Chapter 2 – Review of literature

2.1 Leverage and the cross section of expected returns – Literature and Gaps

There has been unanimous agreement about the fact that operating risk (risk arising from the firm’s business operations, in other words called the firm specific or idiosyncratic risk) and financing risk (arising from the firm specific leverage used to finance business operations) mainly determine the equity risk. For any company, the capital structure decision is the most critical decision because it controls the financial strain on the company. Traditional capital structure theories argue that there exists an optimal debt/equity ratio since leverage affects the value of a firm. There is a plethora of evidence in the literature which corroborates the existence of a significant relationship between leverage and cross section of expected returns.

The concept of a significant relationship between the firm’s debt equity ratio and equity returns dates back to Modigliani and Miller (1958) who emphasized on the fact that value of a firm is independent of the capital structure. One important implication from this fact is that stock returns are significantly affected by leverage. The rationale behind this is that high debt market exposure amplifies the riskiness of the stock as a result of which investors demand a premium. In simple words, Modigliani and Miller (1958) suggested that the return on equity increases with the increase in the amount of debt in the capital structure which consequently became a major theory in corporate finance.

Following up on the earlier studies like Banz (1981), Basu (1977), Stoll and Whaley (1983) and Reinganum (1981), Bhandari (1988) emphasized on the inefficiency of market betas to explain the systematic risk exposure of the firm and suggested that debt equity ratio might fill this void in the earlier literature to explain the cross section of expected returns. The author explained that an increase in the debt equity ratio of a company increased the risk

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exposure of the equity shareholders and hence tested for the relationship between debt equity ratio and the cross section of expected returns. This variable (DER) in addition to the market betas (calculated for the BETA calculation period, 1942-45, which did not overlap the sample test period) were used as independent variables. Independent portfolio formation procedure was used and portfolio returns were calculated. To be more precise, all the stocks were first sorted on the basis of size (measured as logarithm of total equity) and segregated into three groups containing equal number of stocks. Stocks within each of these groups were again ranked on the basis of BETA and DER respectively thereby subdividing them further into three groups each. This resulted into 27 portfolios. The cross sectional regressions were run between monthly average returns of all these 27 portfolios with all the independent variables (explained above) for the period 1948 – 1979 and the average of the time series slopes were reported. The author used monthly data of stocks obtained from CRSP and COMPUTSTAT and used Debt to equity ratio as a proxy for measuring the risk associated with the financial leverage of the firm. The following cross sectional regression was run each month using all the stocks and portfolios separately to arrive at the beta estimates:

$$R_{it} = \alpha + \beta_1 (LTEQ)_{it} + \beta_2 (BETA)_{it} + \beta_3 (DER)_{it} + \epsilon_{it}$$

LTEQ is the natural logarithm of market capitalization of the firm, BETA is the market beta estimated from the Beta calculation period and DER represents the debt equity ratio of the firm. The means of the time series slopes were reported. The results indicated a significant positive relationship between debt equity ratio and the cross section of expected returns.

Fama and French (1992) tested for the significance of the CAPM during the sample period 1963-1990. The study considered all the non financial firms in the intersection of NYSE, AMEX and NASDAQ obtained from Center for Research in Security Prices and COMPUSTAT. Financial firms were excluded from the sample because high leverage has different implications for such firms. Firms were sorted on the basis of previous years’ fundamentals (like size, book to market equity, E/P, etc) and sequential sorting procedure was used to form 10 size portfolios which were again sorted on the basis of beta into 10 sub deciles. This resulted in 100 portfolios. They performed Fama Macbeth cross sectional regressions of monthly stock returns with size, market betas, book to market equity, leverage and E/P as explanatory variables. The pre ranking market betas used for the sorting of the stocks for portfolio formation were estimated using 24 to 60 months of stock returns 5 years prior to time t. The study concluded that the long established relationship between the market betas and the stock returns disappeared during the above sample period. The combination of
book to market and size described the cross section of average returns and absorbed the apparent roles of other variables like leverage and E/P. The effects of leverage, E/P and C/P were insignificant when used in conjunction with size and book to market equity.

**Shortcomings of the study:**

We posit that Fama and French (1992) deal with the market leverage and the book leverage, which do not clearly represent the risk pertaining to the capital structure decisions of the firm, in particular, financial leverage of the firm.

Supporting the above argument, Penman et al (2007) emphasize on the fact that the equity risk of the firm arises as a result of operating risk (due to business operations) and financing risk (due to the use of debt in the capital structure). Under constant operating risk, the stocks’ average returns are an increasing function of leverage (See Modigliani and Miller (1958)).

Hence there was a need to decompose the total risk associated with the B/M ratio of a firm into two components: the enterprise book to price (which has relevance to the firm specific operations and represents the operating risk of the firm), measured as the ratio of book value of operating assets to their market value and a leverage component (which is pertinent to the financing decisions and financial policy of the firm and thus represents the financing risk of the firm), measured as the ratio of market value of debt to market value of equity, which is a widely accepted measure of financial leverage. The objective of the study was to examine the relationship of each of these two components on expected stock returns and to examine the effectiveness of book to market equity measure (as suggested by Fama and French) in incorporating the effects of both these components of equity risk of the firm.

