the variation of asset returns relative to the market portfolio returns of the market portfolio. CAPM is referred as an ex ante model and is presented as

$$E(\tilde{R}_i) = R_f + \beta_i \, [E\,(\tilde{R}_m) - R_f] \qquad [7]$$

And:

$$\beta_i = \frac{Cov\,((R_i\, R_m)}{\sigma_m^2} \qquad [7a]$$

Where:

$E(\tilde{R}_i)$ = The expected return of the asset i;
R_f = Risk free rate;
$E\,(\tilde{R}_m)$ = Expected Return on the market portfolio;
β_i = Beta of an asset i
Cov (Ri Rm) = Covariance between the expected return on asset i and the market portfolio;
σ_m^2 = The risk of the market portfolio

Equation 5 states that a positive linear relationship exists between the return on asset i and its sensitivity to the market portfolio return.

Fama and French (1992,1993) proposed a three factor model, stating that the size and book to market ratio have significant explanatory power to explain the cross section of returns as compared to beta. The three factor asset pricing model can be represented as:

$$E(\tilde{R}_i) = R_f + \beta_i[E\ (\tilde{R}_m) - R_f] + s_i E(SMB) + h_i E(HML) \qquad [8]$$

Where:
$E(SMB)$ = size premium (the difference in returns between the smallest and largest firm sized portfolios)
$E(HML)$ = book to market premium (the difference in returns between the highest book to market and lowest book to market firm portfolios)

Carhart (1997) document that momentum (MOM) captures variation in returns missed by ME and BE/ME. The four factor asset pricing model is represented as:

$$E(\tilde{R}_i) = R_f + \beta_i[E\ (\tilde{R}_m) - R_f] + s_i E(SMB) + h_i E(HML) + m_i E(UMD) \qquad [9]$$

Where:
$E(SMB)$ = size premium (the difference in returns between the smallest and largest firm sized portfolios)
$E(HML)$ = book to market premium (the difference in returns between the highest book to market and lowest book to market firm portfolios)
UMD = one-year momentum in stocks (the difference in returns between winner stocks and loser stocks)

The 25 portfolios formed on the basis of ME and BE/ME are used in this study. The CAPM, three-factor and four-factor equations based on expectations data used in this study are detailed as follows:

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i\left[E_{m,t,t+12} - R_{f,t,t+12}\right] + e_t \qquad [10]$$

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i\left[E_{m,t,t+12} - R_{f,t,t+12}\right] + s_{i,t+12}SMB + h_{i,t+12}HML + e_t \qquad [11]$$

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i\left[E_{m,t,t+12} - R_{f,t,t+12}\right] + s_{i,t+12}SMB + h_{i,t+12}HML + m_{i,t+11}MOM + e_t \qquad [12]$$

Where $E_{i,t,t+12}$ is the expected return on a portfolio based on expected price at the time t+12; every monthly observation covers a 12-month forecast horizon i.e. the forecasts are overlapping. Brav, Lehavy et al. (2005) argue that the problem of overlapping observations is not critical for expected returns; as the expectations are reformed at time t and t+1; therefore expected returns are independent of future realizations. $R_{f,t,t+12}$ is the one year Treasury Bonds return; $E_{m,t,t+12}$ is the value weighted expected market return; SMB, HML and MOM are returns on mimicking portfolios for ME, BE/ME and one-year momentum in stock returns; α is the intercept; β is the market risk term, s, h and m are the coefficients on ME, BEME and momentum respectively; and e is the error term.

The CAPM, three-factor and four-factor equations based on realized data used in this study are detailed as follows:

$$R_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[R_{m,t,t+12} - R_{f,tt+12}\right] + e_t \quad [13]$$

$$R_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[R_{m,t,t+12} - R_{f,t,t+12}\right] + \mathrm{s}_{i,t+12}SMB + \mathrm{h}_{i,t+12}HML + e_t \quad [14]$$

$$R_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[R_{m,t,t+12} - R_{f,t,t+12}\right] + \mathrm{s}_{i,t+12}SMB + \mathrm{h}_{i,t+12}HML + \mathrm{m}_{i,t+11}MOM + e_t \quad [15]$$

Where $R_{i,t,t+12}$ is the realized return on a portfolio, while $R_{f,t+12}$ is the one year Treasury Bonds return. $R_{m,t,t+12}$ is the value weighted realized market return; SMB, HML and MOM are returns on mimicking portfolios for ME, BE/ME and one-year momentum in stock returns; α is the intercept; β is the market risk term, s, h and m are the coefficients on ME, BEME and momentum respectively; and e is the error term. We use 12 month realized holding returns for each month t, causing overlapping data in estimation. A GLS adjustment is used to correct for this problem following Hansen and Hodrick (1980).[8] Once the data is corrected for overlapping observations, analysis is conducted using excess market returns, SMB and HML (mimicking returns for ME and BE/ME factors) and MOM.

In order to examine the sensitivity of the results to the Global Financial Crises (GFC) period, we repeat the one factor, three factor and four-factor model regressions by including a GFC dummy variable. A review of literature on the identification of GFC period reveals various GFC start and finish time periods. For example, Allen and Carletti (2008) in their study on the role of liquidity in the financial crisis argue that the financial crisis started in August 2007. Taylor (2009) studies the causes of the financial crisis and identifies that the GFC seemed to take hold in August 2007. Cornett, McNutt et al. (2011) for their study use time variation in the TED spread (difference between three-month London Interbank offer rate and three-month Treasury rate) to identify the crisis period (Summer 2007 to Spring 2009). According to Chor and Manova (2012), the subprime crisis surfaced in the second half of 2007 and the trade flows showed visible signs of recovery in October 2009. Based on the existing literature, we choose the period from September

[8] For details on overlapping data adjustment please see Harri, A. and B. Brorsen (1998). "The overlapping data problem." Available at SSRN 76460. and Valkanov, R. (2003). "Long-horizon regressions: Theoretical results and applications." Journal of Financial Economics **68**(2): 201-232.

2007 to August 2009 as the GFC period for this study. In order to test if the regression results are sensitive to the GFC period, we include a dummy variable in the GLS regression model, assigning a value of 1 for the GFC period and 0 otherwise.

5. Results

The basic asset pricing question tested in this study is how do expected returns perform in explaining the cross sectional variation in returns. Tests are conducted for the CAPM, the three-factor and the four-factor model over a period of 2002 – 2012.

As a base case scenario, the tests are conducted using the three-factor model and monthly realized excess returns over a period of 2002 – 2012. The monthly returns based results are largely consistent with the Fama and French (1993) paper. The SMB and HML coefficients are related to size and book-to-market equity respectively. However, in their three factor regressions, Fama French (1993) report that intercepts are close to zero i.e. only three out of the 25 intercepts differ from 0. Our results indicate that 14 out of the 25 intercepts are significant, i.e. SMB and HML are unable to capture all the variation in stock returns[9]. this is then extended overlapping 12 month returns based analysis. We use overlapping 12 month realized holding returns for each month t. A GLS adjustment is used to correct for this problem following Hansen and Hodrick (1980).[10]

5.1 Descriptive Statistics of Annual Expected and Realized Returns

Table I shows the descriptive statistics for the 25 portfolios formed in June each year on size and book to market equity over the period from 2002-2012. It appears that the portfolio construction approach achieves the objective of controlling intra-quintile variability; however, there are a few notable exceptions. The smallest BE/ME and largest ME quintile (portfolio 15) contains the most number of stocks, while the fewest stocks are recorded in the highest BE/ME and highest ME quintile (portfolio 55). These results are consistent with the findings of Bhushan (1989), who state that firm size influences the analyst's decision to follow a

[9] Regression result for Fama French (1993) three factor model using monthly realized returns is available on request.

