CHAPTER V
LONG-TERM PRIOR RETURN PATTERNS IN STOCK AND
SECTOR RETURNS IN INDIA

INTRODUCTION

Long-term prior return patterns in asset pricing have been puzzling for researchers. In this chapter, the work has been carried out on lines of De Bondt and Thaler (1985, 1987) by employing portfolio formation periods greater than 12 months. Long-term (24-60) month’s portfolio formation windows have been used for Indian data, which is an emerging stock market. Time series return patterns for both prior return and style portfolios formed on selected company characteristics have been tested. Given that 24-60 months portfolio formation windows may contain short-term momentum effects, the strategies have been tested by skipping 12 months between portfolio formations and holding windows. The study examines if there are any long term prior return patterns in stock returns and whether they can be explained by standard asset pricing models like the CAPM and the Fama French model. Also, an attempt has been made to find if there are any prior return patterns in sector data and whether the sector factor (formed as the difference between winner and loser sectors, WML) is able to explain extra normal returns for the test portfolios.

The chapter is organized as follows. Section 1 describes data and their sources. Section 2 covers methodological issues and empirical results relating to test portfolios formed on long term past returns as well as company characteristics. In section 3, it is examined if there are any long-term time series patterns in sector returns and if the sector factor could explain some of the returns on stock portfolios. Section 4 contains summary and conclusions.

5.1. DATA AND THEIR SOURCES

Monthly share prices (adjusted for stock splits, stock dividends, and rights issue) of 450 companies for the period January 1993 to February 2008 are obtained from Thomson Reuters Datastream software. The companies are a part of the Bombay Stock Exchange\(^1\) (BSE)-500 index\(^2\) as on February 2008 (final month of the study period). The companies represent a large proportion of the Indian equity market both in terms of market capitalization and trading activity.
The monthly share price series have been converted to percentage monthly return series for estimation purpose. Data for company characteristics such as market capitalization, Price to Book (P/B) ratio, Price to Earnings (P/E) ratio, Dividend Yield and Sales have been used in formation of stylized portfolios. BSE National Index (base year 1983-84 = 100) compiled by Bombay Stock Exchange has been used as a surrogate for aggregate economic wealth. It is a free float value-weighted index, which is constructed in lines with the Standard & Poor, USA. Data for firm characteristics and market index have also been taken from Thomson Reuters Datastream software. The implicit yield on 91-day treasury bills has been used as a measure of risk-free proxy and data for the same is available on Reserve Bank of India (RBI) website.

Global Industry Classification System (GICS) has been used for sector classification to form winner minus loser (WML) factor of sectors. GICS comprises of 10 sectors, namely Energy, Materials, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Financials, Information Technology, Telecommunication Services and Utilities. Data for sector classification of Indian companies has been taken from World scope, Reuters Financials & Compustat Global.

### 5.2. LONG-TERM PRIOR RETURN PATTERNS IN STOCK RETURNS

In this section, the study explores whether there are any long-term (24-60 months) prior return patterns in stocks returns. Fama and French (1996) skip one year between portfolio formation and holding windows to control for short-term effects so that long-term stock return patterns can be clearly observed. Sehgal and Jain (2011) report strong short-term prior return patterns (up to 12 months) in India. Hence 12 months are skipped between portfolio formation and holding windows to control for the short-term momentum effects.

Prior return patterns in stocks are explored by forming three types of portfolios: 1) On basis of average past returns of 24, 36, 48 and 60 months (single sorted portfolios), 2) On basis of firm characteristics such as market capitalization, price to book (P/B) ratio, price to earnings (P/E) ratio, dividend yield and past sales growth (PSG) and average past returns of 24-60 months (double sorted portfolios), and 3) On basis of Size and Price to Book (P/B) ratio / Size and Price to Earnings (P/E) ratio and prior returns of 24-60 months (triple sorted portfolios). This is based on the assumption that investor reaction to small and big stocks as well as value and growth stocks may be
different for characteristics such as liquidity, relative strength, availability of information and trading costs. For ranking market capitalization has been used as a measure of size (Banz, 1981), and value characteristic are measured by P/B (Chan, Hamao and Lakonishok, 1991), P/E (Basu, 1983) and PSG (Fama French, 1996). While the first two measures are scaled price variables, the third measure is a fundamental based proxy. Also securities are sorted on dividend yield as it may affect stock returns owing to differential treatment of dividend and capital gain income (Litzenberger and Ramaswamy, 1979). Triple sorted portfolios are constructed based on only size and value (measured by P/B or P/E ratio) characteristics as the past literature concentrates on these attributes, see Lewellen (2002). Past Sales Growth (PSG) is computed as compounded growth rate in net sales three years prior to portfolio formation.

