A Search for Rational Sources of Stock Return Anomalies: Evidence from India

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Abstract

In this paper we investigate the presence of the following asset pricing anomalies viz. size, value, momentum, liquidity, accruals, profitability and net stock issues in India. Size effect is the strongest with a difference of 4.4 % per month between small and big stock returns. A positive relationship is reported between accruals, stock issues and returns and a negative relation between profitability and returns which is in contrast to prior research. CAPM is unable to explain these anomalies with the exception of net stock issues. The Fama French (FF) model is able to capture value, profitability and accruals. While liquidity anomaly is explained by a liquid augmented FF model, the sector and earnings momentum factors do not contribute significantly towards explaining returns. Size and short term momentum are persistent and hence continue to pose challenge to rational asset pricing in India. Our findings shall be highly useful for investment analysts and portfolio managers. The research contributes to asset pricing literature especially for emerging markets.

Keywords: Size effect, Value effect, Stock momentum, CAPM, Fama French model

JEL code: C51, C52, G12, G14, G15

1. Introduction

Anomalies are empirical results that seem to beinconsistent with maintained theories of asset pricing behaviour and indicate market inefficiency or inadequacies in the asset pricing model (Schwert, 2003). There is now extensive evidence that market beta is not able to fully capture the cross-sectional differences in average stock returns in the way the CAPM model predicts. The six most prominent CAPM anomalies are firm size (Banz (1981), book equity to market equity (Stattman(1980), price earnings(Basu,1983), firm leverage (Bhandari, 1988), reversal (De Bondt and Thaler, 1985, 1987) and momentum returns (Jegadeesh and Titman, 1993).

To explain the pricing anomalies not captured by CAPM, Fama French (1993), developed a three factor asset pricing model which 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 additional risk factors in the model are firm specific, yet they have proven to be very effective in explaining major anomalies of the CAPM.

However, recent studies have shown that there are patterns in average returns that even the Fama French model cannot explain. Significant among theses anomalies are momentum, accruals, net stock issues and profitability (Fama and French (2008) and liquidity (Hwang and Lu (2007)). Stock market anomalies that have gained attention in the literature over the past few years are size, value, momentum, liquidity, accruals, profitability and net stock issues.

Size effect-The size effect implies that small firms stocks provide higher risk adjusted returns than the stocks of large firms. Starting with Banz (1981), many papers (Roll (1981), Schultz (1983), Chan and Chen (1991), Perez-Quiroz and Timmermann (2000), Lettau and Ludvigson (2001) have explored the reasons for its existence in both mature and emerging markets. However search for an explanation has been unsuccessful.

Value effect – The value effect owes its existence to Stattman (1980) and implies that companies with relatively high distress (persistently low sales and earnings record) tend to outperform companies which are relatively better performing (persistently high sales and earnings record). 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).

Momentum – Momentum continues to be the premier anomaly across all markets. Jegadeesh and Titman (1993) found that trading strategies that buy stocks with high returns and sell stocks with low returns over the previous 3-12 months generate significant profits. The behavioural models which show investor under reaction or overreaction to firm specific news provide a partial explanation to momentum anomaly (Barberis, Shliefer and Vishny (1998), Daniel, Hirshleifer and Subrahmanyam (1998), Hong and Stien (1999). Chordia and Shivkumar (2002) attribute momentum to macroeconomic factors, while Hong et al (2000) attribute it to size and Moshowitz and Grinblatt (1999) to industry momentum.

Liquidity- Liquidity is generally described as the ability to trade large quantities quickly at low cost with little price impact. Amihud and Mendelson (1986) were the first to study the role of liquidity in asset pricing models and found that investors demand a premium for less liquid stocks so expected returns should be negatively related to the level of liquidity. Although Fama and French (1992) argue that liquidity need not be specifically measured, recent studies show that liquidity needs to be accounted for individually(Chordia et al, 2001), Amihud, 2002, Lee and Swaminathan,2000, and Keene and Peterson, 2007.

Accruals-The accrual anomaly was first documented by Sloan (1996). He argues that if investors naively fixate on earnings, then they will tend to overprice (underprice) stocks in which the accrual component is relatively high (low) since the lower persistence of earnings performance attributable to the accruals component of earnings is not fully anticipated. The mispricing is corrected when future earnings are realized to be lower (higher) than expected. When this happens the market reacts negatively (positively) to the earnings announcement, resulting in predictable negative (positive) abnormal stock returns. He shows that low (high) accrual stocks generate positive (negative) abnormal future returns and a hedge strategy that exploits this anomaly generates a significant annual abnormal return of 10.4% for the US market. Several studies have explored reasons for its occurrence which include post earnings announcement drift (Collins and Hribar, 2000), insider trading(Beneish and Vargus, 2002), abnormal accruals Xie, 2001), distress risk(NG, 2004),institutional and accounting structure(Pincus et al, 2007). Mashruwala et al. (2006) explains why accrual anomaly is not arbitraged away.