The sample included all non financial firms for the period 1962-2001. The data regarding the fundamentals of the firm were obtained from Compustat while stock returns were obtained from CRSP. Their study interestingly demonstrates that enterprise book to price ratio has a significant positive relationship with the expected stock returns while the “leverage” component of book to price ratio which corresponds to the financing risk, does not exhibit a significant relationship with the stock returns. Moreover the relationship between financial leverage and stock returns was negative. This result, according to the author indicates that given a certain level of operating risk of the firm, additional financing risk does not affect the expected stock return which goes against the basic principles of finance which say that as financing risk increase, returns are expected to rise. Penman et al (2007) does not supplement

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46 In this study leverage was explained by the market leverage which is the ratio of market value of debt to market value of equity.
any credible reasoning to explain the negative relationship between the leverage risk and expected stock returns. They attribute the negative relationship to possible errors in measurement of leverage on the balance sheet, mispricing of leverage by the market or due to the omission of important risk factors which bear a negative correlation with leverage.

Ferguson and Shockley (2003) believed that a three factor empirical model containing a relative leverage and relative distress factor as explanatory variables should outperform the traditional Fama and French three factor model in explaining stock returns. They argue that book to market equity is a noisy proxy for relative distress risk; moreover, the reason for the pricing of relative distress risk is not explicitly explained by Fama and French. The objective behind this study was to examine whether the sensitivities of returns to portfolios constructed on the basis of relative leverage and relative distress explained the cross section of expected returns. In other words, they tested whether there existed a commonality in stock returns sorted\(^47\) on the basis of leverage and financial distress (measure based on Altman’s Z\(^48\)) and whether this commonality subsumes the effect of size and book to market equity effects as indicated by Fama and French (1993). The 3 beta model containing the market factor, the leverage factor and the relative distress factor was tested using Fama Macbeth cross sectional regressions. The study concluded that “loadings on portfolios based on relative leverage and relative distress completely subsume the powers of the Fama and French (1993) returns to SMB and HML portfolios in explaining cross section of expected returns”.

Shortcomings of the study:

Though this paper attempted to portend leverage risk as directly related to the distress risk of the firm, it does not form sufficient basis for representing leverage risk as a systematic risk factor. The relationship between leverage risk and the underlying economic fundamentals governed by such risk has not been explained.

Muradoglu and Sivaprasad (2008) investigated the effect of firm’s leverage factor on stock returns and found that leverage had a significant positive relation with stock returns.

\(^{47}\) Stocks were sorted independently on the basis of financial leverage (D/E ratio) into three groups and on the basis of Altman’s Z into two groups. The portfolios formation procedure is similar to the one used in Fama and French (1993).

\(^{48}\) Refer Altman (1968). The author predicted financial distress of the firm using balance sheet ratios which was modeled as follows:

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Z = 1.2 \left( \frac{WC}{TA} \right) + 1.4 \left( \frac{RE}{TA} \right) + 3.3 \left( \frac{EBIT}{TA} \right) + 0.6 \left( \frac{ME}{BD} \right) + 1\left( \frac{S}{TA} \right)
\]

WC is the working capital, TA is total book assets, RE is the retained earnings, BD is book debt, EBIT is earnings before interest and taxes, S is total sales revenue and ME is the market capitalization.
The study used a sample of 792 companies listed on London Stock Exchange for the sample period 1980 to 2003; financial firms and companies for which data was missing were eliminated.

**Shortcomings of the study:**

The above study did not explain the economic rationale behind the leverage risk factor. The collinearity between the HML factor and the leverage risk factor was not tested. Also, the stocks listed on the London Stock Exchange do not provide the basis of a universal asset pricing model incorporating leverage as an additional systematic risk factor.

Ho, Strange and Piesse (2008) conducted a similar study for the Hong Kong market for a sample of 117 stocks during January 1980 to December 1998. The data for these stocks was obtained from Pacific Basin Capital Markets databases and financial firms were eliminated from the sample. The study used book leverage (Ln (A/BE)) and market leverage (Ln(A/ME)) to test for the differential impact of leverage during market uptimes and downtimes. The study concluded that market leverage (Assets/Market value of equity) exhibited a significant conditional relationship with the stock returns. To be more precise a significant positive relationship between market leverage and stock returns was seen during up markets while the effect dampens during down markets due to varying perception of investors about the riskiness of the variables. In short, the financial manager has to arrive at a tradeoff between excessively high leverage level (and hence a high risk premium to the shareholders) and the negative effects of leverage on the financial strength and solvency of the firm.\(^{49}\)

