CHAPTER II

ASSET PRICING AND EQUITY MARKET ANOMALIES:
THEORY AND EMPIRICAL LITERATURE

The most important issue that economists face is the quantification of relationship between risk and expected return. Markowitz was the first to propose a general solution for portfolio selection problem. The development of Capital Asset Pricing Model (CAPM) was the first step towards the quantification of the relationship of risk and return. The empirical evidence in favor of CAPM is very weak as the beta of CAPM is not able to explain the returns of portfolios formed on certain company characteristics and are known as CAPM anomalies. This led to the development of alternative asset pricing models in one-factor and multi-factor framework. Prior returns patterns (contrarian and momentum) in stock return are the most puzzling anomaly in financial literature. The source behind the profitability of these prior return strategies still remains an academically debated issue.

In this chapter, review of field of asset pricing and its anomalies has been done. The chapter comprises of four sections. In section 1 CAPM, its several extensions such as Black’s Zero beta CAPM and multi-factor models like Fama French three-factor model have been explained. Section 2 describes the prominent equity anomalies. In section 3, review of literature on prior return patterns in asset returns has been discussed in detail. Section 4 provides the summary of the chapter.

2.1 ASSET PRICING: AN OVERVIEW

Foundations of modern finance were laid by Harry Markowitz who developed the modern portfolio theory. Markowitz (1952, 1959) was the first to lay the groundwork of CAPM and proposed a general solution for portfolio selection problem. He argued that investors would optimally hold a mean-variance efficient portfolio, that is, a portfolio with the highest return for a given level of variance. Sharpe (1964) and Lintner (1965) followed the Markowitz's portfolio theory to an equilibrium theory of asset pricing under uncertainty.

Capital Asset Pricing model (CAPM) was developed by Sharpe (1964) and Lintner (1965) to quantify the relationship between risk and return. In equilibrium, the model
states that if an investor follows rational procedures when capital prices have been adjusted then the investor is able to attain any desired point along the linear curve. The Sharpe-Lintner CAPM makes the following assumptions: (1) All investors plan investment and consumption decisions as well as portfolio revisions at the beginning of a single time period, which is identical for them. (2) All investors are risk-aversers and seek to maximize the expected utility of terminal wealth. (3) Mean and standard deviation (or variance) of the distribution of returns are sufficient statistics for framing investment decision rules. (4) Capital markets are perfect in the sense that (a) they are frictionless involving no taxes, no transaction costs, infinite borrowing and lending at the risk-free rate, (b) they are competitive, (c) they are informational efficient, and (d) they involve rational investors, and (5) The supply of risky-assets is exogenously determined.

CAPM provides linear relationship between returns on a financial asset and its sensitivity to returns on a broad based market portfolio. The two most important implications of the CAPM equation are (1) the risk-return relationship is linear, and (2) only a fraction of total risk is priced by the market. The relevant risk is systematic in nature and is measured by beta.

CAPM is a one factor model and can be estimated using the excess return version of the market model as shown below:

\[ R_{Pt} - R_{ft} = \alpha + \beta (R_{Mt} - R_{ft}) + e_t \]  

(2.1)

Where,

\[ R_{Pt} - R_{ft} = \text{Excess returns on portfolio for the month } t, \]
\[ R_{Mt} - R_{ft} = \text{Excess returns on the market factor for the month } t, \]
\[ \alpha = \text{Measure of extra normal profits,} \]
\[ \beta = \text{slope coefficient measuring sensitivity of asset returns to market returns,} \]
\[ e_t = \text{Error term for period } t. \]

There is lack of empirical evidence in support of CAPM. The beta of Capital Asset Pricing Model is unable to capture the returns for portfolios formed on basis of certain company characteristics which are known as CAPM anomalies. The emergence of prominent CAPM anomalies (price-earnings (P/E) ratio, firm size, book equity to
market equity (BE/ME) ratio, firm leverage, profits, net stock issues, accruals, reversal and momentum effect) has led to the development of asset pricing models in both one-factor and multi-factor domain. These models pose a challenge to CAPM and are being extensively used by analysts and researchers for applications in finance.