The portfolios have been formed on basis of (i months-j months-k months) strategy where i months involve portfolio formation period, ranging from 24-60 months, j months represent the 12 months that are skipped between portfolio formation and portfolio holding period, while k is fixed at 12 months as portfolio holding period. 12 months are skipped between portfolio formation and holding windows, as suggested by Fama and French (1996), to control for any short-term momentum patterns that may hamper any clear discerning of long-term prior return patterns. Calendar year that is from January to December has been used for purpose of evaluation.

The portfolio formation process of single sorted portfolios for 24 months-12 months-12 months (24-12-12) strategy is done as follows: In December of year t-2, the individual securities are ranked on basis of past twenty four month’s average monthly past excess returns. The ranked securities are then classified into quintiles, P1 to P5. P1 and P5 comprises of bottom and top 20% stocks respectively, on basis of average past period returns. Equally weighted returns are then estimated for sample portfolios leaving a gap of 12 months between portfolio formations and holding windows (that is, January to December of year t-1). The portfolios are rebalanced in December of year t-1 and portfolio returns are estimated for year t. The process is repeated till the end of sample period. The single sorted portfolios are non-overlapping by construction. However, looking at previous literature, it is believed that results for non-overlapping portfolios shall not significantly differ from overlapping portfolios (Jegadeesh and Titman, 1993).
Next, in the study, sorting of sample companies has been done on different company characteristics and prior return patterns are observed within each characteristic group. The analysis is inspired by past research which indicates the relationship between company characteristics and returns. Double sorted portfolios are constructed based on firm characteristics and long-term past excess returns for 24-12-12 investment strategy. In December of year t-2, the sample securities are sorted into two groups, Small or S (bottom 50%) and Big or B (upper 50%) in case of company size (measured by market capitalization) and Low or L (bottom 50%) and High or H (top 50%) in case of other company characteristics, that is, P/B ratio, P/E ratio, dividend yield and past sales growth. Within each characteristic group three prior return portfolios are constructed, that is, (bottom (33⅓ %), middle (between 33⅓ % and 66 2/3 %) and top (greater than 66 2/3 %)) based on twenty-four months average past returns (t-2 and t-1 years). Equally weighted excess returns are estimated for sample portfolios by skipping 12 months between portfolio formation and holding windows (that is, January to December of year t-1) and the portfolios are rebalanced every 12 months based on double sorting criteria for the year t. The sub-portfolios are labeled as S1, S2, S3 and B1, B2, B3 for company size criteria and L1, L2, L3 and H1, H2, H3 for other company characteristics.

Finally, the formation of triple sorted portfolios is done based on size and price to book (P/B) ratio / Size and price to earnings (P/E) ratio and prior returns based on 24 months prior returns. The triple sorting procedure is done as follows: in December of year t-2, the sample securities are sorted on basis of company size into two groups, Small (S) and Big (B). Next, regrouping of the sample stocks has been done on basis of value factor ((P/B)/(P/E)) and form two groups, Low (L) and High (H). Intersection between the two criteria to form four portfolios, SL, SH, BL and BH has been used. Within each four groups, three prior return portfolios are constructed again as described for double sorted portfolios. The portfolios are labeled as SL1, SL2, SL3, SH1, SH2, SH3, BL1, BL2, BL3 and BH1, BH2, BH3. Estimation of 36 months-12months-12months (36-12-12), 48 months-12 months-12months (48-12-12) and 60months-12months-12months (60-12-12) investment strategies are done in similar manner.

Table 5.1 present’s average unadjusted returns estimated from excess returns (portfolio returns minus risk free rate) for past winner and loser portfolios over different time periods. If past winners (P5, S3, B3....) outperform past losers (P1, S1,
B1…) in future, one experiences momentum while the reverse shall imply contrarian pattern. Contrarian profits emerge for almost all test portfolios for long-term investment strategies. In case of return portfolios, 36-12-12 strategy gives the highest return of 0.69% per month. Stylized portfolios give lower returns in most of the cases with few exceptions. High contrarian profits are given by following portfolios: Low PSG-Return portfolio gives 0.99% per month for 60-12-12 strategy, SH of Size-P/E-Return gives 0.95% per month for 48-12-12 strategy, BL of Size-P/E-Return gives 0.94% per month for 24-12-12 strategy. For Indian market, it seems that expanding portfolio formation windows beyond 24 months does not pay off. This is consistent with the U.S. evidence, given by De Bondt and Thaler (1987), where they find that excess returns for losers in test periods are negatively related to long-term formation periods. Contrarian patterns however become dominant on elongating the formation windows beyond 24 months. Next, it is evaluated if these long-term prior return patterns can be explained by standard risk models.

