Seasonal Anomalies in the Indian Stock Market: An Empirical Analysis using Fama-French Three Factor Model.

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Abstract

Indian stock market attracts domestic and foreign investments worldwide as it offers the best liquidity of stocks with the highest volume traded and value traded on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE). Given the strong nexus between world markets, the Indian stock market is directly or indirectly impacted by global market shocks, namely, the US-China Trade War, the COVID-19 pandemic, and implementation of GST (the Goods and Services Tax), and Demonetisation in India. The study uses data between 2014 and 2019 for S&P BSE 100 index to analyse the market anomalies, namely, the Size effect, Value effect, using CAPM (Capital Asset Pricing Model), Fama-French Methodology (FF3F) (1992, 1993, 1997) and dummy variable regression techniques for studying the seasonality effect. Our findings indicate that FF3F has superior explanatory power of cross-sectional variations in the excess portfolio returns over CAPM. Significant evidence exists of the 'November effect' and 'December effect' for the Indian stock market.

Keywords: Seasonal anomalies, BSE100, FF3F, CAPM, December effect

Introduction

Modern Portfolio Theory (MPT) of Markowitz (1952), Sharpe (1964) and Lintner (1965) developed the Capital Asset Pricing Model (CAPM) for the valuation of financial assets and the estimation of the cost of equity. The one-factor model and CAPM state that systematic risk (market beta) is the sole determinant of asset returns. Though CAPM transformed financial asset pricing and valuation with the rapid adoption by many practitioners, the model's reliability remained a major concern, with numerous empirical studies disclosing various drawbacks (Gaunt, 2004; Gupta, 2017; Jindal, 2019; Mehta & Chander, 2010; Patel, 2008; Sarma, 2004). Fama and French (1992, 1993, 1997) conducted consecutive studies over a decade to overcome the drawbacks of CAPM and proposed the three-factor model of asset returns. The Fama-French-Three-Factor (FF3F) model is an extension to CAPM where the size and value factors were appended to CAPM. The three-factor model used, $\mathbf{R_m\text{-}R_f}$ (*Excess return of the market over Risk-free rate*), **SMB** (*Small minus Big*), and **HML** (*High minus Low*) as priced risk factors as the value stocks and the small market cap return surpassed markets frequently, and the three-factors explained approximately 95% of the returns of a diversified stock portfolio. Any supplementary expected returns are credited to the unpriced or unsystematic risk.

Indian stock market attracts domestic and foreign investments worldwide as it offers the best liquidity of stocks with the highest volume and value traded on its stock exchanges, namely the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE). S&P BSE 500 index listed on the Bombay Stock Exchange (BSE) represents 93% of the total market capitalization of BSE, consisting of 501 stocks across 20 industries. Financial firms (30%) are the major constituents of the S&P BSE 500 index, followed by services sector firms, construction, healthcare (7%) and FMCG (11%). The index is well diversified across all major industries. Figure 1 represents the sector-wise market capitalization of the S&P BSE 500 index.

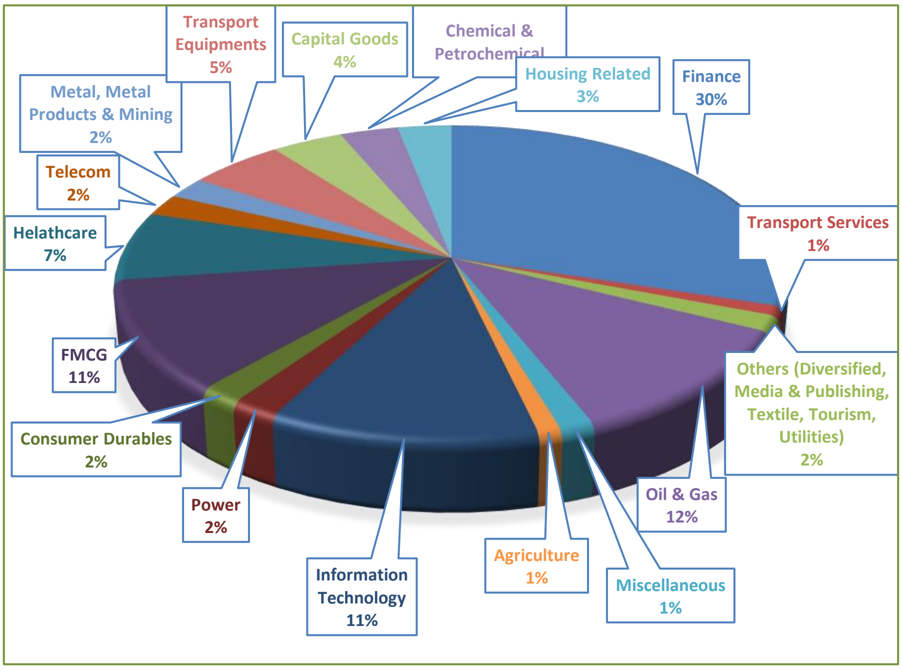

Figure 1 Sector-wise market capitalization of the S&P BSE 500 index

The Indian stock market is tightly integrated with the global stock markets due to the strong nexus among world economies and the rapidly increasing waves of globalization. The nuances of market shocks and turbulence impact the Indian stock market. Market shocks directly or indirectly confront the world markets and the Indian stock market, and this study becomes relevant as it looks at the recent time, i.e. 2015-2019, to study the equity returns behaviour and market anomalies in the context of the implementation of GST, Spillovers of BREXIT, Trade war between US and China, the corporate tax rate cut, COVID 19 and others.

The global market risk factors, namely, the BE-ME ratio (HML factor) that has been well known to impact securities/portfolio returns in the US stock market, do not impact the portfolio returns of the Australian stock market. The results are mixed for differences in the cross-sectional portfolio returns for the Indian stock market. There is very little evidence of the Value effect or the BE-ME effect and the application of the FF3F for the non-US markets, whereas the results are well documented using US data for the US markets (Gaunt, 2004). The present investigates the following research questions, namely,

a) Do 'Value effect', 'size effect' and 'Month-of-the-year effect' exist/persist for the Indian stock market?
b) Do 'SMB' and 'HML' factors significantly explain the portfolio returns for the cross-sectional portfolios?

The study aims to fulfil the objectives - i) to analyze the explanatory power of Market Risk, SMB and HML factors for cross-sectional portfolio returns, ii) to ascertain if Size and Value effects persist for the Indian stock market, and iii) to analyze the seasonal anomalies or 'Month-of-the-Year' effect for the Indian stock market. The study finds FF3F to have superior predictability or explanatory power in explaining the cross-sectional variation in excess portfolio returns for the Indian stock market. The Indian stock market exhibits the Size effect, Value effect, and seasonal effect, namely, the February effect, the March effect, the April effect, the May effect, and the November and the December effects for cross-sectional portfolios.