Profitability- Fama French (2008) and Cohen et al. (2002) report a positive relationship between corporate profits and returns. A possible explanation for this could be that profits are the reward for growth and innovation, which exposes entrepreneurs to greater risk thus resulting in higher returns. This argument is in line with Haugen and Baker (1996) who advocate that currently profitable firms have greater potential for future growth.

Net stock issues - The net stock issues anomaly refers to the negative relation between net changes in equity financing and future stock returns. Future returns are low after stock is issued (Loughran and Ritter (1995)) and high after stock is repurchased (Ikenberry et al, 1995). Lougran and Ritter (1995) have argued that a possible explanation for the underperformance of equity issuing firms is that investors under react to the adverse news of an equity issue. However, Eckbo, Masulis and Norli, 2000) and Eckbo and Norli, 2005) argue that issuing firms are viewed as less risky by investors and hence are priced to yield lower expected returns. A negative relation between net stock issues and equity returns is proved by Daniel and Titman (2006) and Pontiff and Woodgate (2008). Ikenberry et al (1995) find that on average, market under reacts to open market share repurchase announcements. They hypothesise that the market treats repurchase announcements with scepticism leading prices to adjust slowly overtime

Fama French (2008) explore the pervasiveness of five return anomalies viz. net stock issues, accruals, momentum, profitability and asset growth using sorts and cross section regressions for US market from 1963-2005. Examining

results separately for tiny as well as small and big stocks they find that the anomalous returns associated with net stock issues, accruals and momentum show up strongly in all size groups.

In this paper we attempt to investigate the existence of the following asset pricing anomalies viz. size, value, momentum, accruals, liquidity, profitability and net stock issues in India which is an emerging market. Although size, value and momentum have received a lot of attention in the Indian context (Note 1), literature on accruals, net stock issues, profitability and liquidity is still relatively sparse. The paper makes an attempt to fill this void in the literature. Subsequently our objective is to try and build a more comprehensive factor structure which could explain the presence of these anomalies. If anomalies still persist they may warrant possible behavioural explanations.

The paper is organised as follows. In the next section we describe the data and their sources. Section 3 describes the methodology followed. Section 4 gives the empirical results. In section 5 we try to provide explanations for the unexplained anomalies. The last section contains summary, policy implications and concluding remarks.

2. Data

The sample used consists of 493 companies that form part of BSE-500 equity index. The study uses month end closing adjusted share prices (adjusted for capitalisation such as bonus, rights and stock splits) from Jan 1996 to Dec 2010 (180 monthly observations) (Note 2). The Bombay Stock Exchange (BSE) -200 index is used as the market proxy. The month end share price series have been converted into percentage return series for further estimation. Various company characteristics which are used to form "stylized portfolios" are stated below.

- Market capitalisation (as size proxy) is calculated as the natural log of price times shares outstanding.
- Price to book value per share (inverse of BE/ME) (as value proxy) represents the security price over a company's book value.
- Trading volume (as liquidity proxy)- is defined as the average daily turnover in percentage during the portfolio formation period (see Lee and Swaminathan, 2000).
- Return on equity (as a measure of profits) is calculated as the income available to common stockholders for the most recent fiscal year divided by the average common equity and is expressed as a percentage.
- Accruals have been calculated using the balance sheet method (Sloan (1996)) as follows.

$$\text{Accruals} = (\Delta CA - \Delta Cash) - (\Delta CL - \Delta STD - \Delta TP) - Dep \quad (1)$$

Where ΔCA is the change in current assets.

$\Delta Cash$ is the change in cash or cash equivalent.

ΔCL is the change in current liabilities.

ΔSTD is the change in short term debt.

ΔTP is the change in tax payables, and Dep is the depreciation and amortization expense . The value of accruals obtained is deflated by average total assets.

- Net stock issues (in year t) is the natural log of ratio of split adjusted share outstanding at calendar year end t-1 divided by split adjusted shares outstanding at calendar year end in t-2.

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 on share prices, market index, all company characteristics and GICS has been obtained from the Thomsonone database of Thomson Reuters. The implicit yields on 91-day treasury bills have been used as risk-free proxy as is the standard practice in finance literature. The data for this has been taken from the RBI monthly handbook of statistics.

3. Methodology

Single sorted portfolios are formed based on each stylised characteristic. We evaluate the 12 months/12 months investment strategy for all the characteristic sorted portfolios.The 12-12 strategy for individual stocks is estimated as follows: In December of year t-1, the securities are ranked on the basis of the stylised characteristic under consideration. The ranked securities are then classified into five portfolios P1 to P5 and equally-weighted monthly excess returns are estimated for these portfolios for the next 12 months (t). P1 is the portfolio consisting of 20% of companies with lowest attribute while P5 consists of top 20% companies with highest attribute under consideration. P1 and P5 are referred henceforth as corner portfolios in the study. The portfolios are re-balanced at the end of

December of year t. In the case of momentum we also form a 6/6 investment strategy, where the formation and holding windows are kept as 6 months.

First, we observe the unadjusted mean excess returns across the portfolios created. If we a find a pattern in the unadjusted excess returns on the quintile sorted portfolios, then there exists an effect (corresponding anomaly).