Profits associated with contrarian and momentum strategies can be attributed to risk differentials between corner portfolios. Two risk models, namely, Capital Asset Pricing Model (CAPM) developed by Sharpe (1964) and Lintner (1965) and Fama French (F-F) three-factor model (1993) have been used to explain extra returns arising in case of the test portfolios. CAPM is a single-factor model and states that under certain assumptions, excess returns on any risky asset are linearly related to excess returns on market factor.

CAPM is generally estimated by using the excess return version of market model in the form:

\[ R_{pt} - R_{ft} = \alpha + \beta(R_{Mt} - R_{ft}) + e_i \]  \hspace{1cm} (5.1)

Where,

- \( R_{pt} - R_{ft} \) = \textit{Excess Return on a portfolio},
- \( R_{Mt} - R_{ft} \) = \textit{Excess return on the market factor},
- \( \alpha \) = \textit{Measure of abnormal profits},
- \( \beta \) = \textit{Sensitivity measures of stock returns to the market returns},
- \( e_i \) = \textit{Error term}.

Alternatively, Fama French in 1993 developed a multi-factor model to explain CAPM anomalies. The model states that expected returns on a portfolio are function of three
factors: market, size and value. The size and value factors are constructed using the methodology given in Fama French (1993) paper. All other terms are same as equation (1). LMH factor has been used instead of HML as in case of Fama French model, hence the interpretation of value factor will be opposite. All other terms are same as equation (1). LMH factor us used instead of Fama-French HML factor as P/B has been used as a value factor and not book to market, hence the interpretation of value factor shall be inverse to that of Fama French.

The Fama French Model is given as:

$$R_{pt} - R_{ft} = \alpha + \beta(R_{Mt} - R_{ft}) + sSMB_t + IHML_t + e_t$$

(5.2)

Where,

$$SMB = \text{Difference between returns on portfolio of small stocks firm and returns on portfolio of big stocks firm,}$$

$$HML = \text{Difference between returns on a portfolio of high-book-to-market stocks and returns on a portfolio of low-book-to-market stocks,}$$

$$s \text{ and } h = \text{Sensitivity coefficients of SMB and HML respectively.}$$

$$SMB_t$$ is constructed such that it is independent of value factor:

$$\frac{S}{L} + \frac{S}{M} + \frac{S}{H} - \frac{B}{L} + \frac{B}{M} + \frac{B}{H}$$

(5.3)

$$LMH_t$$ is constructed such that it is independent of size factor:

$$\frac{s_B^T}{2} - \frac{s_B^T}{2}$$

(5.4)

The excess returns are regressed on test portfolios on the excess return on market factor (CAPM specification) and returns on market, size and value factors (Fama French three model specification). Tables 5.2 and 5.3 provide results of CAPM and Fama French model for test portfolios. In case of India, CAPM seems to be a poor descriptor of prior return patterns across all long-term portfolio formation strategies. 12, 23, 22 and 25 out of 38 alpha values for the corner portfolios are significant at 5% level for 24-12-12, 36-12-12, 48-12-12 and 60-12-12 strategies respectively. The FF model virtually explains all prior return patterns with exception of 36-12-12 strategy. The significant alpha values in case of FF model are 3, 15, 3 and 2 out of 38 24-12-12, 36-12-12, 48-12-12 and 60-12-12 strategies respectively. The value factor plays
an important role while the size factor doesn’t explain cross-section of average returns. Some prior return anomalies that persist in the Fama French framework probably imply that there may be a role for an additional risk factor in stock returns. The evidence is consistent with previous research, for example, Jegadeesh and Titman (1993) use CAPM benchmark and Grundy and Martin (2001) use Fama French specifications to adjust for cross-sectional differences in risk and they conclude that asset pricing models are not fully able to explain momentum profits. Given the few anomalies, a sector prior return factor is constructed in the next section and to evaluate if it can explain returns that are missed by the FF model.