As there are differences in borrowing and lending rates, Fischer Black (1972) extended CAPM and developed a more general version known as Black's Zero-beta CAPM. Black's CAPM states that the expected return on any risky asset is linearly related to its beta. The zero-beta portfolio is defined as the one which exhibits minimum variance amongst all the portfolios that are uncorrelated with the market portfolio. Since the returns on the zero-beta portfolio is expected to be higher (owing to some risk exposure) than the return on a risk-free asset, Black's CAPM will provide a higher intercept and a flatter slope compared to Sharpe-Lintner CAPM.

Several empirical tests on CAPM suggest that a multi-factor domain is needed to explain asset returns. Gibbons (1982) presents a multivariate statistical framework for estimating the expected return on the zero-beta portfolio and testing a multivariate restriction implied by the CAPM. The multivariate methodology also permits tests of the CAPM that are more powerful than past investigations. In addition, the multivariate hypothesis provides a strong test of the underlying theory, for a very stringent relation must hold among the parameters of a large number of market model equations.

Capital asset pricing model is based on a single period horizon; however the investors intend to hold portfolios over time to maximize their profits. Intertemporal models in multi-factor domain have been developed which imply portfolio behavior different from CAPM. Merton (1971) laid the framework for modeling inter-temporal uncertainty in multi-factor domain. He identifies the following sources of uncertainty (1) relative prices of consumer goods; (2) future labour income; (3) the future value of non-human assets; (4) future investment opportunities; (5) future tastes; (6) future range of consumption goods; and (7) the age of death. He notes that the financial instruments are unlikely to be created for the last three sources of uncertainty.

Merton (1972) demonstrates that a two-fund separation implied by CAPM characterizes equilibrium only if the investment opportunity set is static over time. However, if there are shifts in asset returns and change in the investment opportunity
set, a three-fund separation will be necessary, where funds one and two, namely, the risk-free asset and the market portfolio, provide the efficient risk-return frontier, while the third fund allows investors to hedge unanticipated shifts in the investment frontier.

Merton (1973) develops a multi-factor model in continuous time that explicitly accommodates the first four sources of uncertainty mentioned above for which financial instruments are likely to be created for hedging purposes. The model states that expected return only asset is given by a multi-beta framework where the number is equal to one plus the number of state variables. The variables cannot be identified easily; hence the model cannot be tested empirically however it provides a theoretical framework.

Stephen Ross (1976) developed an alternative theory of asset pricing with no arbitrage argument known as the Arbitrage Pricing Theory (APT). It states that the stochastic process generating security returns is a K-factor linear model. The model seeks to calculate the appropriate price of an asset, taking account of system risks across all class of assets. The APT is based on simpler assumptions and recognizes multiple risk factors thus making it closer to reality. However, APT fails to specify the nature or the number of factors. These risk factors can be macro-economic in nature, such as, political upheavals, level of interest rates, inflation, and real growth in GDP etc. Alternatively, these can be fundamental factors based on company characteristics like size, BE/ME, leverage etc. The APT is based on a weaker set of assumptions as compared to CAPM.

To explain the asset pricing anomalies which are not captured by CAPM, Fama French (1993) developed an empirical model with three factors: market, size and value. They argue that their multifactor model is consistent with Merton's ICAPM framework and Ross's APT framework. The Fama French model states that the expected return on a portfolio in excess of the risk free rate is explained by the sensitivity of its return to three factors: (i) the excess return on a broad market portfolio, (ii) the difference between the return on a portfolio of small stocks and the return on a portfolio of big stocks (SMB) and (iii) the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to- market stocks (HML), where the last two are mimicking size and value factors respectively.
The Fama French Model is given as:

\[ R_{Pt} - R_{Ft} = \alpha + \beta (R_{Mt} - R_{Ft}) + s \text{ SMB}_t + h \text{ HML}_t + e_t \]  \hspace{1cm} (2.2)