Literature Review

In the context of asset pricing anomalies, there have been multiple arguments regarding the effectiveness of CAPM in the estimation of securities/portfolio returns. The CAPM is condemned for not accounting for anomalies like the Size effect, Value effect, and other calendar anomalies. Fama and French (1992, 1993, 1997) proposed a three-factor model as an extension to the CAPM. The Fama-French-Three-Factor (FF3F) model significantly explained 90% of excess portfolio returns, whereas CAPM explained approximately 75%. The three-factor model used SMB (Small minus Big) and HML (High minus Low) factors along with the Market risk factor ($R_m - R_f$) to study the explanatory power of additional risk factors in explaining the cross-sectional differences in portfolio returns. The results showed that the Small market-cap (Small Size) firms and high BE-ME ratio (High Value) firms outperformed the overall market. Small and Value firms surpassed the returns of the large-cap firms and growth firms offering Size and value premiums. Many studies (Al-Mwalla & Karasneh, 2011; Drew, Naughton, & Veeraraghavan, 2003; Gaunt, 2004; Pham, 2007; Sehgal & Balakrishnan, 2013; Soumaré, Aménounvé, Diop, Méité, & N'Sougan, 2013; Taneja, 2010; Manjunatha & Mallikarjunappa, 2009; Sembiring, 2018; Sobti, 2016; Xu & Zhang, 2014) supported the findings of Fama-French.

Gaunt (2004) found that adding Size and Value factors to the Market risk factor of the existing estimation model increased the explanatory power of the model in explaining the significantly higher returns behaviour of the securities' returns. Drew et al. (2003) agreed that FF3F had superior explanatory power for cross-sectional portfolio returns in China than CAPM. Pham (2007) found that firm Size (market-cap) and BE-ME ratios surpass the Market risk factor in the estimation of portfolio returns for the Tokyo stock market and that FF3F cannot be rejected for the Tokyo stock market.

Taneja (2010) found that Market Beta alone failed to capture the risk factors affecting portfolio returns and suggested using FF3F as it better explained the cross-sectional portfolio returns over CAPM. Mehta and Chander (2010) and Al-Mwalla & Karasneh (2011) examined the potentiality of FF3F to explain the variation in cross-sectional returns and acknowledged that FF3F has greater potentiality in explaining the cross-sectional variations in portfolio returns than one-factor or CAPM. Sobti (2016) found a non-linear relationship between the excess returns and market beta of CAPM and suggested that FF3F is better than CAPM in determining the portfolio returns. Soumaré et al. (2013) compared CAPM and FF3F and confirmed the superior predictability of FF3F over CAPM for the BVRM (Bourse Régionale des Valeurs Mobilières) stock exchange. Manjunatha & Mallikarjunappa (2018) studied the explanatory power of the FF3F model using the methodology adopted by Fama and French (1992) and found that all three factors explained the cross-sectional portfolio returns. The market factor had the highest explanatory power in determining portfolio returns, followed by the Size and value factor. Size and value factors significantly explained the portfolio returns in high and medium-value sorted portfolios, and only the market factor explained the returns concerning low-value portfolios. Sembiring (2018) acknowledged the potentiality of FF3F in determining the returns of the winner-looser portfolio. Eraslan (2013) contradicted the earlier studies that the FF3F model had a narrow potentiality in determining the variations in portfolio returns. Drew et al. (2003) found no significant evidence for the Value effect of the Chinese stock market. Trimech, Kortas, Benammou, and Benammou (2009) observed that the explanatory power of a model depended on the time interval used for the estimation. The FF3F risk factors, namely, the Market factor, SMB and HML, had the highest explanatory power in explaining the portfolio returns for medium-term and long-term estimation intervals. There is mixed evidence for the Value effect in the Indian stock market.

The studies debating the predictive power of CAPM used alternative models, namely, FF3F, to report some significant calendar anomalies, Size effect, Value effect, day-of-the-week effect, month-of-the-year effect or the seasonality effect. Sehgal and Balakrishnan (2013) and Sobti (2016) used CAPM and FF3F for the estimation of portfolio returns for the Indian stock market and found a significant Size effect and Value effect. Sehgal and Tripathi (2005) found a strong persistence of the Size effect for Indian stock markets. Taneja (2010) studied the Size and Value anomalies and found that the average returns of small and Big Size portfolios declined as the Value factor (BE-ME ratio) shifted from Low to Medium and Medium to High, indicating an inverse relationship between the Value factor and mean portfolio returns. The study also found a positive relationship between the firm Size and average monthly returns for all the portfolios, excluding small and Low-value portfolios. Li and Lajbcygier (2007) found significant evidence for the 'Value effect' or 'Value Premium'. The findings reported that value premiums showed a downward trend across stocks i.e. the value premiums were increasing if the stocks exhibited negative BE-ME ratios. Al-Mwalla & Karasneh (2011) found significant Size and Value effects for the firms listed on the Amman Stock Exchange. However, Gaunt (2004) found that Small-cap and Low-value or low BE-ME firms had a higher beta risk for the Australian stock market and found no significant explanatory power for the BE/ME risk factor or HML factor. Eraslan (2013) found contradicting evidence as his results indicated that large-cap firms demonstrated greater average excess returns over small-cap firms, clearly denying the Size effect. He also pointed out that the Size effect was fruitless for the Big Size portfolio; however, relevant for Medium Size and Small Size portfolios. Value effect was significant for the portfolios constructed with high BE-ME ratio of firms. The results of Gaunt (2004) align with the findings of Eraslan (2013) as he did not find any existence of Value effect for Australian stock market.

Patel (2008), Mehta and Chander (2010), and Gupta (2017) studied the calendar anomalies in Indian Stock Market. Patel (2008) found a significant existence of the 'November effect', 'December effect', 'March effect' and 'May effect' for the Indian stock market as the portfolios reported significantly greater average returns in November and December over any other months of the year. The returns were significantly lower in March and May than in any other month, indicating the significant month-of-the-year effect or seasonality effect. Mehta and Chander (2010) studied the seasonality effect but did not find statistical evidence for the existence of January effect and April effect. However, the study found a significant 'November effect' and 'December effect' for the Indian stock market. Gupta (2017) reported a significant 'December returns' for Indian stock markets using the S&P BSE SENSEX stocks.

Sarma (2004) found evidence for the seasonality effect or day-of-the-week effect or the weekend effect for the Indian stock markets as he found significant Monday returns than the rest of the days, and the standard deviation (a proxy for risk) was higher ad positive on Mondays and Fridays over the rest of the days indicating significantly higher riskiness of the stock markets on Mondays or Fridays. Jindal (2019) found significantly higher returns on Thursdays *(Thursday effect)* and Fridays *(Friday effect)* over Wednesdays. Friday's average returns were significantly non-identical compared to the other weekdays, indicating a significant *'Friday effect.'*

This study is becoming relevant and exciting as the global markets, including the Indian stock market, have experienced numerous market turbulences and shocks since 2015, namely, the implementation of GST, Spillovers of BREXIT, the Trade war between the US and China, the corporate tax rate cut, COVID 19 and others. According to the literature review, one of the significant price risk factors, namely, the BE-ME ratio (HML factor) that impacted securities/portfolio returns in the US stock market, did not seem relevant for the Australian stock market. The results are mixed for cross-sectional portfolios in the Indian stock market. There is very little evidence of the Value effect or the BE-ME effect and the application of the FF3F for non-US markets, whereas the results are well documented using US data for the US markets (Gaunt, 2004).

Following the gaps identified from the literature review, the study proposes the following hypotheses-

H_1: SMB significantly explains the cross-sectional return variations.
H_2: HML significantly explains the cross-sectional return variations
H_3: The 'Month-of-the-Year effect' is significant for the Indian stock market
H_{31}: January effect is significant
H_{32}: February effect is significant
H_{33}: March effect is significant
H_{34}: April effect is significant
H_{35}: May effect is significant
H_{36}: June effect is significant
H_{37}: July effect is significant
H_{38}: August effect is significant
H_{39}: September effect is significant
H_{310}: October effect is significant
H_{311}: November effect is significant
H_{312}: December effect is significant.