5.3. PRIOR RETURN PATTERNS IN SECTOR RETURN AND FOUR-FACTOR MODEL

The study explores if there are any prior return patterns in sector returns as was observed in case of stock returns. Conrad and Kaul (1998) also report that these asset-pricing models suffer from model misspecifications and there may be some other risk factor to explain extra returns. Moskowitz and Grinblatt (1999) find strong industry momentum patterns in stock returns. However, Grundy and Martin (2001) report that neither industry effects nor cross-sectional differences in expected returns are primary cause of momentum phenomenon. Nijman, Swinkels and Verbeek (2004) investigate whether individual stock momentum in Europe is subsumed by country or industry momentum and suggest that individual stock effects are primarily driven by positive expected excess returns, while industry momentum plays a less important role and country momentum is even weaker.

Boni and Kent (2006) report industry-based recommendation strategies and the short-term industry price momentum are explained by firms with more analyst coverage than firms with low analyst coverage. Menzly and Ozbas (2006) find strong cross-industry momentum for industries related to each other through supply chain. Chen, Benett and Zhang (2006) suggest investors should emphasize sector based approach in developed countries but continue country-based allocation strategies for emerging markets. Safieddine and Sonti (2007) report firms with highest industry growth quintile have significantly higher momentum compared to industries in lowest growth quintile. Liu and Zhang (2008) document that growth rate of industrial production is a risk factor in asset pricing tests and can explain more than half of momentum profits.
The study verifies if there are any long-term prior return patterns in sector return for India. For 24-12-12 strategies, in December of year \( t-2 \), the sample securities are categorized into 10 sectors according to Global Industry Classification System (GICS). The excess monthly return for each sector is then calculated from January to December by taking the simple average of returns on securities that form part of each of these sectors. The individual sectors are then ranked on basis of past twenty four month’s average monthly past excess returns. The ranked sectors are then classified into quintiles, \( K1 \) to \( K5 \). \( K1 \) and \( K5 \) comprise of sectors with lowest and highest average past returns respectively. Equally weighted excess returns are then estimated for sample portfolios by skipping 12 months between portfolio formations and holding windows (that is, January to December of year \( t \)). The portfolios are then rebalanced till the end of sample period. Similar construction procedure is followed for other long-term portfolio formation strategies.

The results for the same are reported in Table 5.4. There are strong momentum patterns in sector returns for all long-term portfolio formation windows. The highest momentum profits are reported for 24-12-12 strategy which provides returns of 2.99% on monthly basis. The results for sector portfolios are in contrast with stock portfolios which report short-term momentum and weak reversals in long run. For stock data, it seems that market under reacts to short-term past information and weakly overreacts to long-term past information. In case of sector data, the market under reacts to short-term as well as long-term past information (say up to 5 years).

The results could possibly be explained by behavioral patterns of investors in India. They seem to be concentrating more on security analysis than sector analysis. Active security analysis, results in foster correction of price distortions caused by short-term under reaction and even leads to a mild long-term overreaction resulting in price reversals. In contrast, low level sector analysis causes a continuation in sector returns that persist for long period of time. Further, while doing sector analysis the investors tend to focus more on short-term past information. This may be owing to their belief that strong short-term stock momentum will be replicated by sector data in light of weak results based on long-term stock information. This may result in greater sector momentum profits for relatively long-term portfolio formation windows say 24 months compared to 6/12 months formation windows.
It is possible that sector momentum may have been caused by fundamental differences across sectors, for instance, Liu and Zhang (2008) document that growth rate of industrial production is a risk factor in asset pricing tests and can explain more than half of momentum profits. The sector factor is constructed by taking difference between winner and loser sectors (WML). The sector factor is combined with the Fama French factors to create the four-factor model. The constructed four-factor model is different from the Carhart version as the sector prior return factor is used instead of stock momentum factor in the study. Under the belief that former has better economic foundation owing to the argument given by Liu and Zhang (2008).

The four-factor model version is as follows:

$$R_{pt} - R_{ft} = \alpha + \beta (R_{Mt} - R_{ft}) + \gamma SMB_t + \delta LMH_t + wWML_t + \epsilon_t$$  \hspace{1cm} (5.5)

- $WML$ = Difference between firms of winner sector and firms of loser sector,
- $w$ = factor sensitivity of $WML$ factor.