Where,

\[ \text{SMB}_t = \text{Difference between returns on portfolio of Small stocks firm and returns on portfolio of Big stocks firm.} \]

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

\[ s \text{ and } h = \text{Factor sensitivity coefficients for SMB and HML respectively.} \]

Fama and French showed that their three-factor model captures the cross-sectional variation in stock market returns that are missed by CAPM. The empirical model has evoked overwhelming response amongst investment researchers, posing a challenge to CAPM, as it is a more appropriate tool for corporate finance and investment management decisions. However, the Fama-French model needs to be supported by strong economic foundation. The three-factor model has been able to explain most of the CAPM anomalies [See Fama and French (1996)]. However, the momentum effect documented by Jegadeesh and Titman [(1993), (2001)] remains unexplained by the three-factor model. Carhart (1997) employs a four-factor model to explain returns with an additional factor of one-year stock momentum along with Fama French factors, to capture cross-sectional return patterns. Daniel, Grinblatt, Titman and Wermers (1997) propose a characteristics-based model suggesting that size and BE/ME are priced because of investors fancy for these characteristics and are not due to any risk loadings related to them.

CAPM may hold conditionally, but fail unconditionally. The market portfolio misspecification hypothesis has been further investigated by Jagannathan and Wang (1996). They test conditional CAPM, allowing for time-varying beta and expected returns, by inserting human capital in wealth proxied by labour income growth. The model allows for three betas - market, human capital and time-variability. They obtain positive results for the conditional CAPM by inserting human capital in wealth.

There is growing evidence in support of the three-factor model for other world markets than the USA. However, the model needs a strong economic foundation and further empirical validation for different world equity markets and over different time periods.
periods, before it can replace CAPM as an acceptable tool for applications in the field of finance.

2.2. EQUITY MARKET ANOMALIES

Since the late 1970’s, researchers have observed that there are patterns in average stock which cannot be explained by the standard Capital Asset Pricing model of Sharpe (1964) and Lintner (1965) and are known as CAPM anomalies. The literature on anomalies shows that some of the portfolios formed on basis of company characteristics are not explained by the beta of CAPM, and the cross-section of average returns can be explained by other risk factors. This is because there seem to be risk factors that affect security returns beyond beta’s one dimensional measurement of market sensitivity. There are six prominent asset pricing anomalies

1. price-earnings (P/E) ratio, Basu (1977, 1983)
2. firm size, Banz (1981)
3. book equity to market equity (BE/ME) ratio, (Statman (1980) and Chan, Lakonishok, Hamao (1991))
4. firm leverage, Bhandari and Weiss (1996)
5. reversal or contrarian effect, (De Bondt and Thaler, (1985, 1987))
6. momentum effect, (Jegadeesh and Titman (1993)).

Fama French (1993, 1996) developed the three-factor model to support the CAPM anomalies and show that the impact of company characteristics on security returns can be explained within a multi factor model framework. The model states that that expected returns on a portfolio is a function of three factors: market, size and value. Recent studies have shown that there are patterns in average returns that even the Fama French three-factor model cannot explain. Significant among these anomalies are accruals, net stock issues, profitability (Fama and French (2008)) and liquidity (Hwang and Lu (2007)).

Price-earnings ratio (P/E) effect was first reported by Basu (1977). He finds that the market portfolio does not seem to be efficient relative to the portfolios formed on the basis of price-earnings (P/E) ratios, i.e., low P/E stocks exhibit higher returns and high P/E stocks provide lower returns than would be the case if the market portfolio was mean-variance efficient. He empirically determines that the investment performance of common stock is related to their P/E ratio.
Size effect or the small firm effect was first documented by Banz (1981) and finds that company size explains the portfolio returns better than CAPM beta. The size effect implies that small companies have higher growth opportunities as compared to big companies. Starting with Banz (1981), many papers have explored the reasons for its existence in both mature and emerging markets. Efforts to explain the size effect include Roll (1981), Reiganum (1981), Stoll and Whaley (1983), Schultz (1983), Chan and Chen (1991), Lettau and Ludvigson (2001).