[10] For details on overlapping data adjustment please see Harri, A. and B. Brorsen (1998). "The overlapping data problem." Available at SSRN 76460. and Valkanov, R. (2003). "Long-horizon regressions: Theoretical results and applications." Journal of Financial Economics **68**(2): 201-232.

firm. Jegadeesh, Kim et al. (2004) documents that analysts prefer to follow high momentum stocks and growth stocks. Further, while panel C indicates that BE/ME ratios are uniform across the first four BE/ME quintiles, there appears to be an irregular decrease in the magnitude of BE ratios in quintile 5. Nonetheless, the pattern in average firm size and BE ratios is consistent with the original Fama and French (1993) study. The largest size quintile has the largest fraction of value. The BE ratios record highest values for largest BE/ME quintile.

[Table 1 about here]

A normal distribution plot is drawn to compare the return distributions for pooled expected and realized 12-month returns. Figure 2 shows that although both return distributions are not normally distributed; return distributions for expected returns (dummy = 1) are significantly different from realized return distributions (dummy = 0). It is important to note that relative to realized return distributions (dummy = 0), expected return distribution (dummy = 1) are much more volatile.

[Figure 2 about here]

The Kolmogorov-Smirnov Two Sample Test for equality of distribution functions is used to test the equality of distributions. The p-value of the Kolmogorov-Smirnov tests we report is smaller than 0.05 indicating that expected return distributions are not equal to realized return distributions for our sample of shares.

[Table 2 about here]

5.2 The Capital Asset Pricing Model

Table 3 -Panel A shows that the market alone has little power to explain the variation in returns. The only R-square value exceeding 0.90 is for the big-stock low BE/ME portfolio. For small-stock and high BE/ME portfolios, R square values are lower than 0.80. Fama and French (1993) argue that when the market is used as the only explanatory variable, R square values for small stock and high BE/ME portfolios are lower than 0.7. Fama and French (1993) explains this trend in R square values by elaborating that these are

the stock portfolios for which SMB and HML factors have the potential to exhibit explanatory powers. Panel B presents the estimates of factor sensitivities for excess market return using historical data. The results are consistent with Panel A. The market leaves considerable variation unexplained, which infers that there are other factors that might capture this variation.

5.3 Fama and French Three Factor Model

Table 4 – Panel A presents the estimates of factor sensitivities for excess market return, HML and SMB factors. Market risk premium and SMB factors capture strong variation in stock returns. The t-statistics on market risk premium are positive and highly significant. The t-statistics of SMB coefficients are lower than 11.70. In every BE/ME quintile, with three exceptions, the SMB coefficients decrease monotonically from smaller to bigger size quintiles; i.e. SMB coefficients are related to size. On the contrary, the HML coefficients do not appear to be related to BE/ME factor. Across all size quintiles, while moving from low BE/ME quintiles to high BE/ME quintiles, the HML coefficients do not follow any discretional pattern. The t-statistics on HML coefficients show a mix of positive and negative significant values. It is interesting to note that when SMB and HML are added as additional explanatory variables in the regression analysis, the R-square values for all portfolios increases. For one factor model, on average the R-square values fall around 0.67. However, for three factor model, the average R-square values increases to 0.76. Fama and French (1993) argue that market, SMB and HML are correlated and by adding SMB and HML factors to regression, the market beta values collapse to around 1. For instance, in one factor regressions (panel A - table 3), the beta values for the biggest size and highest BE/ME quintile portfolios is 1.56. In the three factor regressions (panel A- table 4) the beta values for the same quintile is 1.01. Panel B presents the estimates of factor sensitivities for excess market return, SMB and HML using historical data. The results are consistent with Panel-A, i.e. SMB coefficients are related to size, while HML coefficients are not related to BE/ME factor. The t-statistics of SMB coefficients are lower than 13.07, while the t-statistics on HML coefficients show a mix of significant and non-significant values i.e. not a single value exceeding 5.7. Lastly the intercept values are significant indicating there are other factors missing from the specifications.

5.4 Cahart Four Factor Model – MOM factor constructed using Realized Return Data

Estimates of factor sensitivities for the Cahart four factor model are presented in panel A of table 5. These results show that among the four factors, the market risk premium exhibits high t-statistics. The t-statistic of the SMB coefficients are lower than 11. Panel A shows that with four exceptions, across all BE/ME quintiles, as size increases, the SMB coefficients decrease monotonically i.e. the coefficients appear to be related to size. However, HML coefficients do not follow any discernible pattern. Across all size quintiles, while moving from low BE/ME to high BE/ME quintiles, the HML slopes increase and decrease randomly. The t-statistics on MOM coefficients show a mix of negative and positive significant values. The R-square values presented in panel A suggest that on average, when MOM is added as an explanatory variable to three factor regressions, the R square values increases to 0.80 indicating that market risk premium, HML and SMB and MOM proxy for risk factors. Lastly panel A shows that 17 out of 25 regression intercepts are significant indicating that there are other factors missing from the specifications.

Table 5 (Panel –B) show the results from tests based on realized returns. The market beta values fall roughly close to 1 and the intercept values are significant. The t-statistics on SMB and HML slopes for realized excess returns regressions are greater than SMB and HML slopes for expected excess returns regressions (table 4). The t-statistics on SMB for most portfolios are greater than 3 (16 out of 25); four portfolios are greater than 10; while four portfolios have a value lower than 1. The slopes on SMB show a similar trend to that noted by Fama and French (1993). In general, for every BE/ME quintile, the slope of SMB decreases consistently from small to big size quintiles; indicating that SMB slopes are related to size. Contrary to Panel A results, the HML coefficients appear to be related to BE/ME for the smallest and biggest size quintiles. While moving from low to high BE/ME quintiles, the HML coefficients for big-stock and small-stock portfolios follow an increasing trend. The slopes on MOM are small i.e. not a single value exceeding 0.51. With one exception, the t-statistics on MOM slopes show a mix of negative and positive and significant values.

[Table 5 about here]

5.5 Cahart Four Factor Model – MOM factor constructed using Expectations Data

The regression analysis is repeated using MOM factor constructed from expectations data. Estimates of factor sensitivities for the Cahart four factor model are presented in table 6. These results indicate that the coefficients for the annual market premium are positive and highly significant. Table 6 shows that among the four factors, the market risk premium exhibits high t-statistics. The t-statistic of the SMB coefficients are lower than 11.5. Table 6 shows that with one exception, across all BE/ME quintiles, as size increases, the SMB coefficients decrease monotonically i.e. the coefficients are related to size. Similarly HML coefficients appears to be related to BE/ME. Across all size quintiles, while moving from low BE/ME to high BE/ME quintiles, except for the second and fourth BE/ME quintile, the HML slopes increase monotonically. It is interesting to note that when MOM factor is constructed using expectations data, the explanatory power of SMB increases and HML coefficients exhibit relation with BEME. The MOM coefficients are small i.e. only three values exceeding 0.10. The t-statistics on MOM coefficients show a mix of negative and positive significant values. Moreover, by adding SMB, HML and MOM factors as explanatory variables, the beta values for most portfolios collapses towards 1 i.e. low beta values move up and high beta values move down. The R-square values presented in table 6 suggest that on average, when MOM is added as an explanatory variable to three factor regressions, the R square values increases to 0.83 indicating that market risk premium, HML and SMB and MOM proxy for risk factors. However, an important question is how well these proxy risk factors perform in explaining the variation in returns. Merton (1973) and Ross (1976) imply a simple test of whether premiums associated to proxy risk factors are able to explain the cross section of returns i.e. the intercepts in the time-series regression should not be different from 0. Table 6 shows that 19 out of 25 regression intercepts are significant indicating that there are other factors missing from the specifications.