Next, CAPM regressions are run on each of the five portfolios using the familiar "excess return" version of the market model equation.

$$R_{pt} - R_{ft} = a + b\ (R_{mt} - R_{ft}) + e_t \quad (2)$$

where $R_{pt} - R_{ft}$ is the monthly excess return on the portfolio i.e. return on portfolio P minus risk free return ($R_{ft)}$,

$R_{mt} - R_{ft}$ is the excess market return i.e return on market factor minus risk free return,

e_t is the error term,

a (intercept) is a measure of abnormal profits and

b is the sensitivity coefficient of market factor.

The CAPM implies that excess returns on a portfolio should be fully explained by excess market returns. Hence, the expected value of 'a' (the intercept term) should be 0. A significantly positive (negative) value of 'a' (intercept) implies extra-normal profits (losses). If there is a significant positive or negative intercept in the CAPM specification, then a CAPM anomaly exists. Significant intercepts imply that CAPM fails to explain the returns of the test portfolios. Then we attempt to evaluate if the excess returns of the stylized portfolios that are missed by CAPM can be explained using the three factor model of Fama and French (1993) specified as follows.

The FFModel is given by:

$$R_{Pt} - R_{Ft} = a + b\ (R_{mt} - R_{ft}) + s(SMB_t) + h(LMH_t) + e_t \quad (3)$$

Where SMB_t is the monthly return on the size mimicking portfolio,

LMH_t is the monthly return on the price-to-book mimicking portfolio,

s and h are the sensitivity coefficients of SMB_t and LMH_t

The other two terms are same as defined in equation (2).

Our estimation of the FF model differs in two respects. First we use LMH factor instead of HML factor in the FF regression. Hence our interpretation of the value factor will be inverse. Secondly unlike Fama and French (1993) who perform a 2*3 size-value partition, we construct a 2*2 size-value partition (Note 3). We modify the estimation of the SMB and HML as follows. In each year of the sample period t, the stocks are split into two groups- big (B) and small (S) - based on whether their market capitalization at the end of December of every year in the sample period is above or below the median for the stocks of the companies included. The price to book equity ratio is calculated in this month for all the companies. The stocks are now split into two equal P/B groups((L) and (H)). Then we construct four portfolios viz. S/L, S/H, B/L, B/H from the intersection of the two size and two P/B groups. Monthly equally weighted return series are calculated for all portfolios from Jan of year t to December of year t.

The Fama and French model uses three explanatory variables for explaining the cross section of stock returns. The first is the excess market return factor that is the market index return minus the risk-free return. The second is the risk factor in returns relating to size – small minus big (SMB). The simple average of the monthly returns of the two big size portfolios (B/L, B/H) is subtracted from the average of the two small size portfolios (S/L, S/H) to get the monthly return of the SMB factor. This factor is free from value effects as it has about the same weighted-average price to book.

$$SMB=(S/L+S/H)/2-(B/L+B/H)/2 \quad (4)$$

The third factor is related to value (LMH_t).It is constructed as follows such that it is independent of size factor:

$$LMH=(S/L+B/L)/2-(S/H+B/H)/2 \quad (5)$$

If the intercepts from the FF regressions are insignificant and the intercepts from the CAPM regressions are significant, then this implies that the FF specification is able to capture cross sectional patterns in average stock returns that are missed by CAPM. On the other hand statistically significant intercepts of FF model shall suggest missing risk factors which one needs to identify for creating a complete factor structure. Greater sensitivity of sample portfolio returns to the size and value risk factors is shown by higher factor loadings i.e s and l for these factors.

We start by augmenting the FF model with a liquidity factor, which is calculated as the difference between returns on low liquidity stocks (P1) and high liquidity stocks (P5).The liquidity augmented FF model now is:

$$R_{Pt} - R_{Ft} = a + b\ (R_{Mt} - R_{Ft}) + s(SMB_t) + h(LMH_t) + l(LIQ_t) + e_t \quad (6)$$

Where LIQ is the factor mimicking portfolio for liquidity and l tests the sensitivity of the liquidity factor (see Keene and Peterson(2007). The other terms are same as in equation (3).

Portfolios which are sensitive to the liquidity factor should exhibit a higher l coefficient. We further verify if the corner stylised portfolios (P1 and P5) comprise of stocks with particular attributes i.e small(big) size, low(high)P/B ratio and low(high) liquidity (Note 4). Such stock characteristic patterns in the sample portfolios shall support the strong performance if any of the FF model and the liquidity augmented FF model.

Next to evaluate if sector factor plays an additional role in explaining returns, we add a sector momentum factor as an additional risk factor in the liquidity augmented FF model (see Sehgal and Jain(2011) for details on factor construction). The sector factor has been formed as the difference of winner sector and loser sector, (WML).

The five factor model is as follows:

$$R_{Pt} - R_{Ft} = a + b\ (R_{Mt} - R_{Ft}) + s\ (SMB_t) + h\ (LMH_t) + +l(\ LIQ_t) + w\ (WML_t) + e_t \quad (7)$$

Where w is the factor sensitivity of WML factor and other terms are as defined in equation 6.