Statman (1980) shows that the ratio of book equity to market equity (BE/ME) ratio is positively correlated with the mean returns of stock. Chan, Hamao and Lakonishok (1991) report similar results and show that stocks with high ratios of book value to market value have high average returns. Explanations for the value premium by Fama and French (1992, 1996) show that value strategies are fundamentally riskier, so the higher average return on value stocks reflects compensation for bearing this risk. Another explanation using the overreaction hypothesis is given by, DeBondt and Thaler (1987), Lakonishok et al. (1994), and Haugen (1995). Others researchers like Kothari et al. (1995) propose that the value glamour phenomenon may be due to data snooping and survivorship bias. Schwertz (2002) points out that size and value effect seem to have disappeared in the US after the papers highlighting them were published.

Bhandari (1988) report a positive relationship between leverage and asset return. Employing leverage as a third factor, along with beta and size, residual return variability are explained. The leverage effect corresponds to a negative correlation between past returns and future volatility.

DeBondt and Thaler (1985) were first to document reversals in long-term returns and show that portfolios based on long-term prior returns, 3 to 5 years, provide return premium which is inconsistent with CAPM. They find that investors show a tendency to overreact to recent information and underweight base rate data. These prices biased by excessive optimism and pessimism leads prior losers to become more attractive investments than prior winners. For the U.S. market, during the period from 1920’s to 1980’s, they report that portfolios of losers provide large returns even for more than 5 years of portfolio formation windows. DeBondt and Thaler (1987) and Jones (1993)
attribute contrarian profits to the price reversals which are provoked by market overreaction.

On the other hand, momentum was documented by Jegadeesh and Titman (1993). They report positive auto correlations of 3 - 12 months investment horizon, suggesting strong momentum profits for the U.S. market. The empirical findings have inspired extensive use of momentum strategies by the fund managers that involve short-selling past losers and buying past winners. Rouwenhorst (1998) find that momentum strategies are profitable for equities in 12 European markets. The behavioral models which show investor under reaction or overreaction to firm specific news provide a partial explanation to momentum anomaly (Barberis, Shleifer and Vishny (1998), Daniel, Hirshleifer and Subrahmanyam (1998), Hong and Stein (1999)). Chordia and Shivkumar (2002) attribute momentum to macroeconomic factors, while Hong et al. (2000) attribute it to size and Moskowitz and Grinblatt (1999) attribute to industry momentum.

Liquidity is generally described as the degree to which an asset can be brought and sold with little price impact. Amihud and Mendelson (1986) were the first to study the role of liquidity and suggest that investors hold portfolios depending on the spread. They report that the relationship between stock returns and liquidity is that returns increase in case of illiquidity. Hwang and Lu (2007) investigate factors formed on company characteristics and show that the market portfolio, Fama French factors, momentum, liquidity and co-skewness explain the stock returns.

Sloan (1996) was the first to document accrual anomaly. He investigates whether stock prices reflect information about future earnings contained in accruals and cash flow component and finds that investors fail to account for these two components.

Haugen and Baker (1996) test for profitability anomaly and develop a model of expected returns. They find that even after adjusting for all other variables more profitable firms tend to have greater expected returns. Fama and French (2008) show that higher profitability is associated with abnormally higher returns, but there is little evidence that unprofitable firms have unusually low returns.

The net stock issues anomaly refers to the negative relation in equity financing and future stock returns. Loughran and Ritter (1995) document that future returns are
lower for the stocks that have been issued, while higher for stocks that have been repurchased (Ikenberry, Lakonishiok, and Vermaelen (1995)). However, Daniel and Titman (2006) report that there is a negative relation between net stock issues and average returns.