Data and Methodology

The study uses S&P BSE 500 index as the proxy for the Indian stock market, which represents 95% of the total market capitalization of BSE. The monthly-close price of S&P BSE 500 stocks and the S&P BSE 500 index are referred from the 'CapitalinePlus' database for 2014-2019. The study used only the data of 340 firms (*excluded 91 financial firms as they differ from other firms in their operations, market capitalization, and other financial parameters; the other 69 firms are excluded due to the unavailability of data for the study period*). The log returns of firms are computed as shown in (1).

$$\ln r_t = \ln\left(\frac{p_t}{p_{t-1}}\right) \qquad \ldots (1)$$

Where p_t - adjusted closing price of firms at month t, and p_{t-1} - adjusted closing price of firms at month t-1.

The monthly data for financial ratios (Book Equity-to-Market Equity or BE-ME ratio) and firm capitalization (firm Size) are downloaded from the CapitalinePlus database. BE-ME ratio is computed as the inverse of the price-to-book (PB) ratio, the risk-free rate from the IIMA data library (*https://faculty.iima.ac.in/~iffm/legacy/*). All the return series and ratios are checked for stationarity using ADF (Augmented Dickey-Fuller) test.

Fama and French Cross-sectional Portfolios

The study adopts Fama and French (1992) methodology for constructing the cross-sectional portfolios through univariate sorting of stocks based on firm Size (market capitalization) and BE-ME (Book Equity to Market Equity) ratios. Monthly firm size is used as a classifier to divide firms into two quartiles. Firms above quartile 2 (median) are considered 'large-cap stocks', and those below the median are 'small-cap stocks'. Similarly, the monthly BE-ME ratio is used to classify firms into three groups of

'Low', 'Mid' and 'High' BE-ME ratio firms. Six value and Size sorted portfolios constructed are as follows-

SL – Represents a portfolio of small-cap and low book-to-market ratio companies
SM – Represents a portfolio of the small-cap and medium book-to-market ratio companies
SH – Represents a portfolio of small-cap and high book-to-market ratio companies
BL – Represents a portfolio of large-cap (big Size) and low book-to-market ratio companies
BM – Represents a portfolio of the large-cap and medium book-to-market ratio companies
BH – Represents a portfolio of large-cap and high book-to-market ratio companies

These portfolios are constructed and revised in January every year. With the help of these six value and Size sorted portfolios, the Fama-French factors, namely, Small Minus Big (SMB) and High Minus Low (HML) factors, are computed using the given in (2) and (3).

SMB = [(SL + SM + SH)/3] – [(BL + BM + BH)/3] … (2)

HML = [(SH + BH)/2] – [(SL + BL)/2] … (3)

Where,

SL, SM, SH, BL, BM, and BH are the six portfolios constructed under Fama and French methodology.

Capital Asset Pricing Model (CAPM) for the estimation of Portfolio Returns

The study uses the Capital Asset Pricing Model (CAPM) and the Fama-French Three Factor Model (FF3F) to estimate portfolio returns. The CAPM measures the portfolio returns as a linear function of the market risk factor measured by market beta. The equation is shown in (4)

$$E(r)_i - r_f = \alpha + \beta(r_m - r_f) + \varepsilon_t \quad \ldots (4)$$

Where,

$E(r)_i$ *- Expected return,* r_f *– the risk-free rate of return, α - intercept, β- market risk coefficient,* $(r_m - r_f)$ *- excess market return, and* ε_t- error term.

Fama and French Methodology for estimation of Portfolio Returns

The study uses the Fama and French (1992, 1993) three-factor model to estimate stock returns for cross-sectional portfolios. Previous studies have shown that the Fama-French Three Factor Model explained more than 90% of the variation in the excess portfolio returns for the cross-sectional portfolios. In contrast, Capital Asset Pricing Model explained approximately 70% variation in the excess portfolio returns. FF3F uses SMB and HML factors along with the Market Risk factor, as shown in (5)

$$E(r)_i - r_f = \alpha + \beta_1(r_m - r_f) + \beta_2(SMB) + \beta_3(HML) + \varepsilon_t \quad \ldots (5)$$

Where,

$E(r)_i$ *- Expected return,* r_f *– the risk-free rate of return, α - intercept,* $\beta_1, \beta_2, \beta_3$*- Coefficients,* $(r_m - r_f)$ *- excess market return, SMB = Size risk factor (Small minus Big), HML = Value premium risk factor (High minus Low), and* ε_t- error term.

The study uses multivariate regression (MLR) analysis to determine the explanatory power of market risk factor, SMB and HML factors for estimating the excess portfolio returns. The methodology uses each factor and increments the CAPM model with SMB and HML to explicitly measure the R-square value of the one-factor models with SMB and HML alone and the three-factor model for determining the contribution of each of the factors and all the three-factors in explaining the cross-sectional returns. The adjusted R2 value measures the explanatory power of the three factors.

Dummy Variable Regression Analysis for testing the Seasonality Effect or 'Month-of-the-Year' effect

The seasonality effect tests for seasonal calendar anomalies in stock returns. The study has used 'dummy variable regression' analyses for the seasonality effect or 'month-of-the-year' effect across the cross-sectional portfolio for all 12 months. The test for seasonality is conducted using the equation given in (5)

$$E(p)_t = \alpha + d_1 p_1 + d_2 p_2 + \cdots + d_{11} p_{11} \qquad \ldots (5)$$

Where, p_1, p_2 ... p_{11} – represent average portfolio return for month 1, d_1, d_2... d_{11} - refers to dummy variables. d_1 takes the value 1 if the month is 'January', else 0. Similarly, d_{11} takes the value 1 if the month is 'November', else 0.

Statistical Tests for the Seasonality Effect

The study uses a parametric test, i.e. t-test and a non-parametric test, i.e. Kruskal Wallis H test, for studying the significance of the seasonality effect or the 'month-of-the-year effect.

T-test statistic follows a student's t distribution. The formula for computing the t-statistic is given in (6). Kruskal Wallis H statistic follows a chi-square distribution with (k-1) degrees of freedom. It is computed using (7)

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\left(\frac{s_1^2}{n_1}\right) - \left(\frac{s_2^2}{n_2}\right)}} \qquad \ldots (6)$$

Where $\bar{x}_1, \bar{x}_2$ represent average portfolio returns for a month vs the rest of the year, the total number of observations, k – is the number of groups, R_i – the sum of ranks received by each group, and n_i – is the number of observations in each group.

$$H = \frac{12}{N(N+1)} \sum_{i=1}^{k} \frac{R_i^2}{n_i} - 3(N+1) \qquad \ldots (7)$$

Where N – is the total number of observations, k – is the number of groups, R_i – the sum of ranks received by each group, and n_i – is the number of observations in each group.