[Table 6 about here]

The regression results for expected excess returns show that market risk premium alone is unable to explain all the variation in the cross section of returns. SMB and HML possess some explanatory power, moreover, SMB (the mimicking return for the size factor) appear to be related to ME. The MOM factor also possesses substantial explanatory power with significant intercept values. This finding may suggest that investors expect winner stocks to have higher returns in future as well. In essence, investors consider winner stocks riskier than loser stocks. The results of expected excess returns cannot be compared with prior studies as to the best of my knowledge there is no evidence in the literature of a similar study employing expectation measures to test asset pricing models using time series regressions.

5.6 Impact of GFC

The estimates of [11, 12 & 13] produce no evidence that GFC period effects the regression results. It is relevant to mention here, that even after including the GFC dummy, the regression slopes are positive and significant; indicating that SMB, HML and MOM factors are unable to completely explain the variation in returns. Table 7, 8, 9 and 10 shows that regression slopes are consistent with earlier regression results reported in panel A of table 3, 4, 5 and 6. The t-statistic for dummy factor for more than half of the portfolios is insignificant (17 out of 25); while those that are significant are very small in magnitude, indicating GFC dummy does not add much explanatory power to the regression results. The slopes on SMB, HML and MOM and respective t-statistics are consistent with those reported in panel A of tables 3, 4 and 5.

[Tables 7, 8, 9 & 10 about here]

6. Conclusion

We investigate the use of a forward looking measure i.e. ‘IBES mean target price’ as a proxy for expected price in the calculation of expected returns. We use these expected return estimates within a Fama French (1993) framework. To the best of our knowledge a similar study has not been attempted before and so this paper provides an important contribution to the literature. Moreover, IBES mean target price data have not been used in any prior study to estimate expected returns in asset pricing tests, highlighting another contribution of this study. Although the Brav, Lehavy et al. (2005) study is closest to our study, it is pertinent to mention that Brav, Lehavy et al. (2005) use value line target price in their study of the relationship between expectations and firm attributes within a cross-section framework. Further, our study uses IBES mean target price to form expected returns within Fama and French (1993) time series framework.

Target price forecasts are the analyst's estimate of the firm's stock price level at a 12-month horizon. It has been observed in the literature that the target price predicted by the analysts reflects actual stock price movements; and investors consider target price supplied by analysts in making their investment decisions. Further, Brav and Lehavy (2003) and Bradshaw, Brown et al. (2012) provide empirical evidence that analyst target price forecasts are more informative than stock recommendations and earnings forecasts and thus a better proxy for estimating expected returns.

Empirical results for the three factor model using expectations data and realized data are consistent. Indeed, the sensitivities to firm ME are consistent with the Fama and French (1993) study. The SMB coefficients decrease monotonically across every BE/ME quintile with increases in size. However, HML coefficients do not appear to be related to BEME. Unlike, the HML result reported by Fama and French (1993) study, the HML coefficients do not follow any pattern.

The four factor model results using expectations data reveals that SMB is related to size, while HML coefficients do not follow any discretional pattern. The MOM factor possesses substantial explanatory power with significant t-statistic values; suggesting that investors expect winner stocks to have higher returns in future as well. When the four factor model test is repeated using realized data, SMB and HML coefficients are related to size and book-to-market equity respectively. The MOM coefficients depict a mix of negative, positive and significant values.

For the analyst target price based regressions, as you move from a one factor to a three factor or to a four factor model, R-square values increase. The beta values for all portfolios in four factor model approach a value of 1. It is pertinent to mention that for each of one factor, three factor and four factor regressions; the regression intercepts are significant indicating that SMB, HML and MOM factors are unable to completely explain the variation in returns.

To cater for the possibility of a confounding effect arising from inclusion of the GFC period (Sep 2007 to Aug 2009) in the study period; a GFC dummy variable was included in analyst target price based regressions. While, at times these dummy variable coefficients are statistically significant, the regression results suggest that GFC period is not responsible for the results reported here. One area for future research is to identify other measures of expected price to assess the robustness of the results reported here to our decision to use IBES target price in calculation of expected returns.

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Table 1

Descriptive Statistics of 25 stock Portfolios formed on Size and Book to Market Equity: 2002-2012, (10 years)

Size Quintiles	Book to market equity (BE/ME) quintiles: Low	2	3	4	High
	Panel A: Average of annual number of firms in portfolio				
Small	353	575	654	721	527
2	797	833	748	760	334
3	736	702	581	458	208
4	728	672	469	330	190
Big	1,113	673	428	268	87
	Panel B: Average of annual averages of firm size				
Small	243.45	233.19	227.28	211.09	172.64
2	624.04	623.56	615.60	606.01	599.03
3	1,419.43	1,395.82	1,434.21	1,387.55	1,362.71
4	3,485.41	3,467.47	3,378.19	3,321.39	3,401.10
Big	34,623.90	25,829.74	19,725.55	14,482.54	20,764.32
	Panel C: Average of annual B.E ratios for Portfolio				
Small	0.11	0.39	0.57	0.84	11.09
2	0.15	0.39	0.56	0.83	5.99
3	0.16	0.39	0.56	0.83	5.30
4	0.17	0.38	0.56	0.84	3.84
Big	0.17	0.37	0.56	0.81	2.53

Table I shows the descriptive statistics for the 25 portfolios formed in June each year on size and book to market equity over the period from 2002-2012 (10 years). The smallest BE/ME and largest ME quintile (portfolio 15) contains the most number of stocks, while the fewest stocks are recorded in the highest BE/ME and highest ME quintile (portfolio 55). Panel C indicates that BE/ME ratios are uniform across the first four BE/ME quintiles, there appears to be an irregular decrease in the magnitude of BE ratios in quintile 5.

Table 2 –Two Sample Kolmogorov-Smirnov Test

Kolmogorov-Smirnov Test			
Year	D - Value		Combined P-value
	Realized Return	Expected Return	
2001	0.220	-0.093	0.001
2002	0.210	-0.010	0.00
2003	0.090	-0.307	0.00
2004	0.000	-0.787	0.00
2005	0.000	-0.477	0.00
2006	0.010	-0.370	0.00
2007	0.060	-0.170	0.00
2008	0.800	0.000	0.00
2009	0.643	-0.067	0.00
2010	0.003	-0.513	0.00
2011	0.123	-0.303	0.00
Total	0.108	-0.180	0.00

The Kolmogorov-Smirnov Two Sample Test for equality of distribution functions is used to test the equality of distributions. The p-value of the Kolmogorov-Smirnov tests we report is smaller than 0.05 indicating that expected return distributions are not equal to realized return distributions for our sample of shares.

Table 3 – Panel A

Regressions of annual expected excess stock returns on the excess expected stock market return: 2002 - 2012

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[E_{mt,t+12} - R_{ft+12}\right] + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

	Book to market equity (BE/ME) quintiles									
Size Quintiles	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
	(β)					t(β)				
Small	1.38	1.3	0.93	0.97	1.61	11.56	14.75	11.07	12.31	15.33
2	1.16	1.15	1.09	0.94	1.17	14.41	17.91	21.97	13.01	10.99
3	1.21	1.03	1.12	1.15	0.86	20.93	24.33	25.59	20.92	7.02
4	1.16	1.25	1.27	1.05	1.16	27.79	31.38	21.42	16.63	9.09
Big	0.71	1.03	1.27	1.57	1.56	36.06	22.14	25.09	17.49	8.96
	R-Square					s(e)				
Small	0.52	0.64	0.50	0.55	0.65	0.11	0.08	0.08	0.07	0.10
2	0.63	0.72	0.80	0.58	0.49	0.07	0.06	0.04	0.07	0.10
3	0.78	0.83	0.84	0.78	0.28	0.05	0.04	0.04	0.05	0.11
4	0.86	0.89	0.78	0.69	0.40	0.04	0.04	0.05	0.06	0.11
Big	0.91	0.80	0.83	0.71	0.39	0.01	0.04	0.05	0.08	0.16
	(α)					t(α)				
Small	0.08	-0.01	0.04	0.09	0.01	5.42	-0.51	4.29	9.1	0.57
2	-0.01	-0.01	0.02	0.05	0.02	-0.85	-2.39	3.43	5.50	1.59
3	-0.08	-0.06	-0.03	0.03	0.06	-11.2	-11.95	-6.29	5.20	4.10
4	-0.13	-0.10	-0.06	0.00	0.02	-25.18	-21.04	-7.87	-0.11	1.39
Big	0.02	0.02	0.00	-0.05	-0.07	7.44	3.53	-0.73	-4.33	-3.24