The CAPM anomalies literature has not been fully welcomed by the academicians as they lack a strong theoretical foundation. Also, these results are undermined by problems such as data snooping and sample selection bias. In the next section, the two prominent of asset pricing anomalies, contrarian and momentum have been discussed. The review of literature for both these trading strategies has been dealt in detail for mature and emerging markets.

2.3. PRIOR RETURN PATTERNS IN ASSET RETURNS

Portfolio managers and investment analysts are continuously on the lookout for developing strategies that provide them with extra normal profits. They try to exploit the persisting asset pricing anomalies (value effect, size effect, the January effect, lead-lag effects, mean reversal of long-term losers (contrarian) and momentum of short-term winners) of stock market to earn profits. A large body of finance literature has found that simple trading strategies based on past stock returns yield extra normal profits. Broadly, the two prominent trading strategies are contrarian and momentum. Contrarian strategies are based on price reversal (i.e. past losers are future winners) while momentum strategies are based on price continuation (i.e. past winners remain future winners). These two strategies are diametrically opposite with regards to assumptions about investor behavior and philosophy.

Many studies have dealt extensively with prior return strategies, the existing literature mainly focuses on evaluating whether stock returns are continuing in short-horizon (momentum) or reverting in long-run (contrarian). The strategies have been found time dependent. The contrarian strategies perform well for very short term (0 months - 3 months), Lo and MacKinlay (1990) and long term (3 years - 5 years), De Bondt and Thaler (1985, 1987) while momentum strategies perform well for short term (3months - 12 months) periods, Jegadeesh and Titman, (1993). Both these strategies are applicable at any given point of time in financial markets as contrarian strategies deals with long-term formation windows while momentum strategies are based on short-term formation windows.
De Bondt and Thaler (1985, 1987) were the first to document contrarian strategies. They find that investors show a tendency to overreact to recent information and underweight base rate data. These prices biased by excessive optimism and pessimism leads prior losers to become more attractive investments than prior winners. For the U.S. market, they report that portfolios of losers provide large returns even for more than 5 years of portfolio formation windows. Chopra, Lakonishok and Ritter (1992) indicate that stocks overreact and prior losers outperform prior winners by 5–10% per year. Conrad and Kaul (1993) examine contrarian strategy and find that contrarian profits exist in long period that tends to increase over time.


Other sources of contrarian profits arise from lead-lag effects, (Lo and MacKinlay, 1990 and Jegadeesh and Titman, 1995). Some studies, such as, Lakonishok, Shliefer and Vishny (1994), and Schiereck, De Bondt, and Weber (1999) report that contrarian behavior exists for long-term windows i.e. buying stocks of poor performers and investing for 3-5 years, earn excess returns of 8 percent approximately per annum.

On the other hand, Jegadeesh and Titman (1993) document strategies which buy stocks that have performed well in past and sell stocks that have performed poorly in past, generate superior returns over 3 - 12 months period thus suggesting strong momentum profits for U.S. market. Several academicians have conducted research on momentum strategies. Rouwenhorst (1998) report momentum strategies are profitable for equities in 12 European markets. Moskowitz and Grinblatt (1999) document strong industry momentum effects, whereas Grundy and Martin (2001) show that momentum strategies have been profitable in the U.S. market since 1920’s and industry momentum is not a cause of profitability. Lewellen (2002) finds that size and
B/M portfolios formed on industries as well as individual stocks show momentum profits.

Momentum strategies have attracted many investors because of their consistent profitability. The driving force behind momentum profits is still a puzzle. Some attribute it to market underreaction to firm-specific information (Chan et al., 1996). Hong et al. (2000) document profitability of momentum strategies declines sharply with firm size and works better for stocks with low analyst coverage. Jegadeesh and Titman (2001) report significant positive returns in the first 12 months following the formation period.