Discussion and Findings

Table 1 represents the descriptive statistics of the six cross-sectional Fama-French portfolios: SL, SM, SH (Small Portfolio) and BL, BM, and BH (Big Portfolios) for 2014-2019. The average returns are positive and significant, varying across the cross-sectional portfolios except for the 'Big High' (BH) portfolio. The Small-Low (SL) portfolio (0.012%) earns higher average returns than the Small-High (SH) (0.0023%), Big-High (BH) (-0.003%) and Big-Low (BL) portfolios (0.0097%). The average portfolio returns decline as the BE-ME ratio increases, indicating an inverse relationship between returns and the BE-ME ratio. Small portfolios (SL, SM, SH) exhibit the highest level of volatility (0.0572%, 0.0587%, 0.0761%) in the average returns compared to Big portfolios (BL, BM, BH) at (0.0432%, 0.0393%, 0.0603%), respectively. All the portfolios exhibit negative skewness and leptokurtosis in returns indicating that the returns are not normally distributed.

Table 2 shows the regression estimates of CAPM, one-factor model using SMB and one-factor model HML for all the cross-sectional portfolios. The CAPM-beta significantly explains excess portfolio returns for all cross-sectional portfolios. The explanatory power of market beta in explaining the portfolio returns ranges between *59.26% (SH) to 88.64% (BM)*. Big-Medium (BM) portfolio has the highest adjusted R-square indicating a higher explanatory power of market beta. Market risk factor explained about *75.85% variation in returns for SM, 60.45% for SH, 76.29% for BL and 69.33% for BH. CAPM explained approximately 71.64% variation in the excess portfolio returns for all the cross-sectional portfolios. Our results abide by* Fama and French (1992, 1993, 1997).

The one-factor model using SMB showed that the SMB factor significantly contributed to determining the excess portfolio returns for all the cross-sectional portfolios. The adjusted R-square value of the SMB model ranged from 10.79% (BL) and 61.32% (SH). BL and BH portfolios have almost equal R-square values (10.94%). Between the Small and Big Size portfolios, the SMB factor has good explanatory power for Small Size portfolios at 45.25% (SM) to 61.32% (SH). The adjusted R-square values of Big Size portfolios were the least at 10.79% (BL) and 18.43% (BM). The SMB factor explained approximately 32.24% variation in the excess portfolio returns for all the cross-sectional portfolios. The one-factor model using HML showed that the HML factor significantly explained approximately 18.35% of the variation in the excess portfolio returns for all the cross-sectional portfolios, with a range of R-square between -1.67% (BL) and 42.86% (BH). The BL portfolio reported a negative adjusted R^2 implying a badly fit model. The highest explanatory power of HML was found for the BH portfolio. The HML factor has good explanatory power for high BE/ME portfolios, namely, BH and SH (37.92%) across all Sizes. The explanatory power of the Market factor (71.64%) is higher than SMB (32.24%) and HML (18.35%) factors in explaining the cross-sectional portfolio returns (table 2).

Table 3 summarises the results of the Two-factor and Fama-French Three Factor (FF3F) models. The two-factor model uses the Market risk factor and SMB to capture the incremental explanatory power of SMB. The explanatory power increased to 82.93% from 71.64% *(Market Risk factor alone, of CAPM)* when SMB was added, indicating the significance of SMB for understanding the excess portfolio returns. The R-square values for cross-sectional portfolios vary from 69.23% (BH) and 92.15% (SM). The two factors explain approximately 90% of the variation in excess portfolio returns for SM, SH (90.93%), BM (90.02%) and 70% variation in returns for SL (79.13%) and BL (76.12%). FF3F shows the explanatory power of SMB and HML betas in explaining the cross-sectional portfolio returns along with market beta. The adjusted R-square value has significantly increased in explaining the cross-sectional portfolio returns than CAPM, indicating a superior explanatory power of FF3F. Our findings align with (Al-Mwalla and Karasneh, 2011; Drew, Naughton, and Veeraraghavan, 2003; Gaunt, 2004; Pham, 2007; Sehgal and Balakrishnan, 2013; Soumaré, Aménounvé, Diop, Méité, and N'Sougan, 2013; Taneja, 2010; Manjunatha and Mallikarjunappa, 2009; Sembiring, 2018; Sobti, 2016; Xu & Zhang, 2014). The highest R-square value is found for the SH portfolio (96.27%) and the least for the BH portfolio (83.69%). The FF3F model can explain almost all the variations in the return behaviour of the SH portfolio. The SMB beta is positive and significant for all portfolios except BH and was found to significantly explain the cross-sectional portfolio returns for all portfolios except BH. HML beta is positive and significant for SH and BH, negative and significant for SL and BL and not significant for SM and BM portfolios. The findings indicate a significant impact of SMB for all the Size portfolios except BH. The HML positively impacts High Value (BH, SH) portfolios, negatively impacts Low-Value (SL, BL) portfolios and has no impact on the other portfolios. Our findings partially support Eraslan (2013) as Low-Value portfolio returns are not explained by the BE-ME ratio or the HML factor for the Indian stock market.

Tables 4 to 16 represent the results of the seasonality effect or the month-of-the-year effect. The results indicate that none of the six portfolios reported a significant difference in returns in January, May, June, July, August, September and November than the average returns in the rest of the year. Our findings strongly support Patel (2008), Mehta and Chander (2010), and Gupta (2017). However, there are significantly different returns for some or all of the cross-sectional portfolios during February, March, April, October and December. The results are discussed below.

Table 4 portrays the results of the 'January effect'. As there is no significant variation in the average returns in January over the average returns for the rest of the year, the January effect is insignificant for all the portfolios. The 'February effect' is significant for the SH portfolio. March returns significantly differed for SL and BL (low-value) portfolios. The BH portfolio reported significant differences in May returns but no differences in June, July, August and November. All the portfolios, except BL, reported a significant return difference in October. In December, only the SM portfolio reported significant differences in return behaviour. SL and BL portfolios reported significant returns in March, April, October, and March; SM and BM portfolios had significant October, December, and October returns. The SH portfolio had significant February, April and October returns, and the BH portfolio had significant May and October returns.

Table 5 examines the 'January effect' presence for cross-sectional portfolios. The average returns of SL and BL portfolios were slightly lower in January than the average returns of the eleven months, which is supported by the t-test at a 10% significance level. The non-parametric (Kruskal Wallis H) test did not offer significant statistical support for the 'January effect'. Therefore, no statistical evidence exists for the significant January effect for the cross-sectional portfolios.

Table 6 examines the presence of the 'February effect'. The average February returns of the SL portfolio (small, low-value) are less than the average returns for the rest of the months, as the t-statistic and the p-value reject the null hypothesis, 'there is no significant February returns' 10% significance level. For the SH (small, high-value) portfolio, the t-test and Kruskal Wallis H statistic reject the null hypothesis and support the alternative hypothesis of significant February returns (lower returns than the rest of the year). The small-size portfolios exhibited significant February returns. However, there is no evidence of February returns for the remaining portfolios under study. SL portfolio (small, low-value) also reported significantly higher returns in March than the rest of the year (table 7). The t-test supports the significant and higher March returns for the SL portfolio, and both the t-test and Kruskal Wallis H test rejects the null hypothesis. Similarly, the BL portfolio implies significant and higher March returns for the SL portfolio.