$E_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Table 3 – Panel B

GLS Regressions of annual realized excess stock returns on the excess realized stock market return : 2002 - 2012

$$R_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[R_{mt,t+12} - R_{f,t,t+12}\right] + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

Book to market equity (BE/ME) quintiles

Size Quintiles	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
			(b)					t(b)		
Small	1.71	1.23	0.87	0.87	1.00	16.22	16.17	1.58	14.38	18.65
2	1.14	1.21	1.14	1.26	1.11	15.58	29.00	25.38	19.27	15.82
3	1.30	1.45	1.36	1.40	0.83	25.94	39.19	28.90	31.72	13.32
4	1.67	1.26	1.10	1.61	1.00	45.37	42.10	30.25	29.35	23.45
Big	0.92	0.90	0.94	0.77	1.47	46.54	54.62	36.90	21.36	22.48
			(α)					t(α)		
Small	0.25	3.51	0.87	-0.02	-0.08	3.34	0.19	1.68	-0.54	-2.10
2	0.25	0.09	0.02	-0.09	-1.46	4.67	2.96	0.74	-1.99	-1.45
3	0.20	0.04	0.00	-0.10	-3.00	5.56	1.49	0.11	-3.03	-0.59
4	0.15	0.04	-0.01	-0.08	-0.07	5.49	1.98	-0.72	-1.98	-2.42
Big	0.03	0.90	-0.04	-0.07	-0.11	2.10	-2.60	-2.13	-2.68	-2.40

$R_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Table 4 – Panel A

Regressions of annual expected excess stock returns on the excess expected stock market return and mimicking returns for SMB and HML: 2002 – 2012

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[E_{m,t,t+12} - R_{f,t,t+12}\right] + s_{i,t+12}\ \text{SMB} + h_{i,t+12}\ \text{HML} + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

Book to market equity (BE/ME) quintiles

Size Quintiles	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
			(β)					t(b)		
Small	1.35	1.15	0.84	0.78	0.98	11.49	10.47	8.14	10.13	10.18
2	1.05	1.02	1.02	0.85	0.85	14.56	12.90	19.52	9.65	8.76
3	1.07	0.91	0.92	0.90	0.87	16.23	17.98	19.51	18.26	13.22
4	1.16	1.13	1.10	0.98	0.83	21.20	25.14	15.15	12.09	5.34
Big	0.84	1.05	1.14	1.10	1.01	46.68	19.06	18.83	13.76	4.90
			(s)					s(t)		
Small	2.62	0.69	0.92	1.75	1.40	9.27	2.58	3.72	9.45	6.06
2	2.01	0.52	0.97	1.63	1.12	11.63	2.73	7.71	11.24	4.10
3	0.89	0.43	0.52	1.18	0.04	5.57	3.55	4.57	9.98	0.12
4	-0.25	0.60	0.15	0.14	1.15	-1.98	5.44	0.85	0.71	3.11
Big	-0.15	0.60	-0.30	-0.83	-0.61	-3.60	4.55	-2.04	-4.26	-1.22
			(h)					t(h)		
Small	-0.88	0.05	-0.15	-0.26	0.74	-5.69	0.31	-1.11	-2.56	5.87
2	-0.50	0.50	-0.23	0.13	0.62	-5.26	0.51	-3.31	1.63	4.15
3	-0.04	0.09	0.20	0.08	0.74	-0.49	1.39	3.17	1.23	3.79
4	0.20	0.02	0.27	0.90	0.24	2.93	0.40	2.83	0.85	1.18
Big	-0.19	-0.25	0.36	1.23	1.31	-8.12	-3.52	4.50	11.66	4.81
			R-Square					s(e)		

Small	0.73	0.66	0.55	0.74	0.83	0.08	0.08	0.07	0.05	0.07
2	0.82	0.74	0.86	0.83	0.66	0.05	0.06	0.04	0.04	0.08
3	0.83	0.85	0.89	0.89	0.37	0.05	0.04	0.03	0.03	0.10
4	0.87	0.91	0.81	0.70	0.47	0.04	0.01	0.05	0.06	0.11
Big	0.96	0.83	0.86	0.86	0.49	0.01	0.04	0.04	0.06	0.15
			(α)					t(α)		
Small	0.15	0.02	0.07	0.14	0.07	10.62	1.33	5.81	15.25	5.77
2	0.05	0.00	0.05	0.11	0.07	5.58	-0.09	7.71	14.49	5.04
3	-0.05	-0.05	-0.01	0.08	0.08	-6.55	-7.74	-2.36	12.77	4.31
4	-0.13	-0.08	-0.05	0.05	0.06	-21.47	-15.53	-5.46	0.54	3.44
Big	0.00	0.03	0.00	-0.05	-0.07	4.46	5.34	-1.07	-5.48	-2.66

$E_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. SMB and HML factors are the annual mimicking portfolio returns constructed using expected returns. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Table 4 – Panel B

GLS Regressions of annual realized excess stock returns on the excess realized stock market return and mimicking returns for SMB and HML: 2002 – 2012

$$R_{i.t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[R_{m,t,t+12} - R_{f,t,t+12}\right] + s_{i,t+12}\,\text{SMB} + h_{i,t+12}\,\text{HML} + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

Book to market equity (BE/ME) quintiles

	(b)					t(b)				
Small	1.43	1.15	0.72	0.73	0.87	13.05	12.27	14.05	16.29	18.72
2	0.99	1.06	1.03	1.15	1.16	13.81	30.81	29.79	21.67	13.88
3	1.27	1.40	1.25	1.34	0.79	22.61	34.28	27.22	26.25	11.62
4	1.59	1.19	1.09	1.65	1.02	38.27	41.87	27.60	24.61	18.27
Big	0.94	0.92	0.95	0.79	1.40	48.51	49.49	32.50	19.22	20.21
	(s)					s(t)				
Small	2.73	1.52	1.10	0.64	0.55	13.07	8.57	11.34	7.49	6.25
2	1.47	0.91	0.55	0.61	0.17	10.79	14.01	8.51	6.10	1.08
3	0.60	0.06	0.41	-0.24	0.12	5.63	0.83	4.74	-2.47	0.97
4	0.34	0.36	0.08	-0.30	0.36	4.28	6.76	1.03	-2.39	3.43
Big	-0.05	-0.09	-0.28	-0.21	-0.55	-1.49	-2.67	3.25	-2.74	-4.20
	(h)					t(h)				
Small	-0.77	-0.79	-0.10	0.21	0.26	-4.34	-5.17	-1.21	2.94	3.46
2	-0.38	0.03	0.13	0.16	-0.37	-3.29	0.63	2.28	1.24	-2.76
3	-0.29	0.19	0.21	0.47	0.14	-3.16	2.86	2.89	5.66	1.30
4	0.16	0.04	-0.03	0.59	-0.33	2.37	0.92	-0.51	0.54	-3.67
Big	-0.05	-0.02	0.16	0.09	0.77	-1.76	-0.69	-5.03	1.42	6.92
	(α)					t(α)				
Small	0.16	0.16	0.03	-0.07	-0.12	2.17	2.51	0.86	-2.19	-3.93
2	0.20	0.04	-0.01	-0.13	-0.06	4.07	1.87	-0.40	-3.66	-1.14