Furthermore, Bris and Koskinen (2002) substantiated that multinational export firms (especially firms with higher distress risk) operating in different economies are restrained to undertake profitable ventures abroad when they are exposed to high debt levels. With reference to the Asian Crisis as well as the European and Latin American crisis, the authors warrant that a profit maximizing export firm having their operations spanned up across world markets have the option to either undertake safe business ventures or risky avenues which can be financed by either equity or debt. They further explain that financing a new project with equity gives the finance manager an opportunity to invest in other profitable business ventures in case the concerned project does not yield satisfactory returns. However if debt

has been employed to finance the projects, it automatically enforces a constraint on managers (due to debt overhang) to undertake new operations in case the present undertaking does not yield positive NPV. Since investment in new risky ventures (which are expected to generate positive NPV) significantly contributes to the real income of the economy, it is in the interest of the government to promote these new investments. As a result the government motivates the managers to take advantage of new opportunities by letting the currency float (where domestic currency is pegged to the foreign one). In the event of a currency depreciation the profitability of these new avenues increases (when returns generated by the investment are denominated in a foreign currency while costs of the firm are denominated in the domestic currency which are rigid and sticky in nature) offering an incentive to the managers to finance their projects with debt instead of equity. However, if the government is under the contemplation that safer business strategies made a better contribution to the economy as a whole then it would not let the currency depreciate which significantly increases the distress risk exposure of the firm which has used debt to finance its risky investment projects. In such circumstances, the shareholders demand additional compensation for the high distress risk which the firm is exposed to due to over issuance of debt for undertaking risky investment projects. In a nutshell, higher the financial leverage of the firm, higher is the risk exposure of the firm and hence higher is the return on equity which explains the positive relationship between financial leverage and expected stock returns.

A recent mutual fund report elaborates that the regular interest payments on debt for those companies which fund their investments through debt, tend to erode the cash flow levels of the company by adding to the operating expenses of the firm. However a company with highly profitable growth opportunities and has a strong cash flow position would still earn a higher return on equity since they yield high profit margins. The report bets bottom dollar on the assumption that a period of economic recovery is characterized by a strong economic momentum which bolsters high earning business activities and leads to an outstanding performance of levered equity companies offering significant margins. The rationale behind this is that debt is available at a low cost for companies having promising growth prospects and such companies perform at the peak levels when debt is easily available without major hurdles. The economic recovery in 2003 provides strong evidence to this fact

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50 Source: “How leverage can increase a company’s return on equity”, Putnam Spectral Funds, extracted from: http://www.putnam.com/spectrum/return-on-equity.htm

51 However the risk substantially increases with the excessive use of debt since the firm is under a pressure to honor its debt obligations on a regular basis. Not only that during economic distress, the assumption that debt is available at a low cost may not hold true. The recent credit crisis of 2007 presents significant and plentiful
when the federal funds rate was approximately 1.25% which in turn stimulated the economic growth upwards from 1% to 7%. During this period it was noted that on an average, levered companies, including the high yield bonds and bank loans yielded exorbitant returns.\(^{52}\)

How well do the Fama French factors capture the distress risk arising due to overexposure of the firm to debt? Fama and French (1992) concluded that the combination of book to market and size described the cross section of average returns and absorbed the apparent roles of other variables like leverage and E/P. **However we posit that Fama and French (1992) deal with the market leverage and the book leverage, which do not clearly represent the risk pertaining to the capital structure decisions of the firm, in particular, financial leverage of the firm.** The debt market exposure of a firm is one of the major determinants of the distress risk of a firm and the Fama-French factors may not directly capture this distress risk. Especially in light of the financial crisis of 2007-2008, the firms became overleveraged which increased their vulnerability to the economic downturn. The traditional Fama-French factors may not be able to capture this additional risk.

Our argument is supported by Penman et al (2007) which decomposes the book to price ratio of a firm into two components: the enterprise book to price (which has relevance to the firm specific operations and represents the operating risk of the firm), measured as the ratio of book value of operating assets to their market value and a leverage component (which is pertinent to the financing decisions and financial policy of the firm and thus represents the financing risk of the firm), measured as the ratio of market value of debt to market value of equity, which is a widely accepted measure of financial leverage. Their study interestingly demonstrates that enterprise book to price ratio has a significant positive relationship with the expected stock returns while the “leverage” component of book to price ratio which represents the financing risk, exhibits a significant negative relationship with the expected stock returns. This is in complete contradiction with the risk premium story which emphasizes that higher the financial risk exposure of the firm, higher is the premium required which dictates a positive relationship between the leverage risk factor and the cross section of expected returns, and hence indicates the inefficiency of the common asset pricing models which includes market risk and the Fama French factors. Penman et al (2007) also note that the operating risk component and the financial risk component of the book to price ratio of a

\(^{52}\) Source: “How leverage can increase a company’s return on equity”, Putnam Spectral Funds, extracted from: http://www.putnam.com/spectrum/return-on-equity.htm
firm also have incremental explanatory power over and above the Fama French factors which indicate that the Fama French model and other book to price multifactor models present abstruse and incomprehensible evidence of the existence of a significant relationship between the financing risk and the cross section of expected returns. In other words, the Fama French factors do not advance a distinguished measure of the distress risk of the firm; hence a multifactor asset pricing model is incomplete without the introduction of the financing risk (leverage risk) factor representing default risk of the firm.