Table 8 reports the results of the seasonality of 'April returns'. The SL and SH (Small Size) portfolios reported significantly different returns in April than the average returns for the rest of the year, as the statistical tests rejected the null hypothesis at a 10% significance level. The SL portfolio reported a higher return (3.55%) in April than the rest of the year (1% only). There is no evidence of significant April returns for the other portfolios. Table 9 shows the results of the 'May effect'. The SL portfolio reported significantly higher returns in May than the rest of the year, whereas the BH portfolio reported significantly lower returns in May than the rest of the year. Other portfolios did not report any significant average returns in May. Therefore, the May effect is significant for SL and BH portfolio returns. Table 10 shows the results for the 'June effect'. SL and BL portfolios reported significantly higher June returns than the rest of the year. Other portfolios did not exhibit any significance in their return performance. Table 11 tests for the presence of 'The July effect. Even though all six portfolios reported higher positive returns during July than the average returns of the rest of the months, higher returns are not statistically significant as none of the tests supports them by showing the significance level. Table 12 results indicate no significant 'August returns' across the cross-sectional portfolios. The SL and BL (low-value) portfolios reported significantly higher September returns than the rest of the year (table 13)

Table 14 shows results for the "October effect", which is significant for all the portfolios except the BL portfolio. All six portfolios report positive higher returns during October month than the rest of the year. The presence of anomalous return during October is supported by both t-test and Kruskal Wallis H Test for SL, SH and BH portfolios, and the t-test supported the anomalous return of SM and BH portfolios. Table 15 depicts the results for significant "November returns or the November effect." The average returns of all cross-sectional portfolios during November are lower than the rest of the average returns for the rest of the year. All the portfolios in November reported negative average returns than the average returns for the rest of the eleven months. But these returns were not supported by the statistical test. Table 16 reports the "December returns" or the "December effect." The SM portfolio showed higher average December returns than the other eleven months.

Conclusion

The study found significant differences in the average returns of cross-sectional portfolios created based on the bivariate sorting technique of Fama and French (1995), namely, the firm Size (market capitalization) and the BE-ME ratio. Small firms (SL, SM, SH portfolios) outperformed the Big firms (BL, BM and BH portfolios) as the average returns of the SL, SM, and SH portfolio was higher than the BL, BM, and BH portfolio during the study period. The BH portfolio reported negative average returns. The standard deviation (a proxy for the expected risk or deviation in average portfolio returns) was higher for Small firms than Big Size firms.

The CAPM explained 71.64% of portfolio returns for all the cross-sectional portfolios. The Beta for the market factor was significant for the cross-sectional portfolios. The average explanatory power of the SMB factor alone was 32.24% showing a greater ability to capture the variation in Small Size portfolios than Big Size portfolios. The average explanatory power of the HML factor for all six portfolios stood at 18.35%. The Market factor had the highest explanatory power over SMB and HML factors in explaining the cross-sectional portfolio returns. When the Size factor (SMB) was added to the Market factor (R_m-R_f), the explanatory power increased to 82.93% from 71.64%.

Among the three factors used in the FF3F model for analyzing the explanatory power of SMB and HML factors along with the market beta of CAPM, the study found that all three factors had significant explanatory power. The explanatory power of the Market factor (R_m-R_f) for all six portfolios ranges from 59.26% to 88.64%. The highest adjusted R-square value was reported for medium BE-ME portfolios of all Sizes (BM, SM). There is an inverse relationship between the BE-ME ratio and average portfolio returns as the portfolio returns decreased as the BE-ME ratio increased. The Fama-French Three Factor model explained above 90% of the variation in two portfolios (SM, SH), above 85% for two portfolios (BL, BM), and above 80% for the rest of the two portfolios (SL, BH). The predictive power of the Fama-French Three Factor model is superior to the one-factor model – CAPM.

The dummy-variable regression results for measuring the seasonality effect or 'the month-of-the-year' effect showed significant returns in February, March, April, October and December.

The average return for the SH portfolio in February was significantly lower than for the rest of the year. SL and BL portfolios showed significantly higher returns in March than the rest of the year, indicating a significant 'March effect' for low-value portfolios across all Sizes. The SL portfolio exhibited higher returns in April. BH portfolio reported significantly lower returns in May than the rest of the year. In October, except for the BL portfolio, all other portfolios reported significantly higher returns than the average returns for the rest of the year, implying a significant 'October effect'. The SM portfolio reported a significantly higher return in December over the rest of the year, indicating the presence of the 'December effect' in the Indian stock market.

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Table 1. Descriptive Statistics of Cross-sectional Portfolio returns

Portfolio/Factor	Mean	Median	Std. Deviation	Skewness	Kurtosis	Min	Max
Cross-sectional Portfolio Returns (in %)							
SL	0.0121	0.0233	0.0572	-0.6484	0.3037	-0.1539	0.1007
SM	0.0063	0.0121	0.0587	-0.6482	0.5863	-0.1563	0.1246
SH	0.0023	0.0179	0.0761	-0.3437	-0.3710	-0.1755	0.1534
BL	0.0097	0.0073	0.0432	-0.6780	0.8648	-0.1268	0.0893
BM	0.0057	0.0040	0.0393	-0.4777	0.1392	-0.0884	0.0956
BH	-0.0030	-0.0031	0.0603	-0.1141	-0.3858	-0.1307	0.1376

Source: Author's computation.

Table 2. Regression estimates of the Capital Asset Pricing Model (CAPM), one-factor model using SMB, and one-factor model using HML

Cross-sectional Portfolio	CAPM α	CAPM β_{rm}	CAPM Adjusted R^2	SMB factor α	SMB factor β_{SMB}	SMB factor Adjusted R^2	HML factor α	HML factor β_{HML}	FF3F Adjusted R^2
SL	-0.0054	0.5386***	59.26%	-0.0014	0.3427***	46.47%	-0.0127	0.1245	1.87%
	0.1120	*<0.05*		*0.6135*	*<0.05*		*0.0128*	0.1503	
SM	-0.0026	0.5918***	75.85%	0.0007	0.3305***	45.52%	-0.0130	0.2890***	18.70%
	0.3061	*<0.05*		*0.8078*	*<0.05*		*0.0047*	*<0.05*	
SH	0.0002	0.4085***	60.45%	0.0021	0.2943***	61.32%	-0.0119	0.3104***	37.92%
	0.9599	*<0.05*		*0.3693*	*<0.05*		*0.0030*	*<0.05*	
BL	-0.0067	0.8073***	76.29%	0.0005	0.2313***	10.79%	-0.0114	0.0198	-1.67%
	0.0113	*<0.05*		*0.8866*	*<0.05*		*0.0279*	0.8642	
BM	-0.0044	0.9535***	88.64%	0.0009	0.3222***	18.43%	-0.0131	0.3323***	10.39%
	0.0156	*<0.05*		*0.7892*	*<0.05*		*0.0069*	*<0.05*	
BH	0.0027	0.5515***	69.33%	0.0032	0.1666***	10.94%	-0.0100	0.4157***	42.86%
	0.3412	*<0.05*		*0.3548*	*<0.05*		*0.0091*	*<0.05*	
Average Adj. R^2			71.64%			32.24%			18.35%

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Note: Author's computation. Values with *** are significant at 5% and 1% significance levels. Values in *italics* represent the p-values of the coefficients. Columns 2-4 represent regression estimates and the adjusted R-square of CAPM (Capital Asset Pricing Model) i.e. $\boldsymbol{E(r)_i - r_f = \alpha + \beta_1(r_m - r_f) + \varepsilon_t}$. Columns 5-7 show results of regression estimates and R-square of the one-factor model using SMB i.e. $\boldsymbol{E(r)_i - r_f = \alpha + \beta_1(SMB) + \varepsilon_t}$. Similarly, Columns 8-10 show the results of the one-factor model using HML i.e. $\boldsymbol{E(r)_i - r_f = \alpha + \beta_1(HML) + \varepsilon_t}$