3	0.19	0.02	-0.03	-0.11	-0.04	4.99	1.01	-0.88	-3.17	-0.89
4	0.12	0.02	-0.02	-0.07	-0.08	4.41	1.20	-0.80	-1.50	-2.06
Big	0.03	-0.02	-0.03	-0.06	-0.12	2.74	-2.05	-1.72	-2.35	-2.70

$R_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. SMB and HML factors are the annual mimicking portfolio returns constructed using expected returns. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Table 5 – Panel A

Regressions of annual expected excess stock returns on the excess expected stock market return and mimicking returns for SMB, HML and MOM : 2003 – 2012

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[E_{m,t,t+12} - R_{f,t,t+12}\right] + s_{i,t+12}\text{ SMB} + h_{i,t+12}\text{ HML} + m_{i,t+11}\text{ MOM} + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

Book to market equity (BE/ME) quintiles

Size Quintiles	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
			(β)					t(b)		
Small	1.26	1.31	0.92	0.70	0.88	9.82	15.64	8.49	8.94	8.19
2	1.06	1.06	0.99	0.5	0.49	15.59	12.25	18.28	7.46	4.05
3	1.06	0.90	0.99	0.92	0.34	15.12	16.94	22.7	16.68	2.37
4	1.10	1.16	1.02	1.07	0.64	20.33	22.83	18.12	14.38	4.54
Big	0.84	0.94	1.16	1.08	1.05	40.74	17.96	18.11	11.97	4.44
			(s)					t(s)		
Small	2.91	0.73	0.87	2.05	1.51	8.96	3.45	3.16	10.31	5.58
2	1.58	0.52	1.27	1.77	1.26	9.18	2.4	9.26	10.49	4.16
3	0.71	0.46	0.45	1.06	0.62	3.99	3.44	4.07	7.59	1.70
4	-0.10	0.49	0.07	0.2	1.13	-0.72	3.86	0.43	1.06	3.17
Big	-0.12	0.71	-0.20	-0.88	-0.57	-2.40	5.40	-1.25	-3.88	-0.95
			(h)					t(h)		
Small	-0.83	-0.18	-0.19	-0.26	0.83	-4.95	-1.62	-1.37	-2.57	5.93
2	-0.25	0.02	-0.32	0.16	0.74	-2.83	0.22	-4.55	1.78	4.69
3	0.07	0.13	0.17	0.09	0.54	0.74	1.87	3.02	1.32	2.84
4	0.15	0.03	0.17	-0.12	0.40	2.14	0.42	1.92	-1.19	2.18
Big	-0.20	-0.18	0.32	1.31	1.22	-7.65	-2.62	3.84	11.12	3.95
			(m)					t(m)		
Small	-0.46	-0.85	-0.82	-0.38	0.24	-1.91	-5.39	-3.99	-2.59	1.20

2	-0.53	-0.39	-0.02	0.12	0.78	-4.18	-2.39	-0.23	0.94	3.44
3	0.05	-0.23	-0.47	0.01	1.35	0.40	-2.31	-5.74	0.06	4.95
4	-0.16	-0.06	-0.30	-0.03	1.59	-1.55	-0.66	-2.43	-0.21	5.99
Big	-0.02	0.43	-0.28	-0.35	0.33	-0.42	4.36	-2.33	-2.08	0.74
	R-Square					s(e)				
Small	0.75	0.83	0.62	0.80	0.84	0.08	0.05	0.07	0.05	0.07
2	0.87	0.77	0.89	0.84	0.72	0.04	0.05	0.03	0.04	0.08
3	0.86	0.88	0.93	0.90	0.51	0.04	0.03	0.03	0.03	0.09
4	0.89	0.92	0.87	0.78	0.65	0.03	0.03	0.04	0.05	0.09
Big	0.96	0.88	0.88	0.87	0.50	0.01	0.03	0.04	0.06	0.15
	(α)					t(α)				
Small	0.26	0.21	0.24	0.24	0.02	5.15	6.32	5.70	7.69	0.47
2	0.14	0.09	0.07	0.10	-0.09	5.29	2.52	3.18	3.44	-1.88
3	-0.07	0.00	0.08	0.07	-0.19	-2.60	-0.03	4.96	3.23	-3.36
4	-0.10	-0.07	0.02	0.02	-0.28	-4.61	-3.75	0.73	0.67	-4.99
Big	0.01	-0.05	0.05	0.02	-0.14	1.79	-2.48	2.07	0.61	-1.54

$E_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. SMB and HML factors are the annual mimicking portfolio returns constructed using expected returns. MOM factor is an annual mimicking portfolio constructed using monthly realized returns from CRSP. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Table 5 – Panel B

GLS Regressions of annual realized excess stock returns on the excess realized stock market return and mimicking returns for SMB, HML and MOM : 2003 – 2012

$$R_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i\left[R_{m,t,t+12} - R_{f,t,t+12}\right] + s_{i,t+12}\,\text{SMB} + h_{i,t+12}\,\text{HML} + m_{i,t+11}\,\text{MOM} + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

Book to market equity (BE/ME) quintiles

Size Quintiles	Low	2	3	4	High	Low	2	3	4	High
Small	1.65	1.14	0.80	0.71	0.87	12.98	15.69	15.68	13.75	14.90
2	1.13	1.04	1.00	0.92	0.91	14.29	28.22	27.00	20.30	12.07
3	1.32	1.37	1.22	1.26	0.83	20.81	31.31	23.08	19.10	10.02
4	1.66	1.18	0.98	1.40	1.08	43.15	41.62	27.17	21.47	18.00
Big	0.97	0.84	0.90	0.70	1.41	47.57	37.06	28.82	17.24	18.10
			(s)					s(t)		
Small	1.74	1.39	1.02	0.70	0.22	7.37	10.26	10.78	7.20	2.06
2	1.50	0.86	0.59	0.72	0.50	10.18	12.56	8.52	8.54	3.60
3	0.96	0.15	0.50	-0.22	0.11	8.14	1.85	5.08	-1.80	0.73
4	0.13	0.43	0.28	0.02	0.34	1.75	8.19	4.23	0.17	3.04
Big	-0.10	-0.04	-0.18	-0.04	-0.69	-2.61	-0.99	-3.12	-0.59	-4.78
			(h)					t(h)		
Small	-1.38	-0.61	-0.22	0.45	0.40	-6.61	-5.15	-2.69	5.28	4.17
2	-0.68	0.12	0.22	0.50	0.17	-5.23	1.96	3.67	6.78	1.42
3	-0.57	0.16	0.30	0.72	-0.02	-5.48	2.28	3.46	6.64	-0.18
4	0.13	0.02	0.22	0.55	-0.38	-3.46	0.46	3.64	5.11	-3.86
Big	-0.10	0.15	0.28	0.41	0.75	-3.10	4.00	5.38	6.12	5.86
			(m)					t(m)		
Small	1.56	-0.54	-1.20	-0.81	-1.41	4.16	-2.51	-7.99	-5.33	-8.16
2	0.34	-0.19	-0.54	-0.04	0.13	1.45	-1.79	-4.97	-0.31	0.58

3	0.87	0.24	-0.26	-0.70	0.60	4.67	1.85	-1.68	-3.58	2.44
4	-0.22	-0.71	-0.44	-0.58	-0.81	0.81	-8.58	-4.17	-3.00	-4.58
Big	-0.05	0.22	-0.67	-0.62	-0.18	-0.77	3.30	-7.26	-5.24	-0.81
			(α)					t(α)		
Small	-0.13	0.21	0.25	0.08	0.18	-1.18	3.34	5.56	1.88	3.61
2	0.12	0.07	0.08	-0.14	-0.12	1.75	2.28	2.33	-3.50	-1.88
3	-0.02	-0.04	0.00	0.03	-0.18	-0.31	-0.99	0.06	0.51	-2.46
4	0.10	0.16	0.04	0.01	0.07	2.93	6.37	1.32	0.32	1.36
Big	0.05	-0.09	0.09	0.04	-0.08	3.00	-4.33	3.42	1.31	-1.12