Finally we construct an earnings momentum factor and include the earnings based zero investment portfolio (PMN) as an additional factor in the liquidity augmented FF model (see Chordia and Shivkumar (2006) for details). We now extend the liquidity augmented FF model (6) by including the earnings based zero investment portfolio (PMN) calculated as the difference in returns between extreme SUE portfolios as an additional factor.

$$R_{Pt} - R_{Ft} = a + b\ (R_{Mt} - R_{Ft}) + s\ (SMB_t) + h\ (LMH_t) + +l\ (LIQ_t) + p(\ PMN_t) + e_t \quad (8)$$

Where p is the factor sensitivity of PMN factor and other terms are as defined in equation (6).

We have consciously introduced the two additional factors (sector momentum and earnings momentum) to the liquidity augmented FF model one at a time to understand their marginal impacts.

4. Empirical Results

In this section we discuss the empirical results obtained for each anomaly. Table 1 shows results of unadjusted excess returns. CAPM results are reported in Table 2, and Table 3 gives results of FF regressions. All results are analysed at 5% level of significance.

Size effect- The unadjusted returns on size sorted portfolios are larger for the small stocks as compared to large stocks confirming the negative relationship between size and average returns.The return differential between small and large stocks is 4.4% per month (t statistic=5.25) which is 53% per annum and robust. CAPM results show that the extra normal returns (after adjusting for market risk) is 4.4% per month for small stock and 0.07% per month for large stock portfolios. Small stock portfolios earn statistically significantly positive extra risk adjusted returns confirming the size effect. There has been no substantial difference between beta coefficient of small and large stock portfolios which indicates that market risk of small firms is not substantially larger than that of large firms. This is the reason why CAPM fails to explain size effect. Adj.R^2 is low for small stock portfolios vis-a-vis large stocks showing that the portfolios of small stocks have a very large unexplained variation in their returns. FF regressions show that both SMB and LMH coefficients are higher for P1 as compared to P5, confirming role of size and value factors in explaining size based returns. However these factors only partially explain the size effect, as the small size portfolio still provides an abnormal return of 2% per month which is statistically significant. Thus size is confirmed to be an asset pricing anomaly in Indian context unless one can find additional risk factor(s) to augment the FF model, which possibly captures this anomalous pattern in asset returns.

Value effect-Average returns are 3.2% per month for low P/B (high Book to market equity) compared to 1.49% per month for high P/B (low BE/ME). The return differential is as high as 1.77% per month (t-value=2.3) which is also statistically significant. This confirms the existence of a strong value effect. However size effect is almost 2 ½ times the value effect in the Indian context, which is in confirmation with findings for emerging markets (including India) (See Fama and French (1998).The market model results show that the intercept value is low for the high P/B portfolio as compared to the low P/B portfolio, suggesting that low P/B stocks generate higher CAPM based risk adjusted extra normal returns during the study period. However, CAPM is unable to absorb cross sectional differences on value sorted portfolios. The h coefficient is negative (-0.40) for high P/B (low BE/ME) and positive (1.15) for low P/B(high BE/ME) confirming the presence of value effect. The three factor model is robust as both the size factor and the value factor explain the cross sectional differences in returns.

Momentum - Results show the presence of strong momentum profits for both 6/6 aand 12/12 strategies over the study period. Unadjusted returns on momentum sorted portfolios show that the monthly mean return of the 6/6 (12/12) strategy for the losers portfolio (P1) is 2 % (2.4%) per month whereas the monthly mean return for the winners portfolio(P5) is 3.3% (3.2%)per month. CAPM results show that intercepts for winner portfolios are statistically significant for both strategies. Our findings confirm that market factor does not explain momentum. This could be attributed to the fact that there is very small difference in betas of the corner portfolios i.e. P1 and P5. The intercept of the winner portfolio is significant and provides an abnormal return of 1.5 % (1.3) % per month. The FF model fails to capture momentum owing to the fact that loser portfolio tends to load more heavily on value factor compared to winners portfolio which is in contrast to risk theory. Winners portfolio should have comprised of more distressed low P/B stocks for providing a risk explanation. So winner stocks are growth stocks. Further there is no significant difference between the sensitivity of winner and loser portfolios to the size factor. The regression results are verified by estimating size and P/B ratio for the sample portfolios. These are similar for both 12-12 and 6-6 strategies.

Liquidity - The winners (P5) and losers (P1) provide unadjusted excess monthly return of 3% per month and 1.7% per month respectively. CAPM regressions show that the intercept coefficient is higher for the low volume stocks (0.022) as compared to high volume stocks (0.006) as well as statistically significant. This can be explained by the fact that market betas are higher for high volume stocks than low volume stocks. Table 3 shows that the three factor adjusted return of the least liquid quintile portfolio remains significant and stands at 1.3% per month (t-stat=2.36).The SMB loading is high for the low volume stocks as compared to the high volume stocks and is highly significant in explaining liquidity factor. Thus low volume stocks load on size factor implying that small companies are low volume companies. This is again reconfirmed by our finding that illiquid stocks tend to be small sized value stocks. LMH does not seem to play any significant role in explaining the returns on liquidity sorted portfolios. Hence both CAPM and FF cannot fully explain return on liquidity sorted portfolios.