Table 3. Regression estimates Two Factors Model and the Fama-French Three Factor Model (FF3F)

Cross-sectional Portfolio	FF2F α	FF2F β_{rm}	FF2F β_{SMB}	FF2F Adjusted R^2	FF2F α	FF2F β_{rm}	FF3F β_{SMB}	FF3F β_{HML}	FF3F Adjusted R^2
SL	0.0085***	0.8740***	0.9562***	79.13%	0.0038	0.9749***	1.0856***	-0.3807***	84.17%
	<0.05	<0.05	<0.05		*0.2359*	*<0.05*	*<0.05*	*<0.05*	
SM	0.0027	1.0676***	0.8844***	92.15%	0.0034	1.0519***	0.8643***	0.0590	92.13%
	0.2131	<0.05	<0.05		*0.1384*	*<0.05*	*<0.05*	*0.3531*	
SH	-0.0032	1.1049***	1.5664***	90.93%	0.0031	0.9693***	1.3926***	0.5115***	96.27%
	0.2836	<0.05	<0.05		*0.1278*	*<0.05*	*<0.05*	*<0.05*	
BL	0.0084***	0.9307***	0.0775	76.12%	0.0030	1.0470***	0.2267***	-0.4390***	88.31%
	<0.05	<0.05	0.4544		*0.1503*	*<0.05*	*<0.05*	*<0.05*	
BM	0.0043***	0.8860***	0.1824***	90.02%	0.0038	0.8966***	0.1960***	-0.0400	89.97%
	<0.05	<0.05	<0.05		*0.0333*	*<0.05*	*<0.05*	*0.4054*	
BH	-0.0047	1.2298***	0.1470	69.23%	0.0036	1.0526***	-0.0803	0.6688***	83.69%
	0.2816	<0.05	0.3714		*0.2891*	*<0.05*	*0.5167*	*<0.05*	
Average R^2				82.93%					89.09%

Note: Author's computation. Values with *** are significant at 5% and 1% significance levels.

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Table 4. Seasonality effect or 'Month-of-the-Year' effect for cross-sectional portfolios

Portfolios	BL		BM		BH		SL		SM		SH	
Estimate/ month	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
January	0.0085	0.3724	0.0029	0.1468	-0.0139	-0.4130	0.0020	0.0642	-0.0134	-0.5216	-0.0238	-0.7192
	(0.0229)	(0.3704)	(0.0196)	(0.3931)	(0.0337)	(0.3645)	(0.0314)	(0.3966)	(0.0256)	(0.3463)	(0.0331)	(0.3060)
February	-0.0057	-0.2729	-0.0116	-0.5877	-0.0239	-1.0619	0.0049	0.1464	-0.0217	-0.7114	-0.0587	-1.9310*
	(0.0210)	(0.3827)	(0.0197)	(0.3337)	(0.0225)	(0.2253)	(0.0337)	(0.3931)	(0.0305)	(0.3077)	(0.0304)	(0.0630)
March	0.0421	2.9012***	0.0276	1.2507	0.0148	0.3723	0.0506	2.5921**	0.0448	1.4421	0.0221	0.5280
	(0.0145)	(0.0071)	(0.0221)	(0.1813)	(0.0398)	(0.3705)	(0.0195)	(0.0154)	(0.0311)	(0.1406)	(0.0418)	(0.3451)
April	0.0147	0.7835	0.0136	0.9197	0.0235	1.5324	0.0355	1.7279***	0.0309	1.5771	0.0369	1.7095*
	(0.0188)	(0.2915)	(0.0148)	(0.2594)	(0.0153)	(0.1232)	(0.0206)	(0.0903)	(0.0196)	(0.1151)	(0.0216)	(0.0931)
May	0.0142	1.4291	-0.0042	-0.2804	-0.0286	-2.6458*	-0.0095	-0.5768	0.0002	0.0135	-0.0142	-0.6976
	(0.0099)	(0.1432)	(0.0148)	(0.3819)	(0.0108)	(0.0136)	(0.0165)	(0.3358)	(0.0152)	(0.3974)	(0.0203)	(0.3107)
June	0.0028	0.2852	-0.0065	-0.7825	-0.0297	-1.1827	-0.0105	-0.5187	-0.0085	-0.3698	-0.0177	-0.4706
	(0.0099)	(0.3814)	(0.0083)	(0.2917)	(0.0251)	(0.1969)	(0.0202)	(0.3468)	(0.0230)	(0.3708)	(0.0376)	(0.3552)
July	0.0245	1.3744	0.0191	0.8694	0.0064	0.2310	0.0216	0.7192	0.0099	0.2834	0.0330	0.7486
	(0.0179)	(0.1544)	(0.0220)	(0.2714)	(0.0277)	(0.3868)	(0.0300)	(0.3060)	(0.0349)	(0.3816)	(0.0441)	(0.2994)
August	0.0102	0.8148	0.0025	0.1433	-0.0262	-0.9302	0.0099	1.0483	-0.0060	-0.3639	-0.0050	-0.2025
	(0.0125)	(0.2842)	(0.0172)	(0.3933)	(0.0282)	(0.2569)	(0.0094)	(0.2286)	(0.0164)	(0.3716)	(0.0245)	(0.3893)
September	-0.0123	-0.4245	-0.0097	-0.5313	-0.0257	-0.9890	-0.0126	-0.3761	-0.0175	-0.5467	-0.0166	-0.4640
	(0.0290)	(0.3627)	(0.0183)	(0.3445)	(0.0260)	(0.2428)	(0.0335)	(0.3699)	(0.0320)	(0.3416)	(0.0357)	(0.3564)
October	0.0193	1.1889	0.0264	2.2602**	0.0560	3.8400***	0.0489	3.1248***	0.0374	2.1321**	0.0672	2.9670***
	(0.0162)	(0.1954)	(0.0117)	(0.0327)	(0.0146)	(0.0005)	(0.0156)	(0.0039)	(0.0175)	(0.0427)	(0.0227)	(0.0060)
November	-0.0103	-0.4932	-0.0034	-0.2991	-0.0094	-1.0641	-0.0097	-0.4255	-0.0037	-0.1773	-0.0057	-0.2188
	(0.0208)	(0.3513)	(0.0114)	(0.3798)	(0.0088)	(0.2248)	(0.0228)	(0.3626)	(0.0207)	(0.3911)	(0.0261)	(0.3879)
December	0.0080	0.6761	0.0120	1.2926	0.0214	1.5210	0.0139	1.4042	0.0230	2.6849**	0.0100	0.8462
	(0.0118)	(0.3154)	(0.0092)	(0.1720)	(0.0140)	(0.1253)	(0.0099)	(0.1482)	(0.0086)	(0.0123)	(0.0118)	(0.2769)

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K - W H Test	6.423	7.8367	12.9567	9.9443	7.8905	10.9948
(P Value)	(0.8437)	(0.7279)	(0.2962)	(0.5354)	(0.7231)	(0.4437)

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 5. Regression estimates using Fama-French Three Factor Model for the 'January Effect' across cross-sectional portfolios