**Shortcomings of the study**

However, as indicated earlier in this section, Penman et al (2007) do not supplement any credible reasoning to explain the negative relationship between the leverage risk and expected stock returns. They attribute the negative relationship to possible errors in measurement of leverage on the balance sheet or due to the omission of important risk factors which bear a negative correlation with leverage. On similar lines, another study by Johnson (2004) witnesses a negative relationship between leverage and cross section of expected returns after controlling for firm specific characteristics like volatility. However, note that the relationship between leverage and stock returns in the extant literature is based upon firm-specific leverage. Apart from this, prior studies also do not extend commensurate explanation for leverage as a source of systematic risk having direct macro economic implications from a wider perspective. Further, Arditti (1967) found a significant negative relationship between the shareholder’s required rate of return and the leverage level (measured in terms of debt equity ratio). The paper did not extend any reasonable explanation explaining the negative relationship. However, Modigliani and Miller (1958) did not imply that the leverage risk as a separate risk factor which added to the systematic risk exposure of the firms. Subsequently, Hamada (1969) and Conine (1980) hypothesized that given that CAPM holds, if the financial leverage added to the systematic risk of the firm, it should augment the market betas of the firm in an arbitrage mechanism. However, we argue that financial leverage has different implications on the macro economy and need not necessarily relate to the market betas. Hence analysing the impact of financial leverage as a systematic risk factor on the basis of the market betas of the firm is imprudent.

Following up on the previous discussion, given the fact that the hard hit firms in recent financial crisis were majorly over exposed to debt (which indicates that greater debt exposure increases the riskiness of those firms and demands greater equity premium), what
could be a possible explanation for a significant negative relationship between financial leverage and stock returns? Contemporary studies like Lang et al. (1996), Jung et al. (1996), Rajan and Zingales (1995), Baker and Wurgler (2002) and many others have attested the existence of a significant negative relationship between market to book ratio (which measures the future growth prospects of the firm) and leverage ratio. This indicates that firms with higher growth prospects tend to borrow less. Assuming that the market to book ratio of a firm is a reliable indicator of a firm’s growth opportunities, Chen and Zhao (2006) present a different perspective on this hypothesis. They contemplate that a firm with high market to book ratio with high growth opportunities is believed to have performed well in the past with high profitability. As a result the cost of borrowing from the financial institutions for these firms is lower which encourages them to finance their operations with more debt in their capital structure. However as the market to book ratios of such firms increase further from medium levels to higher levels, the extent of debt financing diminishes since the cost of borrowing for firms with lower market to book ratios shoots up. The results as shown in Chen and Zhao (2006) give prominence to a definite pattern in terms of debt financing and equity financing. Precisely, the evidences in the paper indicate a rising trend in equity and debt financing as the market to book ratio of the firm proliferates from low to medium levels. However a further increase in the market to book ratio reverses the trend and equity financing dominates over debt financing since the cost of debt financing is mounted up significantly. The authors economically interpret that firms with low and medium market to book ratios are devoid of sufficient retained earnings to finance their investment projects; hence they prefer issuance of debt which is relatively cheaper. Following the trade off theory version, the authors extrapolate that having lower debt levels in the capital structure is of primary concern to firms with high market to book ratios (since they have sufficient retained earnings to finance their investment projects). On the other hand, firms with lower market to book ratios are believed to have poor growth prospects and hence prefer borrowing from the external markets (since cost of debt is lower than the cost of equity) as compared to issuance of equity. Thus the relationship between market to book ratio and the financing leverage is non monotonic in nature. Extending this argument further, one can also predict a non monotonic relationship between financial leverage and stock returns, since stock return are highly governed by the market to book ratios (as indicated by the Fama French 3 factor model) and future growth prospects of the firm. To be more elaborate, one could expect a positive

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54 This is consistent with the pecking order theory (Myers and Majluf, 1984) of capital structure.
relationship between stock returns and financial leverage for weak firms with poor investment opportunities (since debt increases the risk exposure of such firms and investors demand a premium to compensate for the additional risk undertaken) and a negative relationship between financial leverage and stock returns for strong firms (having higher growth opportunities and sufficient retained earnings to fund their investment projects as a result of which shareholders do not require additional compensation).

We can also advance another palatable explanation to support a negative effect of leverage on return on equity from a corporate governance perspective. Jensen and Meckling (1976) suggest that increased debt levels have direct implications on the cash flow of the company by enforcing regular interest payments on debt which controls managerial expropriation. Fama and Jensen (1983) explain that increased debt levels adds to the default risk of the firm and affects the manager’s reputations adversely in case the firm defaults on its interest payments or debt liabilities. Default on corporate debt may also lead to the event of the winding up of the firm which would throw the manager out of employment. This imposes a constraint on manager expropriation and leads to better corporate disclosures.