Profitability-Sorting on profits we find that average returns are significantly higher for low profitability stocks and significantly lower for high profitability stocks. We find that highly profitable firms are large sized growth stocks. From an investor's perspective who is developing a trading strategy for himself, a highly profitable firm is less risky and hence should provide more returns. Estimating the CAPM regression we find an abnormal return of 1.1 % per month(t-stat=2) on lowest profitability portfolio. CAPM betas are lower for highly profitable firms and higher for lower profitability firms. However intercepts of the corner portfolios are statistically significant confirming the presence of a profitability anomaly within the CAPM framework. The FF results show insignificant intercepts for corner portfolios owing to the additional contribution of the size factor. Hence the three factor model absorbs the profitability sorted returns that are missed by CAPM.

Accruals - Contrary to existing studies on mature markets we find that accruals are positively associated with average returns. The high accrual firms report an average monthly excess return of 2.3% (t-stat=2.54) while low accrual firms provide a monthly return of 1.9 % (t-stat=2.53). This implies that probably Indian investors are behaving contrary to the theory proposed by Sloan. They have learned from Sloan's (1996) initial study which subsequently led to a degeneration of excess returns from potential mispricing of accruals, eventually rendering the associated trading strategy useless. Our results are in line with Leippold and Lohre (2010) who finds that the unadjusted returns on low accruals sorted portfolios generate 1.9% per month while high accruals stocks generate 2.2% per month from May 1994 to April 2008 for the Indian market. Pincus et al (2007) do not find the presence of a significant accrual anomaly for India. The market model results show that an abnormal return of 0.8% per month (t-stat=2.09) is generated on low accrual firms and significant abnormal excess return of 1% per month on high accrual firms (t-stat=2.22). The market beta is lower for the low accrual portfolio as compared to the high accrual portfolio, which is in contrast to similar high betas found by Sloan (1996) for extreme quintiles for the US. We find that low accrual stocks are low P/B, illiquid but not small as compared to the high accrual stocks (in line with Leippold and Lohre (2010). This is understandable as big firms have stronger bargaining power compared to small firms and hence can generate more cash sales from customers. Table 3 shows that the FF model is successful in absorbing the extra normal returns that are missed by CAPM. This is made possible by additional contribution of the size factor. SMB value is low for low accrual portfolios vis-a-vis high accrual portfolios indicating that low accrual portfolios are big stocks contrary to small size firms in low accrual stocks found by other studies for mature markets. This is supported by the value of average market cap of the corner portfolios which we have estimated. LMH however does not play any significant role in explaining returns on accrual sorted portfolios. Thus the accrual anomaly does not pose any serious challenge to asset pricing in the Indian environment.

Net stock issues - The relation between average returns and share issues and repurchases is captured by the net share issues variable A positive value indicates issues of shares whereas a negative value implies repurchases. We will

discuss results for each case separately. Indian evidence shows that returns for companies with larger stock issues are high as compared to those with lower stock issues. Unadjusted excess return increase from 2% per month on lowest issues portfolio to 2.8% per month on the highest issues portfolio. This result is contrary to earlier findings for mature markets (see Loughran and Ritter, 1995). However, the CAPM absorbs this anomaly since we find insignificant intercepts for the corner portfolios. The beta of the highest issues portfolio is much larger than that of the lowest issues portfolio, indicating that the winners portfolio might be more risky and thus it is compensated by higher returns. We find that cash flow to assets ratio is lower for high stock issues firms compared to low stock issues firms both for the year prior to issue period and three years later (Note 5). The findings suggest that high stock issues firms persistently exhibit lower operating efficiency and hence are riskier than low issues firms. Our results are supported by the view of Jain and Kini (1994) who found that for 682 firms going public during 1976-1988 period, the median operating cash flow to assets ratio fell dramatically between the year prior to going public and three years later. We can therefore say that stock issues do not provide anomalous returns in the Indian context.

On the other hand higher repurchases (P1) provides positive unadjusted excess return of 2.9% per month (t-stat=2.74). Unadjusted excess returns are much smaller 1.7 % (t-stat=1.6) for less extreme repurchases (P2). Thus positive abnormal returns after repurchase are pervasive, which is consistent with existing literature. The market model results indicate insignificant intercepts implying that CAPM absorbs the anomalous pattern in excess returns. This is attributed to the higher beta for the larger repurchases portfolio. Thus stock issues and repurchases (net stock issues) anomaly does not pose serious challenge to standard asset pricing models for India.

5. Unexplained Anomalies

On the basis of our results in the previous section we conclude that net stock issues are explained by CAPM and value, profitability and accruals by the FF model. However size, momentum (6/6 and 12/12) and liquidity defy FF model at 5% level of significance. In this section we investigate whether these asset pricing anomalies can be explained by additional risk factor(s) which are used to augment the FF factor structure. A growing body of literature shows that the use of additional risk factor(s) like liquidity, sector momentum and earnings momentum in asset pricing models has been successful in explaining cross-sectional variation in asset returns. This motivates us to use them as additional explanatory variables in the FF model and test if they contribute in eliminating any of the above anomalies in the Indian case.