Portfolios	BL		BM		BH		SL		SM		SH	
Estimate/ month	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
January	0.0085	0.3724	0.0029	0.1468	-0.0139	-0.4130	0.0020	0.0642	-0.0134	-0.5216	-0.0238	-0.7192
	(0.0229)	(0.3533)	(0.0196)	(0.3780)	(0.0337)	(0.3470)	(0.0314)	(0.3818)	(0.0256)	(0.3277)	(0.0331)	(0.2866)
Rest of the Year	0.0098	1.7288*	0.0060	1.1535	-0.0020	-0.2497	0.0130	1.7472*	0.0081	1.0342	0.0047	0.4611
	(0.0057)	(0.0930)	(0.0052)	(0.1899)	(0.0078)	(0.3691)	(0.0074)	(0.0907)	(0.0078)	(0.2155)	(0.0101)	(0.3388)
K - W H Test	0.0789		0.0016		0.3307		0.2448		0.5410		0.9015	
(P Value)	(0.7788)		(0.9680)		(0.5653)		(0.6210)		(0.4620)		(0.3424)	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 6. Regression estimates using Fama-French Three Factor Model for the 'February Effect' across cross-sectional portfolios

Portfolios	BL		BM		BH		SL		SM		SH	
Estimate/ month	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
February	-0.0057	-0.2729	-0.0116	-0.5877	-0.0239	-1.0619	0.0049	0.1464	-0.0217	-0.7114	-0.0587	-1.9310*
	(0.0210)	(0.3666)	(0.0197)	(0.3146)	(0.0225)	(0.2095)	(0.0337)	(0.3780)	(0.0305)	(0.2883)	(0.0304)	(0.0705)
Rest of the Year	0.0111	1.9506*	0.0073	1.4208	-0.0011	-0.1294	0.0127	1.7292*	0.0088	1.1599	0.0079	0.7907
	(0.0057)	(0.0686)	(0.0051)	(0.1387)	(0.0081)	(0.3790)	(0.0074)	(0.0929)	(0.0076)	(0.1885)	(0.0099)	(0.2705)

K - W H Test	0.5024	0.5810	0.7098	0.0016	1.0603	2.7056
(P Value)	(0.4785)	(0.4459)	(0.3995)	(0.9680)	(0.3031)	(0.1000)

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 7. Regression estimates using Fama-French Three Factor Model for the 'March Effect' across cross-sectional portfolios

Portfolios	BL		BM		BH		SL		SM		SH	
Estimate/ month	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
March	0.0421	2.9012**	0.0276	1.2507	0.0148	0.3723	0.0506	2.5921**	0.0448	1.4421	0.0221	0.5280
	(0.0145)	(0.0178)	(0.0221)	(0.1701)	(0.0398)	(0.3533)	(0.0195)	(0.0276)	(0.0311)	(0.1351)	(0.0418)	(0.3265)
Rest of the Year	0.0067	1.1758	0.0037	0.7441	-0.0046	-0.6038	0.0086	1.1284	0.0028	0.3713	0.0005	0.0511
	(0.0057)	(0.1852)	(0.0050)	(0.2810)	(0.0076)	(0.3113)	(0.0076)	(0.1951)	(0.0075)	(0.3535)	(0.0099)	(0.3822)
K - W H Test	2.7056***		1.2921		0.2720		2.3651		1.6140		0.6225	
(P Value)	(0.1000)		(0.2557)		(0.6020)		(0.1241)		(0.2039)		(0.4301)	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 8. Regression estimates using Fama-French Three Factor Model for the 'April Effect' across cross-sectional portfolios

Portfolios	BL		BM		BH		SL		SM		SH	
Estimate/ month	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic	Co-eff.	t-statistic
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
April	0.0147	0.7835	0.0136	0.9197	0.0235	1.5324	0.0355	1.7279*	0.0309	1.5771	0.0369	1.7095*
	(0.0188)	(0.2722)	(0.0148)	(0.2412)	(0.0153)	(0.1205)	(0.0206)	(0.0931)	(0.0196)	(0.1137)	(0.0216)	(0.0954)
Rest of the Year	0.0092	1.5954	0.0050	0.9433	-0.0054	-0.6512	0.0100	1.2938	0.0041	0.5116	-0.0008	-0.0811
	(0.0058)	(0.1110)	(0.0053)	(0.2359)	(0.0082)	(0.3014)	(0.0077)	(0.1618)	(0.0079)	(0.3296)	(0.0103)	(0.3813)
K - W H Test	0.0646		0.1118		1.2320		1.0060		0.9530		1.6140	
(P Value)	(0.7994)		(0.7381)		(0.2670)		(0.3159)		(0.3290)		(0.2039)	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 9. Regression estimates using Fama-French Three Factor Model for 'May Effect' across cross-sectional portfolios

Portfolios	BL		BM		BH		SL		SM		SH	
Estimate/ month	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
May	0.0142	1.4291	-0.0042	-0.2804	-0.0286	-2.6458**	-0.0095	-0.5768	0.0002	0.0135	-0.0142	-0.6976
	(0.0099)	(0.1373)	(0.0148)	(0.3657)	(0.0108)	(0.0256)	(0.0165)	(0.3168)	(0.0152)	(0.3827)	(0.0203)	(0.2913)
Rest of the Year	0.0093	1.5548	0.0066	1.2493	-0.0006	-0.0743	0.0141	1.8042***	0.0068	0.8481	0.0038	0.3637
	(0.0060)	(0.1170)	(0.0053)	(0.1704)	(0.0083)	(0.3815)	(0.0078)	(0.0840)	(0.0081)	(0.2575)	(0.0104)	(0.3546)
K - W H Test	0.0946		0.4652		1.7528		1.4166		0.2191		0.8028	
(P Value)	(0.7584)		(0.4952)		(0.1855)		(0.2320)		(0.6397)		(0.3703)	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 10. Regression estimates using Fama-French Three Factor Model for the 'June Effect' across cross-sectional portfolios

Portfolios	BL		BM		BH		SL		SM		SH	
Estimate/ month	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
June	0.0028	0.2852	-0.0065	-0.7825	-0.0297	-1.1827	-0.0105	-0.5187	-0.0085	-0.3698	-0.0177	-0.4706
	(0.0099)	(0.3651)	(0.0083)	(0.2724)	(0.0251)	(0.1838)	(0.0202)	(0.3283)	(0.0230)	(0.3537)	(0.0376)	(0.3371)
Rest of the Year	0.0103	1.7297*	0.0068	1.2629	-0.0005	-0.0652	0.0141	1.8338*	0.0076	0.9672	0.0041	0.4107
	(0.0060)	(0.0929)	(0.0054)	(0.1677)	(0.0080)	(0.3818)	(0.0077)	(0.0806)	(0.0079)	(0.2305)	(0.0100)	(0.3473)
K - W H Test	0.5410		1.5137		0.8514		1.3536		0.7098		0.4652	
(P Value)	0.4620		0.2186		0.3561		(0.2446)		(0.3995)		(0.4952)	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 11. Regression estimates using Fama-French Three Factor Model for the 'July Effect' across cross-sectional portfolios