The empirical results based on four-factor model are given in Table 5.5. For all portfolio formation windows, the sector factor does absorb some of the profits on long-term prior return which are missed by the FF model. The number of significant alphas for the corner portfolios is 2, 3, 3 and 2 (out of 38) for 24-12-12, 36-12-12, 48-12-12 and 60-12-12 strategies respectively. The four-factor model particularly does well for 36-12-12 strategy which continues to be a pricing anomaly in the FF framework. Thus results confirm that long-run sector return patterns tend to partially drive long-run stock return patterns. The four-factor model does a better job than CAPM and the FF model in explaining prior return patterns in stock returns and hence should be used as a baseline for evaluating investment strategies.

5.4. SUMMARY AND CONCLUSION

Reversals in long-term returns (contrarian) and continuation of short-term returns (momentum) are two patterns observed by researchers for stock returns. Some researchers show that risk factors such as size, book-to-market equity, past sales growth, cash flow/price are related to firm’s average stock returns. Asset pricing models such as CAPM and Fama French three-factor model account for some of these
risk factors, however some suggest that these abnormal returns have a behavioral explanation, that is, and investors underreact or overreact to firm specific information.

The chapter explores the following propositions for Indian market: (1) Are there any long-term reversals or momentum patterns in average stock returns? (2) Can these profits be explained by single factor (CAPM) or multifactor (Fama French three factor) asset pricing model? And, (3) Are prior return patterns in stock returns an outcome of prior return patterns in sector returns? The portfolios are constructed on single (past returns), double (firm characteristics and past returns) and triple (Size and Price to Book (P/B) ratio / Size and Price to Earnings (P/E) ratio and past returns) sorted criterion for (24-60) month’s formation windows, 12 months holding period and skipping 12 months between portfolio formations and holding windows to control for short-term momentum effects.

For long-term prior return based portfolios, contrarian profits emerge for almost all test portfolios for long-term investment strategies. In case of return portfolios, 36-12-12 strategies give the highest return of 0.69% per month. Stylized portfolios give lower returns in most of the cases with few exceptions. For Indian market, it seems that expanding formation window beyond 24 months does not pay off. CAPM seems to be a poor descriptor of prior return patterns across all long-term portfolio formation strategies. FF model is able to explain most of the long-term prior return patterns in stock returns with exception of 36-12-12 strategy. The value factor plays an important role while size factor doesn’t explain cross-section of average returns.

There are momentum patterns in sector returns for all long term portfolio formation windows (24-60 months). This is in contrast to results of stock data, where short-term momentum and long-term weak reversals exist. The results can probably be explained by a behavioral story which assumes that investors focus more on security analysis than sector analysis resulting in more delayed price adjustment process in case of latter information. The constructed sector factor and find that it does absorb most of the profits on long-term prior return that are missed by the FF model. Thus the result confirms that long-run sector return patterns tend to drive long-run stock return patterns.

The findings are relevant for investment analysts and portfolio managers who are continuously tracking global markets, including India, in pursuit of abnormal returns.
Research on long-term prior return effects is pertinent in light of the fact that most literature on this subject has concentrated on analysis and explanation of short-term momentum profits. It is suggested that similar work for other emerging markets to develop a comparative platform, as it will help us better understand investor behavior in emerging markets and how it differs from mature markets.
NOTES

1) The Bombay Stock Exchange (BSE) is the oldest and second largest (in terms of trading volume) stock exchange and accounts for most of the trading in India.

2) BSE-500 index comprises of 500 large and well-established companies with high trading volumes and is popularly used by investment analysts as a market proxy. It accounts for more than 90% of market capitalization and about 95% of daily trading volume on BSE and hence is representative of market performance.

3) Percentage Returns estimation is based on capital gains component. There is no dividend component as in India dividend yields of companies are very low, Gupta (2000). Also all the Bombay Stock Exchange (BSE)-500 index series do not include any dividends while computing index values. Hence dividend inclusion in individual stock returns may bias the estimators of the proposed time series regressions.

4) Annualized implicit yields on 91-day t-bills available for all weekly auctions over the study period have been used. The implicit yield for the last week of each month to match with month end closing prices of sample stocks is selected. Approximate monthly risk free yield is generated by dividing monthly risk free yield by twelve.

5) Reserve Bank of India (RBI) is the central bank of India and hence the most reliable source of data on money market operations including Treasury bill yields. The RBI website link is http://www.rbi.org.in/scripts/statistics.aspx.