We begin with liquidity as an additional explanatory variable in the FF model following the work of Pastor and Staumbaugh (2003), Keene and Paterson (2007), Bali and Cakici (2004), Chan and Faff (2005), Mirralles and Mirralles(2006) who document the relationship between volume based liquidity factor and expected returns. Most of them assigned to liquidity a role of stock's common risk factor similar to SMB and HML (LMH in our case) in the framework of FF model and found liquidity to be an important factor affecting returns even after the effect of other known variables was taken into account. It is rational to believe that less liquid stocks(proxied by lower trading volume) expose investors to risk of marketability, leading to loss of asset value while trading, compared to high liquid stocks. Using the above arguments and that liquidity risk is a state variable (Pastor and Stambaugh, 2003), we start by augmenting the FF model with a liquidity factor (Note 6). Whether the inclusion of liquidity alters the effect of other variables on portfolio returns or alters estimated intercepts is known by comparing results of equation 6 with equation 3. The dependent variable in the above regression is the excess return on size sorted portfolio, liquidity sorted portfolio and momentum portfolios (6/6 and 12/12).

Results in table 4 show that the liquidity augmented FF model is able to mop up all the excess returns on the liquidity sorted portfolios which were missed by the FF model since intercept for low liquidity portfolio is not significantly distinguishable from zero. The augmented model is also a better descriptor of returns on size sorted portfolios (Table 4). Liquidity plays an important role in explaining size as it absorbs almost 40% of the extra normal returns generated from the FF model. But there are unexplained returns to the tune of 14.4% p.a which is significant at 5% level (Note 7). This shows the ability of the Liquidity augmented FF model to represent a well specified asset pricing model.

Pastor and Staumbaugh (2003) and Leipplod and Lohre (2009) find liquidity to be a crucial driver in governing momentum effects. However regression results of the four factor model on the winner portfolios (both 6/6 and 12/12) show significant intercepts (Table 4).This implies that the Liquidity augmented FF model fails to capture any extra normal returns reported by winner portfolios on both the trading strategies.

Given the failure of the liquidity augmented FF model in fully explaining size and momentum patterns in returns we include additional risk factors. A body of research debates the importance of industry or sectors in explaining momentum (Moskowitz and Grinblatt (1999, Grundy and Martin, 2001) and Liu and Zhang (2008). Moskowitz and Grinblatt (1999) document that once returns are adjusted for industry effects, momentum becomes significantly

weaker. Liu and Zhang (2008) show that the growth rate of industrial production is a priced risk factor in asset pricing tests and explains more than half of momentum profits. Using the above argument we purport that stock momentum may be caused due to sector momentum. It is possible that winner stocks belong to winner industries and winner industries have a higher sales growth potential than loser industries. These winner industries might be exposed to higher risks while they chase accelerated growth. This growth risk differential can be proxied by building a sector factor, which in turn can be constructed by taking return differential of the winner and loser sectors. We thus augment the liquidity augmented FF model with a sector momentum factor.

Results in Table 5, show significant intercept values for size sorted portfolios thus reflecting the inability of sector momentum factor in explaining the residual size effect. We also find significant intercepts for winner portfolio of momentum strategy (both 6/6 and 12/12) in the five factor model. This means that sector momentum factor does not account for returns on size and momentum based portfolios which are missed by the liquidity augmented FF model. This may possibly be because our existing factors absorb the role of sector momentum factor in stock returns. This is confirmed by a significantly high correlation between sector momentum and size and sector momentum and value factors .

Another argument in asset pricing literature relates to an earnings momentum factor. Earnings momentum refers to the fact that firms reporting unexpected high earnings subsequently outperform firms reporting unexpectedly lower earnings. Chordia and Shivkumar (2006) and Lieppold and Lohre (2009) state that price momentum is subsumed by the respective earnings momentum factor. Hong, Lee and Swaminathan (2003) find that price momentum exists only in those countries in which earnings momentum is profitable. Chordia and Shivkumar (2006) purport that the return on *PMN* (earnings based zero investment portfolio)is correlated with future growth in GDP, industrial production, consumption, labor income, inflation, and T-bill returns, and that *PMN* has a greater predictive power for future business conditions than the Fama–French factors. Perez-Quiros and Timmermann (2000) have evidenced that during recessions there are larger asymmetries in the risk and return attributes of smaller firms than those of larger firms. This shows that size effect may be caused by the fact that small sized stocks are more sensitive to business cycle conditions than big stocks. Given these links between momentum and size based returns with the business cycle factors and the fact that earnings momentum may proxy for business cycle conditions we introduce an earnings based momentum factor in our analysis.

When we augment the liquidity augmented Fama French model with earnings momentum factor we find that earnings momentum is not able to explain profits based on small stock portfolio that are missed by liquidity augmented FF model. However, abnormal returns from 12/12 strategy get absorbed whereas momentum from 6/6 strategy still persists (Note 8).

This may suggest that there may be a role for additional risk factors in explaining momentum.