$R_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. SMB and HML factors are the annual mimicking portfolio returns constructed using expected returns. MOM factor is an annual mimicking portfolio constructed using monthly realized returns from CRSP. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Table 6

Regressions of annual expected excess stock returns on the excess expected stock market return and mimicking returns for SMB, HML and MOM : 2003 – 2012

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_t + \beta_t \left[E_{m,t,t+12} - R_{f,t,t+12}\right] + s_{i,t+12}\text{ SMB} + h_{i,t+12}\text{ HML} + m_{i,t+11}\text{ MOM} + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

Book to market equity (BE/ME) quintiles

Size Quintiles	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
			(b)					t(b)		
Small	1.15	1.07	0.70	0.86	0.93	8.75	14.49	6.67	7.87	8.38
2	0.93	0.95	1.00	0.87	0.73	13.77	10.95	18.23	8.98	6.48
3	1.05	0.82	0.88	0.97	0.75	14.57	15.9	19.92	17.95	5.87
4	1.01	1.10	1.11	1.06	1.09	20.49	22.36	16.91	13.83	9.17
Big	0.85	1.05	1.06	0.94	1.16	41.31	20.6	17.11	10.94	4.75
			(s)					t(s)		
Small	3.13	1.17	1.28	2.19	1.40	9.87	6.61	5.09	10.99	5.30
2	1.84	0.72	1.25	1.66	0.83	11.43	3.46	9.46	10.77	3.10
3	0.70	0.59	0.67	1.01	-0.09	4.07	4.79	6.28	7.77	-0.32
4	0.03	0.56	0.24	0.22	0.30	0.22	4.74	1.50	1.19	1.06
Big	-0.13	0.50	-0.04	-0.66	-0.75	-2.70	4.09	-0.27	-3.22	-1.29
			(h)					t(h)		
Small	-0.92	-0.35	-0.36	-0.32	0.87	-5.56	-3.81	-2.74	-3.10	6.32
2	-0.36	-0.05	-0.32	0.20	0.90	-4.25	-0.50	-4.60	2.43	6.43
3	0.07	0.08	0.08	0.11	0.82	0.78	1.21	1.53	1.68	5.19
4	0.10	0.00	0.10	-0.12	0.73	1.68	0.05	1.25	-1.28	4.89
Big	-0.20	-0.09	0.26	1.22	1.29	-7.88	-1.49	3.33	11.39	4.26
			(m)					t(m)		
Small	-0.09	-0.23	-0.21	-0.03	0.04	-2.04	-8.91	-5.76	-0.94	1.03

2	-0.13	-0.10	0.02	0.09	0.24	-5.36	-3.31	1.33	4.08	6.11
3	-0.02	-0.08	-0.09	0.06	0.39	-0.74	-4.38	-6.05	3.38	8.80
4	-0.10	-0.06	-0.09	-0.01	0.44	-5.75	-3.65	-3.94	-0.45	10.38
Big	0.01	0.10	-0.10	-0.15	0.10	2.53	5.81	-4.41	-4.78	1.19
	R-Square					s(e)				
Small	0.75	0.87	0.67	0.79	0.84	0.08	0.04	0.06	0.05	0.07
2	0.88	0.78	0.89	0.86	0.77	0.04	0.05	0.03	0.04	0.07
3	0.86	0.89	0.93	0.91	0.65	0.04	0.03	0.03	0.03	0.08
4	0.91	0.93	0.88	0.78	0.77	0.03	0.03	0.04	0.05	0.07
Big	0.95	0.89	0.89	0.89	0.50	0.01	0.03	0.04	0.06	0.15
	(α)					t(α)				
Small	0.24	0.21	0.24	0.18	0.04	6.31	9.97	7.95	7.65	1.20
2	0.13	0.08	0.04	0.04	-0.11	6.71	3.35	2.77	2.46	-3.52
3	-0.05	0.01	0.06	0.02	-0.21	-2.29	0.85	4.83	1.54	-5.89
4	-0.06	-0.04	0.03	0.02	-0.28	-3.91	-2.84	1.38	1.04	-8.82
Big	0.00	-0.04	0.07	0.06	-0.15	-0.40	-2.95	3.81	2.39	-2.21

$E_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. SMB and HML factors are the annual mimicking portfolio returns constructed using expected returns. MOM factor is an annual mimicking portfolio constructed using expected returns. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Table 7

Regressions of annual expected excess stock returns on the excess expected stock market return and GFC Dummy : 2002 - 2012

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[E_{m,t,t+12} - R_{f,t,t+12}\right] + \mathrm{d}_t \text{ dummy} + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

Book to market equity (BE/ME) quintiles

Size Quintiles	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
			(β)					t(β)		
Small	1.34	1.28	1.02	0.90	1.52	10.29	13.29	11.42	9.12	13.42
2	1.19	1.10	1.16	1.00	1.25	13.49	15.86	22.39	12.73	10.80
3	1.15	1.12	1.13	1.18	0.88	18.62	26.14	23.73	19.73	6.58
4	1.16	1.29	1.24	0.98	1.18	25.29	30.35	19.23	14.62	8.47
Big	0.71	1.08	1.26	1.43	1.62	32.98	21.91	22.75	15.39	8.51
			(d)					t(d)		
Small	0.02	0.01	-0.05	-0.02	0.05	0.78	0.51	-2.60	-1.05	2.16
2	-0.01	0.03	-0.04	-0.03	-0.04	-0.71	1.92	-3.44	-1.75	-1.62
3	0.03	-0.04	-0.01	-0.01	-0.01	2.73	-4.80	-0.72	-1.23	-0.41
4	0.00	-0.03	0.01	0.03	-0.01	0.34	-2.45	1.16	2.32	-0.41
Big	0.00	-0.03	0.01	0.07	-0.03	-0.03	-2.71	0.52	3.78	-0.76
			R-Square					s(e)		
Small	0.52	0.64	0.52	0.55	0.67	0.11	0.08	0.07	0.07	0.09
2	0.63	0.73	0.81	0.59	0.50	0.07	0.06	0.04	0.07	0.10
3	0.79	0.85	0.84	0.78	0.28	0.05	0.04	0.04	0.05	0.11
4	0.86	0.89	0.79	0.70	0.40	0.04	0.03	0.05	0.06	0.12
Big	0.91	0.81	0.83	0.74	0.39	0.02	0.04	0.05	0.08	0.16
			(α)					t(α)		
Small	0.08	-0.06	0.04	0.09	0.01	5.40	-0.52	4.43	9.12	0.52
2	-0.01	-0.02	0.02	0.05	0.02	-0.83	-2.45	3.63	5.57	1.63

3	-0.08	-0.06	-0.03	0.04	0.06	-11.53	-12.88	-6.26	5.23	4.09
4	-0.13	-0.10	-0.06	0.00	0.02	-25.09	-21.41	-7.90	-0.15	1.39
Big	0.02	0.02	-0.01	-0.05	-0.07	7.41	3.66	-0.74	-4.62	-3.22

$E_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. $Dummy$ is a binary variable which is assigned a value of 1 for GFC period and 0 otherwise. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Table 8

Regressions of annual expected excess stock returns on the excess expected stock market return and mimicking returns for SMB, HML and GFC Dummy: 2002 - 2012

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[E_{m,t,t+12} - R_{f,t,t+12}\right] + s_{i,t+12}\, SMB + h_{i,t+12}\, HML + d_{i,t} dummy + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