6) Global Industry Classification System (GICS) is an industry classification system, developed by Standard & Poor's (USA) in collaboration with Morgan Stanley Capital International (MSCI). It comprises of 10 sectors, 24 Industry groups, 68 industries and 154 Sub-Industries. GICS was developed in response to the financial community’s need for one complete, consistent set of global sector and industry definitions. The GICS standard can be applied to companies globally, in both developed and developing markets. In this work only information for sectors has been used.
### Tables

**Table 5.1: Mean Excess Returns (unadjusted returns) for sample portfolios**

<table>
<thead>
<tr>
<th>Characteristic Sorted Portfolios</th>
<th>Panel A: 24-12-12 strategies</th>
<th>Panel B: 36-12-12 strategies</th>
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<td>P1</td>
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**Size - Return Portfolios**

| | Small (S) | 0.032 | 0.030 | -0.002 | 0.028 | 0.036 | 0.033 | -0.003 | 0.034 |
| | Big (B) | 0.018 | 0.015 | -0.003 | 0.016 | 0.021 | 0.017 | -0.004 | 0.020 |

**P/B - Return Portfolios**

| | Low (L) | 0.028 | 0.025 | -0.002 | 0.025 | 0.032 | 0.027 | -0.004 | 0.030 |
| | High (H) | 0.018 | 0.017 | -0.001 | 0.017 | 0.019 | 0.019 | 0.000 | 0.020 |

**P/E - Return Portfolios**

| | Low (L) | 0.031 | 0.024 | -0.007 | 0.027 | 0.034 | 0.032 | -0.002 | 0.032 |
| | High (H) | 0.014 | 0.016 | 0.003 | 0.014 | 0.020 | 0.017 | -0.003 | 0.018 |

**Dividend Yield - Return Portfolios**

| | Low (L) | 0.015 | 0.016 | 0.001 | 0.015 | 0.018 | 0.017 | -0.001 | 0.018 |
| | High (H) | 0.027 | 0.021 | -0.006 | 0.023 | 0.027 | 0.027 | 0.000 | 0.028 |

**Past Sales Growth - Return Portfolios**

| | Low (L) | 0.020 | 0.021 | 0.001 | 0.020 | 0.023 | 0.020 | -0.003 | 0.021 |
| | High (H) | 0.029 | 0.025 | -0.005 | 0.025 | 0.027 | 0.020 | -0.007 | 0.025 |

**Size-P/B - Return Portfolios**

| | Small-Low (SL) | 0.037 | 0.036 | 0.000 | 0.034 | 0.042 | 0.045 | -0.003 | 0.041 |
| | Small-High (SH) | 0.032 | 0.026 | -0.006 | 0.027 | 0.040 | 0.033 | -0.007 | 0.031 |
| | Big-Low(BL) | 0.019 | 0.015 | -0.004 | 0.020 | 0.026 | 0.021 | -0.005 | 0.024 |
| | Big-High(BH) | 0.009 | 0.016 | 0.008 | 0.013 | 0.018 | 0.017 | -0.002 | 0.018 |

**Size-P/E - Return Portfolios**

| | Small-Low (SL) | 0.040 | 0.039 | -0.001 | 0.038 | 0.050 | 0.045 | -0.005 | 0.045 |
| | Small-High (SH) | 0.024 | 0.023 | -0.001 | 0.022 | 0.029 | 0.026 | -0.003 | 0.027 |
| | Big-Low(BL) | 0.025 | 0.016 | -0.009 | 0.022 | 0.028 | 0.021 | -0.007 | 0.026 |
| | Big-High(BH) | 0.012 | 0.015 | 0.003 | 0.013 | 0.016 | 0.015 | -0.001 | 0.016 |
Table 5.1: Mean Excess Returns (unadjusted returns) for sample portfolios