Adding to this, Jensen (1986) suggests, leverage increasing transactions such as LBOs, new debt issues (bonds), and stock repurchase reduce the manager’s access to free cash, thus reducing their waste. Jensen (1986) further suggests that debt reduces agency cost. Easterbrook (1984) provides concrete explanation about the relationship between the debt equity ratio and the agency costs of a firm. They explain that managers tend to address agency problems by choosing on an appropriate dividend policy and trying to finance their projects majorly on retained earnings thereby increasing the value of the firm and hence maximise shareholder wealth. Continuing dividends provide valuable information about the company to the shareholders and increase the credibility of the firm. However continuing, as quoted by the author, coerces the firm to consistently tap the external markets to finance their operations. This provides better information to the investors because the firm’s affairs would be consistently scrutinized by the investment bankers and other agencies contributing capital which allows greater transparency about the firm’s profitability and risk exposure. This offers an opportunity for both the debt holders and the shareholders to examine the company affairs and attain adequate information about the company’s future prospects before investing. This implies that as leveraging increases, external monitoring increases, and managerial efficiency is expected to rise. Furthermore, this may be interpreted as suggesting that as firms become efficient, shareholders demand less risk premium, and as a result, return on equity may actually decline.
A seminal paper by Harris and Raviv (1990) highlights the informational advantages of the firm’s capital structure. The paper justifies the role of debt in establishing a disciplinary environment for the managers who are reluctant to disclose important information to the investors especially in the event of liquidation. The authors explain that the decision of the shareholders regarding the operations of the firm (or liquidation of the firm) and the capital structure policies of the firm is instigated by the ability of the firm to pay off its debt obligations on time. Hence the fact follows that a firm with a lower probability of default on its contractual obligations (given an optimal debt level) generates a better value having bright future prospects and commensurate cash reserves. Further evidence was given by Lang et. al (1995) who exhibited the existence of a negative relationship between financial leverage and future growth of a firm. The authors emphasize that the negative relationship between leverage and growth of a firm is more apparently seen in firms with a low Tobin’s – q ratio since these firms are characterised by negligible growth opportunities not recognised by the capital markets. The study further rationalises that managers of firms with considerably lucrative growth opportunities generally do not opt for a high leverage because high interest payments on debt tend to erode the profitability of the firm which prevents the firm to utilise the benefits of these growth opportunities. Hence, a negative relationship between leverage and growth seems rational and thus the negative relationship between leverage and stock returns.

Considering the other side of the coin, Faccio et. al (2001) suggest that the leverage levels may have contrasting implications on corporate governance and may actually increase the risk exposure of the firm depending on the structure of ownership and control. However, in an environment where the financial markets are efficient and dominated by informed traders and informed external suppliers of finance like banks and financial

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55 According to the paper, managers choose leverage on the basis of the private information which is available to them about the future growth prospects and hence, the financial health of the firm.
56 Moving further on the basis of this discussion, one can conjecture that a firm with low leverage (having low Tobin’s – q and insignificant growth opportunities) are more hit during distress periods as compared to firms with higher leverage ratios (with major growth prospects and positive NPV projects). This also explains a negative relationship between credit spread and firm’s leverage, which will be documented in the subsequent sections of this study.
57 Faccio et al (2001) observe that in many countries in Europe and Asia have major concentrations of corporations with a controlling block of shares held by a single shareholder which could also supply top managers. This protects the managers from the risk of their reputation being at stake when the firm defaults on its liabilities and may increase agency costs especially if the manager himself is a controlling shareholder. As the controlling shareholder has more resources at his disposal he can assume more liabilities and increase the default risk of the company leaving behind a bunch of disappointed creditors with uncollectible bad debts and endangering the financial system as a whole.
regulatory bodies, the leverage decisions cannot be fully governed by the controlling shareholders. Majority of the developed nations in the western economies and the European nations have effective capital market institutions. Faccio et al (2001) posited that these capital market institutions conjecture that excessive and unrestrictive supply of debt to such corporations will trigger expropriation of minority shareholders and hence exert greater external monitoring of the firm’s operations and regulate the flow of debt into these firms thereby reducing agency costs.

2.2 Liquidity risk and the cross section of expected returns

2.2.1 Liquidity as an additional risk factor

It has been widely established that investment decisions are highly governed by parameters like immediacy of trading (liquidity), the transaction costs and the marketability of assets. Kim, Mauer and Sherman (1998) theoretically and empirically investigate the firm’s decision to invest in liquid assets. The authors explain that firms need to perform a detailed cost benefit analysis of holding liquid assets. This is because the opportunity cost of holding less liquid but more productive assets might be high. Apart from this, there might be other constraints like higher transaction costs and agency problems and hence indirectly affect the stock returns.

The existence of market frictions like transaction costs, circuit breakers, short sale restrictions and the actions of regulatory bodies have restricted the ability of investors to obtain liquidity in the market without affecting the price. Hence the relationship between liquidity and the stock returns has attracted the attention of academicians as well as the individual investors, regulatory bodies and other traders in the market. Especially during the crisis, when liquidity dries up and disappears, it has a phenomenal impact on the stock returns.

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59 See studies like Huberman (1984) and Ang (1991). Myers and Rajan (1998) quote that inspite of the ease with which firms can raise cash on a short notice due to liquid assets, excess liquidity can hold management from committing to profitable investment projects. According to the authors, excess liquid assets enhances the value of the creditor’s claims and hence leads to underinvestment problems.
Amihud and Mendelson (1986) conducted an empirical study to examine the relationship between expected return and illiquidity. They believed that illiquidity assumed major relevance in the securities industry where portfolio managers construct portfolios in accordance with the time horizons and liquidity objectives of the investors. They hypothesized that expected returns are an increasing and concave function of the bid-ask spread. To test this hypothesis the monthly returns of stocks obtained from CRSP and their relative bid-ask spreads for the stocks listed on NYSE were used for a sample period during 1961-80. The relative bid-ask spread was calculated as the ratio of the dollar spread and the average of bid and the ask prices at the year end. Stocks were sorted on the basis of relative spread into 7 groups, each of which were further subdivided into 7 sub groups resulting in 49 portfolios. The dependent variable in the model contained the portfolio returns while the explanatory variables included market betas, size and spread. The results indicated that risk adjusted returns in an increasing function of the spread. The slope coefficients of the spread were positive and generally decreasing as they progressed towards higher spread groups. Another important result brought forward in this study is the existence of clientele effect, i.e. the stocks with higher spreads are generally held by investors with longer time horizons which results in lower sensitivities of returns on high spread stocks to relative spread leading to a concave return – liquidity relationship. As concluded in the paper, higher spread stocks indicate lower liquidity and hence investors demand higher yield on these stocks. This would encourage the companies to strengthen their liquidity position and design financial policies which boost the liquidity levels of the firm, which in turn drives the value of the firm.