5. Summary and Conclusions

The empirical results confirm the presence of asset pricing anomalies in the Indian context. The size effect is the strongest with the mean difference in returns of 4.4% per month between small and big stocks. Profitability is negatively correlated with returns contrary to the results of Fama and French (2008). We find a positive relationship between accruals and portfolio returns which is in contrast to the findings of Sloan (1996).Further we also find a positive relationship between size of stock issues and returns which is opposite to the findings of Loughran and Ritter (1995).

The CAPM is unable to explain these asset pricing anomalies with the exception of net stock issues. Value, profitability and accruals are captured by FF model. However size, momentum (6/6 and 12/12) and liquidity defy Fama French model at 5% level of significance.

The liquidity augmented FF model is able to mop up all the extra normal returns on the liquidity sorted portfolios as well as 40% of the returns on the smallest stock portfolios. Thus the four factors Liquidity Augmented FF seems to be a better descriptor of asset pricing compared to one factor CAPM and three factor Fama French. Other risk factors such as sector momentum and earnings momentum do not play a significant role in asset pricing framework. However size and short term momentum (6/6) persist as asset pricing anomalies which may be strategically useful information for portfolio managers.

The persistence of size and momentum anomalies may suggest that there is role for additional risk factors in returns. Factor identification continues to be a challenge for researchers especially when one is trying to develop a strong economic foundation for the risk story. Alternatively one might require a behavioural explanation. Perhaps Indian investors under react to accounting and financial information for small and momentum stocks. This may be caused due to poor and infrequent disclosures, lack of investor confidence in information and general investor neglect of

these small cap companies and winner companies. Investors may also be under reacting to past information for winner companies and possibly overreacting for loser companies in line with one of the many behavioural arguments provided in the literature (see Barberis, Shleifer and Vishny (1998), Daniel, Hirshleifer and Subrahmanyam (1998), Hong and Stien(1999) etc.)

The present research contributes to asset pricing and behavioural finance literature especially for emerging markets. A search for rational explanations of size and momentum continues to be a challenge for empirical researchers. Further research on the subject is warranted till these pricing anomalies are fully resolved.

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Notes

Note 1. See Sehgal and Tripathi (2005), (2007)), Sehgal and Balakrishnan (2008), Sehgal and Jain (2011).

Note 2. Due to paucity of data, sample period for accruals is from January 1997-December2010(168 monthly observations) and for net stock issues from January 2002 to December 2010(108 monthly observations).

Note 3. Correlation between SMB and LMH was significant at 0.7 when we used the 2*3 partition. However the correlation was only 0.31 with the 2*2 partition.

Note 4. Results have not been reported due to space constraints.

Note 5. High stock issues firms report a cash flow to assets ratio of 0.074 prior to issue and 0.078 on average for three years on post formation basis. Similar figures for low stock issues firms are 0.087 and 0.084 respectively.

Note 6. We find that correlation between the liquidity factor and SMB and liquidity factor and LMH factors are low and stand at 0.007 and -0.04.respectively.

Note 7. The size anomaly seems to be explained at 1% level of significance. However an abnormal return of 14% on an annualized basis cannot be ignored and warrants additional explanation.

Note 8. Results have not been reported due to space constraints.

Table 1. Unadjusted average monthly excess returns

Portfolio	P1		P5(P2 for repurchases)	
	Mean	t-stat	Mean	t-stat
Size sorted portfolio	0.054	5.046	0.010	1.568
Value sorted portfolio	0.032	3.12	0.0149	2.23
Momentum sorted portfolios6/6	0.020	2.313	0.033	4.204
Momentum sorted portfolios12/12	0.024	2.572	0.032	3.811
Liquidity sorted portfolios	0.029	3.856	0.017	2.049
Profitability sorted portfolios	0.022	2.46	0.015	2.197
Accruals sorted portfolios	0.019	2.533	0.023	2.542
Stock issues sorted portfolios	0.020	1.967	0.028	2.179
Stock repurchases sorted portfolios	0.028	2.749	0.017	1.600

Table 2. Empirical results based on one factor CAPM

Portfolio	a	b	t(a)	t(b)	Adj. R^2
Size sorted portfolios					
P1	0.044	1.017	5.139	10.054	0.358
P5	0.0007	0.989	0.443	47.717	0.927
Value(P/B) sorted portfolios					
P1	0.021	1.164	2.882	13.333	0.496
P5	0.005	0.961	2.090	29.92	0.833
Momentum sorted portfolios 6/6					
P1	0.010	1.125	1.820	17.253	0.623
P5	0.023	1.072	5.552	21.838	0.726
Momentum sorted portfolios 12/12					
P1	0.014	1.040	2.108	13.064	0.486
P5	0.021	1.125	4.733	21.275	0.716
Liquidity sorted portfolios					
P1	0.022	0.778	3.727	11.05	0.403
P5	0.006	1.220	1.574	27.184	0.804
Profitability sorted portfolios					
P1	0.011	1.166	2.078	17.810	0.638
P5	0.005	0.988	2.008	30.003	0.833
Accruals sorted portfolios					
P1	0.008	0.972	2.092	19.514	0.694
P5	0.010	1.194	2.222	22.371	0.749
Stock issues sorted portfolios					
P1	0.000	1.167	0.082	19.467	0.779
P5	0.004	1.346	0.641	15.466	0.690
Stock repurchases sorted portfolios					
P1	0.009	1.120	1.667	17.258	0.735
P2	-0.001	1.085	-0.161	12.895	0.607

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Table 3. Empirical Results for the three factor Fama French Model based on Market, Size and Value factors.