<table>
<thead>
<tr>
<th></th>
<th>Panel C: 48-12-12 strategies</th>
<th>Panel D: 60-12-12 strategies</th>
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<td>Dividend Yield - Return Portfolios</td>
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<td>Size-P/B - Return Portfolios</td>
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<tr>
<td>Small-Low (SL)</td>
<td>0.046</td>
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</tr>
<tr>
<td>Small-High (SH)</td>
<td>0.041</td>
<td>0.032</td>
</tr>
<tr>
<td>Big-Low(BL)</td>
<td>0.029</td>
<td>0.030</td>
</tr>
<tr>
<td>Big-High(BH)</td>
<td>0.016</td>
<td>0.019</td>
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<tr>
<td>Size-P/E - Return Portfolios</td>
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<tr>
<td>Small-Low (SL)</td>
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<td>0.052</td>
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<tr>
<td>Small-High (SH)</td>
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<tr>
<td>Big-Low(BL)</td>
<td>0.032</td>
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<tr>
<td>Big-High(BH)</td>
<td>0.015</td>
<td>0.018</td>
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Table 5.2: Risk adjusted returns based on CAPM regressed on the excess return on the market factor

\[ R_{Pt} - R_{Ft} = \alpha + \beta (R_{Mt} - R_{Ft}) + \epsilon_t \]

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>( \alpha )</th>
<th>( t(\alpha) )</th>
<th>( R^2 )</th>
<th>( \beta )</th>
<th>( t(\beta) )</th>
<th>( R^2 )</th>
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<td>0.003</td>
<td>3.113</td>
<td>0.000</td>
<td>0.000</td>
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<td>-0.002</td>
<td>0.026</td>
<td>2.599</td>
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<td>0.023</td>
<td>2.252</td>
<td>0.235</td>
<td>0.024</td>
<td>2.293</td>
<td>0.251</td>
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<td>0.272</td>
<td>0.022</td>
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<td><strong>B1</strong></td>
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<td>0.349</td>
<td>0.012</td>
<td>1.770</td>
<td>0.371</td>
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<td>0.006</td>
<td>1.057</td>
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<td>0.265</td>
<td>0.020</td>
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<td>0.482</td>
<td>0.008</td>
<td>1.281</td>
<td>0.481</td>
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<td><strong>P/B - Return Portfolios</strong></td>
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<td>2.500</td>
<td>0.262</td>
<td>0.022</td>
<td>2.361</td>
<td>0.284</td>
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<td>0.005</td>
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<tr>
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<tr>
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<td><strong>Size-P/E - Return Portfolios</strong></td>
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<td>0.498</td>
<td>0.013</td>
<td>1.560</td>
<td>-0.006</td>
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</table>
Table 5.2: Risk adjusted returns based on CAPM regressed on the excess return on the market factor

\[ R_{p1} - R_{f1} = \alpha + \beta R_{m1} + R_{h1} + \epsilon_t \]

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>( \alpha )</th>
<th>( t(\alpha) )</th>
<th>( \bar{\epsilon}^2 )</th>
<th>( \alpha )</th>
<th>( t(\alpha) )</th>
<th>( \bar{\epsilon}^2 )</th>
</tr>
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<tbody>
<tr>
<td>P1</td>
<td>0.035</td>
<td>3.123</td>
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<td>2.983</td>
<td>0.005</td>
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<tr>
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<td>2.767</td>
<td>0.004</td>
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**Size - Return Portfolios**

<table>
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<th>( t(\alpha) )</th>
<th>( \bar{\epsilon}^2 )</th>
<th>( \alpha )</th>
<th>( t(\alpha) )</th>
<th>( \bar{\epsilon}^2 )</th>
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<tbody>
<tr>
<td>S1</td>
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<td>0.242</td>
<td>0.029</td>
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<td>S3</td>
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<td>1.267</td>
<td>0.470</td>
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**P/B - Return Portfolios**

<table>
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<th>( t(\alpha) )</th>
<th>( \bar{\epsilon}^2 )</th>
<th>( \alpha )</th>
<th>( t(\alpha) )</th>
<th>( \bar{\epsilon}^2 )</th>
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<tbody>
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**P/E - Return Portfolios**

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<th>( \alpha )</th>
<th>( t(\alpha) )</th>
<th>( \bar{\epsilon}^2 )</th>
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<tbody>
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**Dividend Yield - Return Portfolios**

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<th>( \bar{\epsilon}^2 )</th>
<th>( \alpha )</th>
<th>( t(\alpha) )</th>
<th>( \bar{\epsilon}^2 )</th>
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</thead>
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**Past Sales Growth - Return Portfolios**

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<th>( t(\alpha) )</th>
<th>( \bar{\epsilon}^2 )</th>
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**Size-P/B - Return Portfolios**