Eleswarapu and Reinganum (1993) extended the hypothesis of Amihud and Mendelson (1986) and tested for the existence of seasonality of the liquidity premium in asset pricing. The study investigated the empirical relationship between average stock returns and bid-ask spread during January and non January months over the period 1961-1990 using monthly returns on NYSE firms obtained from CRSP. Cross sectional regressions were fit for each month with the portfolio returns regressed against market betas, spread and market capitalization of the portfolios with special emphasis on January and non January months. The time series means of the coefficients with the corresponding standard errors indicate that the return premium due to the bid-ask spread as demonstrated by Amihud and Mendelson

60 The results showed that coefficient of the dummy variables which indicated different spread groups were negative and significant. These coefficients indicated the difference in the premiums associated with the highest spread group to a particular spread group. This indicates that risk adjusted returns increase with the increase in spread.
(1986) is generally a seasonal phenomenon since it is significant and positive only in the months of January.

Amihud and Mendelson (2002) examined the relationship between return and illiquidity using Amihud’s measure of illiquidity which was calculated as the daily ratio of absolute stock return to its dollar volume traded. This measure of illiquidity was better as compared to other liquidity measures like bid ask spread or the probability of informed trading because such measures required the availability of transaction by transaction microstructure data which was not available for longer time periods and for all the stock markets. Amihud’s measure of illiquidity can be interpreted as the price impact generated by one dollar volume of shares traded, in other words it indicates the direction in which the market is moving. In short illiquidity for a stock \( i \) for any year for \( D_t \), number of days is calculated as

\[
Illiq_i = \frac{1}{D_t} \sum_{t=1}^{D_t} |R_{it}| / \text{Dollar volume traded for stock } i \text{ during day } d
\]

To test for the significance of liquidity to explain stock returns, the study considered data for stocks traded on the NYSE extracted from daily and monthly databases of CRSP for the years 1963-1997. Cross sectional regressions were estimated for each month in the year \( y \), for a sample period of 1963-1997 i.e. for 408 months. Monthly stock returns were taken as the dependent variable while the explanatory variables included the stock illiquidity variable (as explained above) and stock characteristics (for the previous year \( t-1 \)) like market betas, size (measured as the logarithm of the market capitalization of the firm), standard deviation of the daily stock returns for each year, dividend yield (annual cash dividend divided by price at the end of the year), stock returns over the past 100 days and stock returns calculated for the period between the beginning of the year and 100 days before the year ends. The stock illiquidity variable used in the cross sectional regression was mean adjusted by dividing the individual stocks’ illiquidity by the average market illiquidity. The average market illiquidity variable was calculated by taking an average of the individual stocks’ liquidity as follows:

\[
Alliq = \frac{1}{N} \sum_{i=1}^{N} Illiq_i : N \text{ indicates the number of stocks and } i \text{ indicates the } i^{th} \text{ stock.}
\]

The model did not include book to market equity as used by Fama and French (1992) since the sample included only those stocks from NYSE for which the book to market equity was insignificant in explaining stock returns. Also, the authors believed (See Berk (1995)) that the relationship between stock returns and market value of equity played a major role in
explaining the significant relationship between expected stock returns and book to market equity. In short, the following cross sectional regression model was run for each month using all the stocks:

\[ R_i = k_o + \sum_{t=1}^{T} k_t X_t + U_t \]  

(3)

In the above equation \( R \) indicates the stock returns for stock \( i \) in each month for the year \( t \), \( X \) indicates the stock characteristic (which includes the stock illiquidity variable and other variables as mentioned in the previous paragraph of stock \( i \) for the year \( t \) and \( U \) indicates the residuals of the regression model. The results (the mean of the coefficients estimated from the above cross sectional regressions each month) emphasized that the coefficients of the stock illiquidity variable remained positive and significant for the entire period.

Brennan and Subrahmanyam (1996) question this relationship by emphasizing that quoted bid ask spread as used in all the earlier studies is a noisy measure of illiquidity since most of the large trades take place outside the spread while majority of the small trades happen within the quoted spread.\(^{61}\) On the basis of studies like Glosten (1989), Kyle (1985), Easley and O’Hara (1987) and Glosten and Harris (1988) the paper quotes that liquidity costs arising due to asymmetric information among the investors is expected to be reflected in the price impact of a trade or the variable component of trading costs. Hence the study uses transactions data to estimate both the variable and the fixed costs of transacting\(^{62}\). The authors demonstrated the existence of a premium associated with the fixed and the variable components of trading costs. More specifically, the paper concludes that the variable costs of transacting have a significant positive and concave relationship with the illiquidity premium, while the relationship is increasing and convex in the case of fixed component of transacting. These results question the concave liquidity – return relationship as postulated by Amihud and Mendelson (1986).