Portfolios	**BL**		**BM**		**BH**		**SL**		**SM**		**SH**	
Estimate/ month	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
July	0.0245	1.3744	0.0191	0.8694	0.0064	0.2310	0.0216	0.7192	0.0099	0.2834	0.0330	0.7486
	(0.0179)	(0.1468)	(0.0220)	(0.2527)	(0.0277)	(0.3711)	(0.0300)	(0.2866)	(0.0349)	(0.3653)	(0.0441)	(0.2800)
Rest of the Year	0.0083	1.4422	0.0045	0.8879	-0.0038	-0.4739	0.0112	1.4985	0.0060	0.7898	-0.0005	-0.0498
	(0.0058)	(0.1351)	(0.0051)	(0.2485)	(0.0080)	(0.3365)	(0.0075)	(0.1258)	(0.0076)	(0.2707)	(0.0098)	(0.3822)
K - W H Test	0.8514		1.8243		0.2720		0.3951		0.3307		1.0603	
(P Value)	(0.3561)		(0.3561)		(0.6020)		(0.5297)		(0.5653)		(0.3031)	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 12. Regression estimates using Fama-French Three Factor Model for the 'August Effect' across cross-sectional portfolios

Portfolios	**BL**		**BM**		**BH**		**SL**		**SM**		**SH**	
Estimate/ month	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
August	0.0102	0.8148	0.0025	0.1433	-0.0262	-0.9302	0.0099	1.0483	-0.0060	-0.3639	-0.0050	-0.2025
	(0.0125)	(0.2651)	(0.0172)	(0.3782)	(0.0282)	(0.2388)	(0.0094)	(0.2124)	(0.0164)	(0.3546)	(0.0245)	(0.3737)
Rest of the Year	0.0096	1.6263	0.0060	1.1454	-0.0008	-0.1050	0.0123	1.5485	0.0074	0.9209	0.0030	0.2852
	(0.0059)	(0.1066)	(0.0053)	(0.1916)	(0.0080)	(0.3803)	(0.0079)	(0.1180)	(0.0080)	(0.2409)	(0.0104)	(0.3651)
K - W H Test	0.0302		0.0145		0.5024		0.2448		0.5810		0.0045	
(P Value)	(0.8620)		(0.9042)		(0.4785)		(0.6207)		(0.4459)		(0.9467)	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 13. Regression estimates using Fama-French Three Factor Model for the 'September Effect' across cross-sectional portfolios

Portfolios	BL		BM		BH		SL		SM		SH	
Estimate/ month	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
September	-0.0123 (0.0290)	-0.4245 (0.3451)	-0.0097 (0.0183)	-0.5313 (0.3259)	-0.0257 (0.0260)	-0.9890 (0.2256)	-0.0126 (0.0335)	-0.3761 (0.3528)	-0.0175 (0.0320)	-0.5467 (0.3228)	-0.0166 (0.0357)	-0.4640 (0.3383)
Rest of the Year	0.0117 (0.0053)	2.1858** (0.0493)	0.0071 (0.0052)	1.3739 (0.1469)	-0.0009 (0.0080)	-0.1099 (0.3800)	0.0143 (0.0073)	1.9622* (0.0675)	0.0085 (0.0076)	1.1131 (0.1984)	0.0040 (0.0101)	0.3982 (0.3493)
K - W H Test (P Value)	0.5810 (0.4459)		0.5024 (0.4785)		0.8028 (0.3703)		0.1719 (0.6785)		0.3006 (0.5835)		0.1504 (0.6982)	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 14. Regression estimates using Fama-French Three Factor Model for the 'October Effect' across cross-sectional portfolios

Portfolios	BL		BM		BH		SL		SM		SH	
Estimate/ month	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**
Months	***(SE)***	***(P Value)***	***(SE)***	***(P Value)***	***(SE)***	***(P Value)***	***(SE)***	***(P Value)***	***(SE)***	***(P Value)***	***(SE)***	***(P Value)***
October	0.0193 (0.0162)	1.1889 (0.1825)	0.0264 (0.0117)	2.2602** (0.0443)	0.0560 (0.0146)	3.8400*** (0.0050)	0.0489 (0.0156)	3.1248* (0.0130)	0.0374 (0.0175)	2.1321* (0.0532)	0.0672 (0.0227)	2.9670** (0.0162)
Rest of the Year	0.0088 (0.0058)	1.5097 (0.1240)	0.0039 (0.0053)	0.7249 (0.2853)	-0.0083 (0.0079)	-1.0480 (0.2125)	0.0088 (0.0077)	1.1362 (0.1935)	0.0035 (0.0079)	0.4370 (0.3430)	-0.0036 (0.0101)	-0.3577 (0.3555)
K - W H Test (P Value)	0.9530 (0.3290)		1.4810 (0.2236)		6.1207** (0.0134)		2.7943* (0.0946)		1.7528 (0.1855)		3.5555* (0.0593)	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 15. Regression estimates using Fama-French Three Factor Model for the 'November Effect' across cross-sectional portfolios

Portfolios	**BL**		**BM**		**BH**		**SL**		**SM**		**SH**	
Estimate/ month	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
November	-0.0103 (0.0208)	-0.4932 (0.3330)	-0.0034 (0.0114)	-0.2991 (0.3634)	-0.0094 (0.0088)	-1.0641 (0.2090)	-0.0097 (0.0228)	-0.4255 (0.3449)	-0.0037 (0.0207)	-0.1773 (0.3758)	-0.0057 (0.0261)	-0.2188 (0.3722)
Rest of the Year	0.0115 (0.0057)	2.0296 (0.0614)	0.0066 (0.0054)	1.2197 (0.1763)	-0.0024 (0.0084)	-0.2827 (0.3654)	0.0141 (0.0077)	1.8382 (0.0802)	0.0072 (0.0080)	0.9037 (0.2449)	0.0030 (0.0104)	0.2928 (0.3642)
K - W H Test (P Value)	1.1161 (0.2908)		0.5410 (0.4620)		0.1719 (0.6785)		0.8028 (0.3703)		0.1504 (0.6982)		0.1118 (0.7381)	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance level.

Table 16. Regression estimates using Fama-French Three Factor Model for the 'December Effect' across cross-sectional portfolios

Portfolios	**BL**		**BM**		**BH**		**SL**		**SM**		**SH**	
Estimate/ month	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**	**Co-eff.**	**t-statistic**
Months	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*	*(SE)*	*(P Value)*
December	0.0080 *(0.0118)*	0.6761 *(0.2960)*	0.0120 *(0.0092)*	1.2926 *(0.1620)*	0.0214 *(0.0140)*	1.5210 *(0.1222)*	0.0139 *(0.0099)*	1.4042 *(0.1416)*	0.0230 *(0.0086)*	2.6849** *(0.0242)*	0.0100 *(0.0118)*	0.8462 *(0.2580)*
Rest of the Year	0.0098 *(0.0059)*	1.6570 *(0.1024)*	0.0052 *(0.0054)*	0.9528 *(0.2337)*	-0.0052 *(0.0083)*	-0.6252 *(0.3069)*	0.0119 *(0.0079)*	1.5031 *(0.1251)*	0.0048 *(0.0081)*	0.5878 *(0.3146)*	0.0016 *(0.0106)*	0.1517 *(0.3776)*
K - W H Test (P Value)	0.0351 *(0.8515)*		0.0179 *(0.8936)*		0.7790 *(0.3774)*		0.1030 *(0.7482)*		0.2861 *(0.5927)*		0.0007 *(0.9787)*	

Note: Values with *** are Significant at 1% level, **are Significant at 5% level, and *are significant at 10% significance