Book to market equity (BE/ME) quintiles

Size Quintiles	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
			(β)					t(β)		
Small	1.24	1.12	0.90	0.77	0.88	10.39	9.70	8.50	9.55	9.08
2	1.02	0.97	1.07	0.81	0.72	13.55	11.80	19.89	9.61	6.10
3	0.99	0.98	0.93	0.91	0.51	15.21	20.19	18.70	17.49	3.31
4	1.11	1.16	1.08	0.91	0.83	20.19	24.90	14.12	11.01	5.10
Big	0.83	1.08	1.14	1.01	1.11	44.23	18.95	17.92	12.66	-5.15
			(s)					t(s)		
Small	2.78	0.72	0.83	1.76	1.55	9.98	2.70	3.32	9.30	6.86
2	2.05	0.61	0.91	1.59	1.03	11.66	3.18	7.28	10.84	3.73
3	1.00	0.33	0.51	1.17	-0.01	6.60	2.91	4.39	9.69	-0.03
4	-0.25	0.55	0.18	0.22	1.15	-1.98	5.04	1.03	1.15	3.02
Big	-0.15	0.55	-0.31	-0.70	-0.75	-3.48	4.17	-2.03	-3.72	-1.49
			(h)					t(h)		
Small	-0.95	0.02	-0.10	-0.26	0.67	-6.29	0.17	-0.78	-2.55	5.50
2	-0.51	0.01	-0.20	0.14	0.66	-5.38	0.14	-2.92	1.82	4.43
3	-0.10	0.14	0.20	0.08	0.76	-1.17	2.27	3.21	1.29	3.86
4	0.20	0.04	0.25	0.05	0.24	2.91	0.73	2.62	0.47	1.18
Big	-0.19	-0.23	0.36	1.17	1.37	-8.02	-3.21	4.45	11.51	5.02
			(d)					t(d)		

Small	0.06	0.02	-0.04	-0.04	0.06	3.05	0.88	-2.10	0.21	3.49
2	0.01	0.03	-0.02	-0.01	-0.04	1.16	2.40	-2.70	-1.29	-1.83
3	0.05	-0.04	0.00	0.00	-0.02	4.17	-4.92	-0.54	-0.49	-0.81
4	0.00	-0.02	0.01	0.03	0.00	-0.22	-2.07	1.07	2.39	-0.11
Big	0.00	-0.02	-0.02	0.05	-0.06	0.26	-1.94	-0.17	3.68	-1.51
			R-Square					s(e)		
Small	0.74	0.66	0.56	0.74	0.84	0.08	0.08	0.07	0.05	0.06
2	0.82	0.76	0.87	0.83	0.67	0.05	0.05	0.04	0.04	0.08
3	0.85	0.88	0.89	0.89	0.38	0.04	0.03	0.03	0.03	0.10
4	0.87	0.92	0.81	0.71	0.47	0.04	0.03	0.05	0.06	0.11
Big	0.96	0.84	0.86	0.88	0.50	0.01	0.04	0.04	0.05	0.15
			(α)					t(α)		
Small	0.15	0.02	-0.04	0.14	0.07	11.17	1.39	-2.10	15.16	6.27
2	0.05	0.00	0.05	0.10	0.07	5.66	0.09	7.68	14.39	4.94
3	-0.05	-0.05	-0.01	0.08	0.08	-6.65	-8.79	-2.38	12.65	4.23
4	-0.14	-0.08	-0.05	0.01	0.06	-21.34	-15.85	-5.37	0.73	3.41
Big	0.01	0.03	-0.01	-0.05	-0.07	4.45	5.24	-1.07	-5.46	-2.78

$E_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. SMB and HML factors are the annual mimicking portfolio returns constructed using expected returns. $Dummy$ is a binary variable which is assigned a value of 1 for GFC period and 0 otherwise. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Table 9

Regressions of annual expected excess stock returns on the excess expected stock market return and mimicking returns for SMB, HML, MOM and GFC Dummy : 2003 - 2012

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_t + \beta_t\left[E_{m,t,t+12} - R_{f,t,t+12}\right] + s_{i,t+12}\text{ SMB} + h_{i,t+12}\text{ HML} + m_{i,t+11}\text{ MOM} + d_{i,t}dummy + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

Book to market equity (BE/ME) quintiles

Size Quintiles	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
			(β)					t(β)		
Small	1.08	1.27	0.97	0.66	0.75	10.36	14.47	8.54	8.05	7.04
2	1.00	0.98	1.04	0.53	0.58	14.37	11.11	18.67	7.53	4.72
3	0.97	0.96	0.99	0.94	0.42	14.14	18.36	21.47	16.11	2.75
4	1.09	1.20	1.19	1.03	0.69	19.03	22.91	16.93	13.21	2.93
Big	0.83	0.98	1.14	0.95	1.18	38.40	18.33	16.90	10.92	4.74
			(s)					t(s)		
Small	3.14	0.78	0.80	2.10	1.67	10.36	3.66	2.89	10.50	6.50
2	1.66	0.62	1.21	1.73	1.13	9.77	2.91	8.94	10.16	3.78
3	0.83	0.38	0.45	1.04	0.53	5.00	2.96	3.99	7.33	1.43
4	-0.09	0.44	0.10	0.26	1.05	-0.59	3.49	0.55	1.38	2.93
Big	-0.12	0.65	-0.18	-0.72	-0.73	-2.29	5.04	-1.08	-3.40	-1.21
			(h)					t(h)		
Small	-0.89	-0.19	-0.20	-0.28	0.79	-5.73	-1.74	-1.26	-2.71	5.96
2	-0.27	0.00	-0.31	0.16	0.77	-3.12	-0.01	-4.44	1.89	4.99
3	0.04	0.15	0.17	0.10	0.56	0.43	2.30	3.00	1.39	2.97
4	0.15	0.04	0.16	-0.13	0.42	2.07	0.63	1.85	-1.36	2.28
Big	-0.21	-0.16	0.31	1.27	0.26	-7.63	-2.47	3.76	11.70	4.09
			(m)					t(m)		
Small	-0.71	-0.90	-0.75	-0.44	0.06	-3.09	-5.61	-3.57	-2.91	0.33

2	-0.62	-0.49	0.04	0.16	0.91	-4.82	-3.06	0.39	1.23	4.01
3	-0.08	-0.14	-0.47	0.03	1.46	-0.61	-1.46	-5.54	0.27	5.21
4	-0.18	-0.01	-0.33	-0.09	1.67	-1.67	-0.09	-2.54	-0.66	6.13
Big	-0.02	0.49	-0.30	-0.53	0.50	-0.52	4.97	-2.46	-3.29	1.10
			(d)					t(d)		
Small	0.09	0.02	-0.02	0.02	0.07	4.58	1.46	-1.42	1.59	3.91
2	0.03	0.04	-0.02	-0.01	-0.05	2.73	2.84	-2.67	-1.34	-2.51
3	0.05	-0.03	0.00	-0.01	-0.04	4.46	-3.95	-0.06	-0.92	-1.57
4	0.01	-0.02	0.01	0.02	-0.03	0.71	-2.41	0.75	1.95	-1.24
Big	0.00	-0.02	0.01	0.06	-0.06	0.46	-2.63	0.88	4.68	-1.60
			R-Square					s(e)		
Small	0.79	0.83	0.63	0.80	0.86	0.07	0.05	0.07	0.05	0.06
2	0.88	0.79	0.90	0.84	0.73	0.04	0.05	0.03	0.04	0.07
3	0.88	0.89	0.93	0.90	0.52	0.04	0.03	0.03	0.03	0.09
4	0.89	0.92	0.87	0.79	0.66	0.03	0.03	0.04	0.05	0.09
Big	0.96	0.89	0.88	0.89	0.51	0.09	0.03	0.04	0.05	0.15
			(α)					t(α)		
Small	0.32	0.22	0.23	0.25	0.06	6.58	6.51	5.18	7.89	1.48
2	0.16	0.11	0.05	0.08	-0.12	5.96	3.24	2.48	2.99	-2.50
3	-0.04	-0.02	0.08	0.06	-0.22	-1.58	-1.04	4.76	2.89	-3.67
4	-0.09	-0.09	0.02	0.03	-0.29	-4.26	-4.32	0.89	1.15	-5.15
Big	0.01	-0.06	0.06	0.06	-0.18	1.84	-3.14	2.22	1.84	-1.91