As contemplated by Amihud and Mendelson (1986) investors with longer time horizons do not demand a larger premium for illiquidity and tend to hold relatively illiquid stocks giving rise to a clientele effect associated with time horizons. Adding to this hypothesis, Brennan and Subrahmanyam rationalize that there exists another clientele effect

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\(^{62}\) The study uses Glosten – Harris model to estimate the market depth parameter (similar to the Kyle’s \( \lambda \)) and the fixed cost parameter (\( \psi \)). These estimates were subsequently used to arrive at different measures of variable and fixed costs of transacting which were introduced in the model representing different measures of illiquidity. The fixed and the variable costs of each of the portfolios sorted on the basis of size and \( \lambda \) were calculated and introduced as an explanatory variable along with the Fama French factors to test the empirical relationship between illiquidity and stock returns.
related to the trade sizes in addition to time horizons. This explains the relative comparative advantage enjoyed by an investor trading small orders over large traders trading in stocks having high variable costs of transacting (as measured by \( \lambda/P \)). Thus it is expected that investors having longer horizons and trading in small sizes generally hold stocks with high values of \( \lambda/P \) while investors only with long time horizons (irrespective of the trade sizes) generally hold stocks with high fixed proportional component of trading costs. As a result the concavity in the relationship between stock returns and the trading costs is expected to be greater for the variable component than the fixed component because the variable component of trading costs admits two clientele effects (related to trade size and horizon) while the fixed component admits only one clientele effect (relative to time horizon).

**Shortcomings of the paper:**

The paper clearly establishes a direct link between the liquidity levels of the firm and the cross section of expected returns. Investor demand compensation for the higher costs associated with trading. However, liquidity is time varying in nature and we believe that the risk associated with liquidity spans over several years, which has to be considered for designing portfolio strategies.

2.2.2 Liquidity levels and liquidity risk – a distinction

Merton Miller (1991) quotes, “Liquidity, according to Keynes, offers a classic example of the fallacy of composition: what is true for a part is not necessarily true for a whole. The ability to reverse positions and get out quickly vanishes when everyone tries to do it at once.”

It is important to note that liquidity of individual assets has different economic implications from the market wide liquidity. While both these variables are driven by the demand and supply conditions in the market, firm specific characteristics play a predominant role in characterizing liquidity of the individual assets (in other words, firm specific liquidity) while the factors like macroeconomic conditions relate to the economy wide market liquidity. To be more specific, firm specific factors like size and profitability of the firm may influence the demand and supply conditions of the firm’s individual assets. On the other hand market wide macroeconomic factors like legal and political issues, monetary and fiscal policies of the government, similar trading styles of institutional investors and mutual funds,

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program trading of simultaneous large orders, introduction of a revolutionary new technology which might affect the performance and profitability of a large number of firms operating in particular industry, etc play a major role in ascertaining the commonality in liquidity and hence the market wide liquidity. In simple words, liquidity levels of individual stocks refer to the static component of liquidity which affects stock returns and acts as a source of risk. On the other hand the commonality in liquidity which causes the market wide liquidity risk constitutes the dynamic component which acts as a source of systematic risk for the stocks and cannot be diversified. While most of the studies discussed above have focused on the liquidity of individual securities, they do not truly comprehend the relationship between liquidity as a market wide systematic risk factor and the expected stock returns. Popular liquidity measures like the share turnover ratio and the bid ask spread more closely represent the firm specific characteristic rather than the systematic risk component associated with liquidity which appears to be common across all the stocks.

Several studies have tried to conjecture the empirical relationship between stock returns and independent variables like beta risk, size, residual risk and publicly availability of information (bid ask spread) in the market. For example, Banz (1981) found a significant negative relationship between stock returns and size. Amihud and Mendelson (1986) advocated a “clientele effect” which explained the increasing concave relationship between stock returns and bid ask spread. Merton (1987) supported the relationship between asset pricing and idiosyncratic risk (non diversifiable risk) of the firm. Parallel to these studies, there is another strand of literature which articulates the relationship between bid ask spread and publicly available information in the market. In a nutshell, higher the information asymmetry in the market, lower is the amount of publicly available information about the firm available with the investors. This has a direct implication on the residual risk of the firm, i.e. the risk which is specific to the firm and cannot be diversified. In such cases, an increase in the publicly available information reduces the level of arbitrage and private information in the market, which in turn reduces the residual risk of the firm. This suggests the increase in the availability of public information in the market, higher is the trading volume and hence lower the bid ask spread (because investors do not demand a premium for the risk associated with information asymmetry). This clearly draws a distinction between the liquidity levels of individual stocks per se and the market wide liquidity which will be explained in the subsequent sections. In short, one can observe a direct correlation between the residual risk of

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65 See Chordia, Roll and Subrahmanyam (2000)
the firm and publicly available information in the market, in other words, a direct relationship between the residual risk and the risk associated with information asymmetry which is reflected in the bid ask spread (e Garbade(1982), Demsetz (1968), Bagehot (1971), Copeland and Galai (1983), Glosten and Milgrom (1985), Benston and Hagerman (1974)). The inter correlation between each of the above variables (size, residual risk, bid ask spread and market betas) suggested that an exploration considering the joint effect of each of these variables on the cross section of expected returns would be appreciated.