Recent studies by Ahn, Conrad and Dittmar (2003) show that their non-parametric adjustment of risk, accounts for half the momentum profits. They construct a stochastic discount factor based on minimal factors such as the law of one price or no arbitrage condition to measure risk adjusted industrial portfolios in an unconditional setting. Scott, Stump and Xu (2003) document that after controlling for earnings-related news and stock's growth rate, the interaction between momentum and volume largely disappears. Torsten, Lukas and Ulrich (2003) find contrarian traders show signs of overconfidence, disposition effect and reliance on non fundamental information, whereas momentum traders appear as least risk taking professionals who may aim for exploiting sub-optimal behavior of others. Kent, Hirshliefer and Subrahmanyam (2004) propose a theory based on overconfidence and biased self-attribution to explain several of securities return patterns. Gabbi G. (2005) provides
evidence on correlation dynamics among geographic areas and business sectors under the assumption that they are linked to international correlations. Shen, Sazakmary and Sharma (2005) find that momentum strategies earn significant profits in commodity futures market. Miffre and Rallis (2006) show presence of short-term continuation in US commodity futures market generating momentum profits of 9.38% per annum on an average. Antoniou, Lam and Paudyal (2007) report that some missing risk factor related to business cycle can probably explain momentum in European markets and behavioral models do not explain much of momentum. 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.

Dapaah and Peiying (2009) show that contrarian and momentum strategies provide superior performance using data for REITS stocks traded on NYSE. In case of momentum strategies, the superior performance is limited to 12 months period and declines afterwards. Chen et al. (2010) examine relationship between price (return) momentum, earnings momentum and revenue momentum using US market data. They find all the three strategies are profitable. Profits from price momentum strategy are largest and persistent followed by earnings momentum and revenue momentum.

Prior return strategies in order to provide extra normal profits must outperform standard risk factor models. Capital asset pricing model (CAPM) developed by Sharpe (1964) and Lintner (1965), with market returns as a risk factor try to explain extra normal returns, however it was unable to explain the set of stylized facts. Fama and French (1993) developed a three-factor model comprising of market, size and value factors, which explain cross-section of average stock returns better than CAPM. Fama and French (1996) show that their multifactor model could explain almost all CAPM anomalies with the exception of momentum behavior. Carhart (1997) employs a four-factor model to explain returns with an additional factor of one-year stock momentum along with Fama French factors, to capture cross-sectional return patterns. Naranjo and Porter (2007) show standard risk factor models explain a significant portion of the cross-country co-movement of momentum returns.

Portfolio managers and investment analysts want to diversify their portfolios across mature as well as emerging markets. A number of authors have examined the behavior of foreign investors in emerging markets and conclude that investors in
general adopt momentum based strategies, see Frankel and Schmukler (1996, 1998), Froot, Conell and Seaholes (2001), Richards (2002) and Kaminsky, Lyons and Schmukler (2002). Rouwenhorst (1999) study 20 emerging markets from the period 1980’s to 1990’s and find significant price momentum and the factors that drive cross-sectional differences in stock returns for emerging markets are similar to those of developed markets. Chui, Titman, and Kim (2000) document that momentum strategies are highly profitable when applied to eight Asian markets outside Japan. Kim and Wei (2002) find that foreign investors living outside Korea are more likely to employ momentum and herding trading than foreign individuals living in Korea as a result of information asymmetry. Hameed and Kusnadi (2002) report little evidence that momentum strategy when applied to individual stocks in six Asian markets yield significant profits. Lin and Swanson (2004) find evidence that foreign inflows have short-term positive impacts on local market returns, but find only minimal evidence that foreign investors employ momentum trading.

Swanson and Lin (2005) investigate eighteen emerging markets (which include all the BRICKS countries) and eighteen developed markets over the period 1992 -2003. They conclude that U.S. investors tend to employ winners-momentum trading strategy (buy past winners) in emerging markets, developed markets and global market and employ losers-contrarian trading (buy past losers) in all the three markets segments.