$E_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. SMB and HML factors are the annual mimicking portfolio returns constructed using expected returns. MOM factor is an annual mimicking portfolio constructed using monthly realized returns from CRSP. $Dummy$ is a binary variable which is assigned a value of 1 for GFC period and 0 otherwise. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Table 10

Regressions of annual expected excess stock returns on the excess expected stock market return and mimicking returns for SMB, HML, MOM and GFC Dummy: 2003 – 2012

$$E_{i,t,t+12} - R_{f,t,t+12} = \alpha_i + \beta_i \left[E_{m,t,t+12} - R_{f,t,t+12}\right] + s_{i,t+12}\,\text{SMB} + h_{i,t+12}\,\text{HML} + m_{i,t+11}\,\text{MOM} + d_{i,t}\text{dummy} + e_t$$

Dependent variable : Excess returns on 25 stock portfolios formed on size and book-to-market equity

Book to market equity (BE/ME) quintiles

Size Quintiles	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
			(β)					t(β)		
Small	0.98	1.05	0.78	0.63	0.78	7.45	13.42	7.15	7.10	7.08
2	0.88	0.88	1.06	0.80	0.81	12.49	9.74	18.59	8.94	6.87
3	0.89	0.90	0.90	0.99	0.78	13.37	17.81	19.18	17.28	5.79
4	1.00	1.15	1.10	1.01	1.09	19.05	22.39	15.75	12.55	8.67
Big	0.85	1.08	1.05	0.81	1.28	38.68	20.23	15.90	9.67	4.98
			(s)					t(s)		
Small	3.40	1.19	1.15	2.23	1.63	11.14	6.55	4.56	10.92	6.42
2	1.91	0.83	1.17	1.61	0.71	11.71	3.96	8.88	10.24	2.61
3	0.87	0.47	0.64	0.98	-0.15	5.30	4.06	5.87	7.34	-0.49
4	0.04	0.49	0.25	0.30	0.29	0.36	4.18	1.53	1.59	0.98
Big	-0.13	0.45	-0.02	-0.47	-0.94	-2.56	3.62	-0.15	-2.40	-1.58
			(h)					t(h)		
Small	-0.99	-0.36	-0.32	-0.33	0.80	-6.39	-3.84	-2.48	-3.20	6.18
2	-0.38	-0.09	-0.29	0.21	0.94	-4.51	-0.81	-4.35	2.59	6.72
3	0.02	0.11	0.09	0.12	0.84	0.26	1.89	1.66	1.80	5.24
4	0.10	0.02	0.10	-0.15	0.73	1.59	0.37	1.19	-1.52	4.86
Big	-0.20	-0.08	0.25	1.17	1.35	-7.82	-1.26	3.22	11.68	4.43
			(m)					t(m)		
Small	-0.10	-0.23	-0.21	-0.03	0.03	-2.35	-8.90	-5.76	-0.98	0.93

2	-0.13	-0.10	0.03	0.09	0.25	-5.50	-3.48	1.48	4.15	6.28
3	-0.02	-0.08	-0.09	0.06	0.40	-0.99	-4.56	-6.00	3.42	8.81
4	-0.10	-0.06	-0.09	-0.01	0.44	-5.76	-3.62	-3.93	-0.54	10.33
Big	0.02	0.11	-0.10	-0.15	0.11	2.51	5.94	-4.42	-5.38	1.26
			(d)					t(d)		
Small	0.08	0.01	-0.04	0.01	0.07	4.00	0.56	-2.25	0.95	4.07
2	0.02	0.03	-0.02	-0.01	-0.03	1.93	2.36	-2.73	-1.33	-2.03
3	0.05	-0.03	-0.01	-0.01	-0.02	4.49	-4.57	-1.16	-1.07	-0.80
4	0.00	-0.02	0.00	0.02	0.00	0.62	-2.49	0.33	1.86	-0.21
Big	0.00	-0.01	0.00	0.06	0.00	0.25	-1.82	0.52	4.54	-1.43
			R-Square					s(e)		
Small	0.78	0.87	0.68	0.79	0.86	0.08	0.05	0.06	0.05	0.06
2	0.89	0.79	0.90	0.86	0.78	0.04	0.05	0.03	0.04	0.07
3	0.88	0.91	0.93	0.91	0.65	0.04	0.03	0.03	0.03	0.08
4	0.91	0.93	0.88	0.79	0.77	0.03	0.03	0.04	0.05	0.07
Big	0.96	0.89	0.89	0.90	0.51	0.01	0.03	0.04	0.05	0.15
			(α)					t(α)		
Small	0.25	0.21	0.23	0.18	0.05	7.05	9.95	7.87	7.70	1.63
2	0.13	0.09	0.04	0.04	-0.12	6.94	3.61	2.60	2.34	-3.73
3	-0.04	0.01	0.06	0.02	-0.22	-2.08	0.53	4.72	1.44	-5.92
4	-0.05	-0.04	0.03	0.03	-0.28	-3.83	-3.11	1.40	1.20	-8.24
Big	0.00	-0.04	0.07	0.07	-0.16	-0.38	-3.12	3.83	2.98	-2.34

$E_{m,t,t+12}$ is the value weighted annual excess return on all the stocks in the 25 ME, BE/ME portfolios. $R_{f,t,t+12}$ is the one year US Treasury Constant Maturity rate (FRTCM1Y) from data stream. SMB and HML factors are the annual mimicking portfolio returns constructed using expected returns. MOM factor is an annual mimicking portfolio constructed using expected returns. $Dummy$ is a binary variable which is assigned a value of 1 for GFC period and 0 otherwise. In order to form the 25 portfolios, we sort the NYSE stocks in June of each year t, by size and by book to market equity independently. For the size sort, the ME is calculated at the end of June each year t. While for the BE/ME sort, book to market equity is calculated at the end of December last year (t-1). NYSE breakpoints for ME and BE/ME are used to assign all the stocks in the sample (NYSE, NASDAQ & AMEX stocks) to ME and BE/ME quintiles. The 25 ME-BE/ME portfolios are constructed from the intersection of ME and BE/ME quintiles. The value weighted return on the portfolios is calculated each year from July of year t to June of year t+1.

Figure 1 – Breakdown of Periods

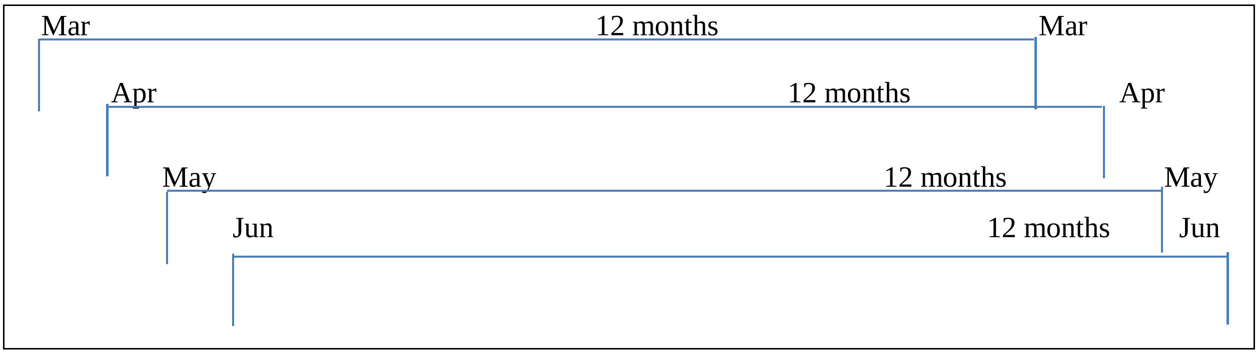

Figure 2 – Expected and Realized Return Distributions