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<th>( \alpha )</th>
<th>( t(\alpha) )</th>
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Table 5.3: Risk adjusted Return based on Fama French model Regressed on the excess Return on the Market \((R_m-R_f)\) Factor and Two Proxy Portfolios that Relate to Size (SMB) and value (LMH) Factors

\[
R_{p,t} - R_{f,t} = \alpha + \beta (R_{m,t} - R_{f,t}) + \alpha SMB_t + \beta LMH_t + \epsilon_t
\]

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Table 5.3: Risk adjusted Return based on Fama French model Regressed on the excess Return on the Market \((R_M - R_F)\) Factor and Two Proxy Portfolios that Relate to Size (SMB) and value (LMH) Factors

\[
R_{p,t} - R_{f,t} = \alpha + \beta (R_M - R_F) + \text{SMB}_t + \text{LMH}_t + \varepsilon_t
\]

### Panel C: 48-12-12 Strategies

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### Size - Return Portfolios

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### P/B - Return Portfolios

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<td>0.657</td>
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<tr>
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<td>0.449</td>
<td>0.665</td>
<td>0.003</td>
<td>0.382</td>
<td>0.678</td>
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<td>-0.002</td>
<td>-0.217</td>
<td>0.619</td>
<td>-0.001</td>
<td>-0.192</td>
<td>0.650</td>
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<td>BL1</td>
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<td>1.440</td>
<td>0.572</td>
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<tr>
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<td>-0.001</td>
<td>-0.222</td>
<td>0.523</td>
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<td>0.548</td>
<td>0.000</td>
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Table 5.4: Mean Excess Returns on sectoral momentum Portfolios

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<th>Strategy</th>
<th>K1</th>
<th>K2</th>
<th>K3</th>
<th>K4</th>
<th>K5</th>
<th>K5 - K1</th>
<th>t(K5-K1)</th>
<th>EW1</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-12-12</td>
<td>-0.005</td>
<td>0.006</td>
<td>0.009</td>
<td>0.013</td>
<td>0.025</td>
<td>0.030</td>
<td>1.755</td>
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<tr>
<td>36-12-12</td>
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<td>0.006</td>
<td>0.008</td>
<td>0.011</td>
<td>0.022</td>
<td>0.028</td>
<td>-0.344</td>
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<tr>
<td>48-12-12</td>
<td>-0.003</td>
<td>0.006</td>
<td>0.009</td>
<td>0.011</td>
<td>0.022</td>
<td>0.025</td>
<td>0.435</td>
<td>0.009</td>
</tr>
<tr>
<td>60-12-12</td>
<td>0.000</td>
<td>0.006</td>
<td>0.008</td>
<td>0.011</td>
<td>0.020</td>
<td>0.021</td>
<td>-0.602</td>
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Table 5.5: Risk adjusted returns based on four factor model regressed on the Market factor (R\textsubscript{Mt} - R\textsubscript{Ft}) factor and three proxy portfolios that relate to Size (SMB), Value (LMH) and Sector (WML) Factors

\[ R_{Pt} - R_{Ft} = \alpha + \beta R_{Mt} - R_{Ft} + \gamma \text{SMB}_t + \lambda \text{LMH}_t + \omega \text{WML}_t + \epsilon_t \]

<table>
<thead>
<tr>
<th>Strategy</th>
<th>24-12-12</th>
<th>36-12-12</th>
<th>48-12-12</th>
<th>60-12-12</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>P/B</td>
<td>P/E</td>
<td>Dividend Yield</td>
<td>Past Sales Growth</td>
</tr>
<tr>
<td></td>
<td>Return-Portfolios</td>
<td>Return-Portfolios</td>
<td>Return-Portfolios</td>
<td>Return-Portfolios</td>
</tr>
<tr>
<td>P1</td>
<td>(0.032)</td>
<td>(3.056)</td>
<td>(0.015)</td>
<td>(0.039)</td>
</tr>
<tr>
<td>P5</td>
<td>(0.029)</td>
<td>(2.962)</td>
<td>(0.016)</td>
<td>(0.033)</td>
</tr>
<tr>
<td>S1</td>
<td>(0.000)</td>
<td>(0.022)</td>
<td>(0.579)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>S3</td>
<td>(0.002)</td>
<td>(0.459)</td>
<td>(0.593)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>B1</td>
<td>(0.000)</td>
<td>(0.816)</td>
<td>(0.714)</td>
<td>(0.006)</td>
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<tr>
<td>B3</td>
<td>(0.000)</td>
<td>(1.260)</td>
<td>(0.721)</td>
<td>(0.006)</td>
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</tbody>
</table>

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