Sehgal and Balakrishnan (2002) empirically find in India that there is reversal in long-term returns, once short-term momentum effect has been controlled. They also find short-term continuation in stock returns. Sehgal and Balakrishnan (2004) find that momentum returns that are missed by CAPM are partially explained by Fama-French three factor model. Ananthanarayanan (2004) does not find any evidence of contrarian and momentum strategies being employed by foreign investors in Indian market.
Sehgal and Balakrishnan (2008) report strong momentum profits in India for individual stocks as well as wide range of characteristic-sorted portfolios. The study suggests there are rational sources of momentum profits, which are in contrast to U.S. market. Sehgal and Balakrishnan (2010) find that high PSG stocks outperform low PSG stocks, which is contrary to international evidence.

In the last three decades, these prior return patterns in stock returns have been evaluated extensively for mature as well as emerging markets. Since the end of nineties, a body of literature has emerged that concentrates on prior return patterns in sector returns and which advocates that these sector patterns tend to drive prior return patterns in stock returns. The belief here is that the stocks within a sector have a lot in common in terms of business perspectives and hence winner stocks may owe their success to being a part of winner sectors while loser stocks may belong to poor performing sectors. There is also some empirical evidence which suggests that the role of sector factor in stock returns is over emphasized.

Moskowitz and Grinblatt (1999) were the first to document strong momentum effect in industry component of stock returns. They find industry momentum is the cause for positive persistence in stock returns for the intermediate investment horizons (6 to 12 months) even after controlling for size, book-to-market equity, individual stock momentum, cross-sectional dispersion in mean returns, and microstructure influences. Asness, Porter and Stevens (2000) find that within-industry momentum has predictive power for the firm’s stock returns beyond that captured by across industry momentum and also there is a significant short-term (one-month) industry momentum effect. Neal (2000) provides evidence of industry momentum over intermediate time horizons by the performance of industries in mutual funds. Serra (2000) document that cross-market diversification seems better than cross-industry diversification, for emerging markets, returns are driven by country factors and not by the industrial composition of indices. Nijman, Swinkels and Verbeek (2004) suggest that positive expected excess returns are primarily driven by individual stock effects, while industry momentum plays a less important role and country momentum is even weaker. Du and Denning (2005) find that industry momentum is mainly due to common factors and not industry-specific risk. Scowcroft and Sefton (2005) study large value-weighted capitalization universe and report that price momentum is driven by industry
momentum and not individual stock momentum, however for small-cap universe; stock momentum plays a greater role.

Menzly and Ozbas (2006) find strong cross-industry momentum for industries related to each other through supply chain. Boni and Kent (2006) report that short-term industry price momentum phenomenon is partly explained by returns of firms with more analyst coverage leading those with less analyst coverage. Phylaktis and Xia (2006) show that global and industry effects are dominated by country effects in emerging markets, which is contrary to the evidence on mature markets. Chen, Benett and Zheng (2006) suggest investors should emphasize sector based approach in developed countries but continue country-based allocation strategies for emerging markets.

Saffieddine 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 stock momentum profits. Fraulo and Nguyen (2009) replicate Moskowitz and Grinblatt’s work and find that industry momentum strategies do provide greater returns than individual stock momentum strategies and also the optimal time horizon of industry momentum strategy has no correlation with the size of the industries. They also find that the (6, 6) and (12, 12) strategies are unaffected by the one-month return, confirming the previous intuition that these strategies are uncontaminated by any potential short-term effects due to microstructure or liquidity.