Portfolio	a	b	s	h	t(a)	t(b)	t(s)	t(h)	Adj.R^2
Size sorted portfolios									
P1	0.020	0.872	1.546	0.504	3.615	13.161	13.467	4.258	0.736
P5	0.000	0.979	0.031	0.072	-0.020	46.713	0.863	1.925	0.928
Value(P/B) sorted portfolios									
P1	0.000	0.961	1.169	1.155	-0.257	31.011	21.757	20.854	0.939
P5	0.002	0.988	0.385	-.403	1.253	38.783	8.739	-8.859	0.899
Momentum sorted portfolios6/6									
P1	0	1.058	0.641	0.273	-0.004	18.463	6.458	2.676	0.722
P5	0.015	1.047	0.591	-.064	4.199	24.317	7.926	-0.831	0.798
Momentum sorted portfolios 12/12									
P1	-.004	0.883	1.081	0.812	-1.263	20.258	14.321	10.427	0.852
P5	0.013	1.121	0.710	-.286	3.466	25.124	9.195	-3.590	0.806
Liquidity sorted portfolios									
P1	0.013	0.731	0.615	0.110	2.367	11.096	5.392	0.939	0.499
P5	-.001	1.184	0.551	0.050	-0.510	31.020	8.338	0.745	0.864
Profitability sorted portfolios									
P1	0.000	1.066	0.686	0.522	-0.120	20.983	7.794	5.759	0.791
P5	0.001	0.997	0.420	-.269	0.609	35.901	8.748	-5.433	0.886
Accruals sorted portfolios									
P1	0.000	0.927	0.487	0.130	0.170	21.022	6.414	1.648	0.769
P5	0.000	1.151	0.623	0.029	0.158	25.237	7.934	0.363	0.823
Stock issues sorted portfolios									
P1	-.004	1.139	0.241	0.023	-.792	18.787	2.025	0.169	0.789
P5	0	1.331	0.467	-.209	-0.113	15.153	2.707	-1.045	0.706
Stock repurchases sorted portfolios									
P1	0.008	1.143	0.330	-.374	1.433	17.445	2.563	-2.501	0.749
P2	-.004	1.080	0.298	-.165	-.572	12.444	1.747	-0.837	0.611

Table 4. Empirical results for the liquidity augmented Fama French model

Port.	a	b	s	h	l	t(a)	t(b)	t(s)	t(h)	t(l)	Adj.R^2
Size sorted portfolios											
P1	0.012	1.128	1.510	0.470	0.566	2.540	18.590	16.061	4.853	9.382	0.823
P5	0	0.976	0.031	0.072	-.005	0.028	41.500	0.870	1.928	-.252	0.928
Momentum sorted portfolios (6/6)											
P1	-.001	1.093	0.636	0.269	0.078	-.240	17.069	6.411	2.632	1.230	0.722
P5	0.014	1.086	0.586	-.069	0.085	3.803	22.663	7.895	-.903	1.794	0.801
Momentum sorted portfolios (12/12)											
P1	-.005	0.896	1.080	0.810	0.028	-1.349	18.321	14.258	10.378	0.580	0.851
P5	0.012	1.149	0.706	-.290	0.062	3.165	23.048	9.150	-3.640	1.265	0.807
Liquidity sorted portfolios											
P1	0.001	1.100	0.563	0.061	0.814	0.354	27.185	8.988	0.958	20.258	0.849
P5	0.001	1.100	0.563	0.061	-0.185	0.354	27.185	8.988	0.958	-4.609	0.878

Table 5. Empirical results for multifactor model involving market, size, value, liquidity and sector momentum factors.

Size sorted portfolio

Port.	a	b	s	h	l	w	t(a)	t(b)	t(s)	t(h)	t(l)	t(w)	Adj.R^2
P1	0.011	1.120	1.466	.467	.558	0.063	2.414	18.373	14.683	4.824	9.225	1.280	0.824
P5	0	0.981	0.053	0.074	-.002	-.032	0.183	41.642	1.391	1.984	-0.087	-1.664	0.929
Momentum sorted portfolio(6/6)													
P1	0	1.122	.783	.280	.104	-.215	0.147	18.253	7.778	2.878	1.708	-4.278	0.747
P5	0.014	1.089	0.602	-.067	0.088	-0.024	3.838	22.555	7.617	-0.884	1.843	-.617	0.800
Momentum sorted portfolio(12/12)													
P1	-.006	0.883	1.014	0.805	0.016	0.095	-1.585	18.197	12.759	10.448	0.346	2.405	0.855
P5	.012	1.143	0.675	-.292	.057	.046	3.050	22.804	8.222	-3.673	1.148	1.121	0.807