While focusing on industry patterns in stock returns, it is important to understand the industry classification systems which are currently in vogue. There are several industry classification systems which are being used worldwide. Amongst these Global Industry Classification System (GICS) provided by Standard & Poor's (USA) in collaboration with Morgan Stanley Capital International (MSCI) is extremely popular and hence extensively employed by market players as well as empiricists. GICS is a four digit classification system involving 10 sectors, 24 Industry groups, 68 industries and 154 Sub-Industries. One may discern different prior return patterns for each stage of industry classification that is sector, industry group, industry and sub-industry.
Most of the work on prior return strategies is focused on developed markets. Portfolio managers and investment analysts want to diversify their portfolios across mature as well as emerging markets. The present study shall focus on filling the research gap by providing additional evidence for BRICKS which is an important emerging market basket. There is limited work for BRICKS except for the study carried out by Swanson and Lin (2005) who investigate eighteen emerging markets (which included all the BRICKS countries) and eighteen developed markets over the period 1992 - 2003. They conclude that U.S. investors tend to employ winners-momentum trading strategy (buy past winners) in emerging markets, developed markets and global market and employ losers-contrarian trading (buy past losers) in all the three markets segments. However, recent work on these markets is almost missing.

Past research so far has concentrated on testing either prior return patterns in stocks or forming portfolios on individual company characteristics such as size, P/B, P/E, dividend yield, leverage, profitability. Limited work is available on stylized portfolios which have been formed by combining selected company characteristics (size, P/B, P/E, dividend yield and past sales growth) and past excess returns especially for emerging markets. There is universal evidence on prior return patterns in stock returns; however there is minimal work on prior return patterns in sector returns and the evidence is almost missing for industry group and industry level classification. Most asset pricing anomalies have been evaluated vis-à-vis one factor CAPM and three-factor Fama French model. Some empirical work also employs Carhart four-factor model as a baseline for detecting extra normal returns. However, there is weak economic rationale for Carhart stock momentum factor.

In the present study, both short-term and long-term prior return patterns should be analyzed for BRICKS economies. The work should be conducted for prior return as well as stylized portfolios which are formed by combining company characteristics as well as past excess returns. These prior return portfolios should be evaluated vis-à-vis CAPM and Fama French model. In addition, the Fama French model should be augmented by including a sector prior return factor based on the arguments of Liu and Zhang (2008). The sector prior return factor replaces the stock prior return factor of Carhart in the suggested multi-factor asset framework. Finally, prior return patterns shall also be examined for sector data at three levels, that is, sector, industry group and industry classification. Also, the research should test if prior return patterns in
stock returns are absorbed by prior return patterns in sector return. The present study shall not only provide fresh empirical evidence on propositions which have been evaluated earlier but also provide evidence on new dimensions in asset pricing research.

2.4. **CONCLUDING REMARKS**

The chapter contained a brief review of CAPM which is a one-factor asset pricing model that develops relationship between risk and return. Next, multi-factor asset pricing framework provided by Merton (1973) and Ross (1976) have been reviewed. Fama French (1993) provides an empirical model comprising of three factors: market, size and value have been described. A large body of empirical literature shows that Fama French model has a universal appeal as it provides a better description of cross section of average returns. In this chapter, the Fama French model as well as its extension by Carhart (1997) has been explained. It may be noted that Carhart added an additional stock momentum factor to the Fama French Framework.

There is a growing body of literature covering prominent asset pricing anomalies such as price-earnings (P/E) ratio, firm size, book equity to market equity (BE/ME) ratio, firm leverage, prior return effects, growth, accruals, net stock issues, profitability (Fama and French, 2008) and liquidity (Hwang and Lu (2007)). One of the most dominant and puzzling anomalies in finance literature relates to prior return patterns in stock returns. These prior return patterns are of two types which generally exhibit time specificity. Contrarian strategies work well for very short-term windows (0 months-3 months) and long-term formation windows (3 years-5 years), while momentum strategies generally provide high return for short-term formation windows (3 months-12 months). Empirical literature on these equity market anomalies has been discussed in general and for prior return anomalies in detail.

Finally, the research gap has been identified in the prior return literature especially for emerging markets and shall try to fill this empirical gap by addressing relevant research questions in the subsequent chapters.