On the basis of the above discussion, Amihud and Mendelson (1989) jointly estimated the role of beta risk, size, residual risk and public availability of information on the cross section of expected returns. The paper indicated that expected stock returns are an increasing function of market betas and bid ask spread but reported lack of significant relationship with residual risk and firm size. The insignificant relationship between expected returns and variables like residual risk and size (given market betas and bid ask spread) hints that bid ask spread tends to absorb the effects of these two variables and hence assumes a dominant role in the model (which is also indicative of a high correlation between bid ask spread and these two variables, i.e. size and residual risk). These results try to distinguish between the liquidity risk associated with the inventory levels in the market and information asymmetry. The former has direct implications on the market wide liquidity contributing to the liquidity risk in the economy (which cannot be diversified) while the latter is more closely associated with the liquidity levels of individual security (which is reflected in the number of trades of individual investors or the bid ask spread and can be diversified) contributing to the idiosyncratic risk of the firm.

2.2.3 Time varying liquidity and commonality in liquidity – leading to liquidity risk

Chordia, Roll and Subrahmanyam (2000) shifted their emphasis from liquidity of individual assets to market wide liquidity caused by the commonality in some portion of individual transaction costs which covary with time. The objective of the study was to test for the existence of commonality in the individual transaction costs over a period of time. The authors hypothesize that some part of firm specific liquidity is highly influenced by the shocks in market wide liquidity and hence provide evidence for the existence of a common component in firm level liquidity which is pervasive across the market as a whole. The authors advanced several plausible reasons for the existence of such commonality. Firstly, co movements in the optimum inventory levels of the dealers could be induced due to the
variation in the trading volume which in turn causes the bid ask spreads, quoted depth etc to covary over a period of time. Change in external factors like market interest rates can also cause covariation in the inventory carrying costs of the dealers. The study used transactions data of 1169 stocks listed on NYSE obtained from Institute for the Study of Securities Markets (ISSM) for 254 days of the calendar year 1992. The following five different liquidity measures were used in the study:

i. Quoted Spread = $P_A - P_B$; ii. Proportional Quoted Spread = $(P_A - P_B)/P_M$

iii. Depth = $0.5 (Q_A + Q_B)$; iv. Effective spread = $2 |(P_t - P_M)|$

v. Proportional Effective spread = $2 |(P_t - P_M)|/P_t$

where $P$ is the price, $A$ = ask, $B$ = Bid, $M$=midpoint of bid and ask, $Q$=quantity available for trade. The study presented the existence of commonality in liquidity and suggested evidence to explain the sources of this commonality based on the transactions data obtained for NYSE stocks extracted from Institute for the Study of Securities Markets (ISSM) during the year 1992. The following time series regression for each stock specific change in liquidity regressed against market wide aggregate liquidity (measures of liquidity have been discussed above) was estimated:

$$DL_{j,t} = \alpha_j + \beta_j DL_{M,t} + \epsilon_{j,t}$$

The dependent variable $DL_{j,t}$ is the percentage change in the liquidity (as measured by 5 different measures discussed above\(^{66}\)) of individual stock $j$ from trading day $t-1$ to t. $DL_{M,t}$ refers to the cross sectional average of the individual liquidity measures of all the stocks in the market excluding the stocks which forms part of the dependent variable. The reason behind using percentage changes is to take care of the econometric problems arising due to non stationarity of data. The Cross sectional averages of the time series slope coefficients (using all the five measures of liquidity) were positive and significant which indicated that liquidity exhibited commonality.

This explains that some part of firm specific liquidity is highly influenced by the shocks in market wide liquidity and hence provides evidence for the existence of a common component in firm level liquidity which is pervasive across the market as a whole. The study also established that the commonality is significant even after controlling for factors like

\(^{66}\) All the five measures of liquidity were used for the purpose of analysis.
price, volume and volatility. The commonality was more conspicuous in case of larger stocks than small stocks. This could be due to the investment activities of institutional investors (resulting in institutional herd trading) or the greater inventory adjustments (and hence more frequent revising of bid ask spreads) made by the specialists for large stocks as compared to small stocks. They further explained that the commonality in liquidity advanced important implications for the risks explained by inventory models and the asymmetric information model. Elaborating on this, the authors find that individual trading frequency on a particular stock had a strong positive relationship with the quoted spread and other spread measures while the market wide trading volume exhibited a significant negative relationship with the quoted spread. This explains that as the individual trading frequency on a stock increases, the dominance of informed traders increases thereby increasing the risk due to information asymmetry. On the other hand as the market wide trading volume increases, uninformed traders, especially institutional traders tend to dominate the market as a result of which excess inventory in the market balances the risk per trade and hence lowers the bid ask spread.  

Critique of the study:

The study did not focus on the macro economic factors which could influence the commonality in liquidity which would provide a strong foothold to ascertain that commonality in liquidity is indeed a systemic risk factor associated with the macro economy as a whole. The study also didn’t draw major implications of commonality in liquidity on asset pricing.

Huberman and Halka (2001) examined the time series properties of spread and depth (which are two different dimensions of liquidity) and portrayed liquidity as a systematic risk factor which is correlated across securities in the form of market wide liquidity risk. The paper quotes that previous models which explain the relationship between the bid ask spread is the difference between the bid and the ask prices. Depth refers to the ability to trade a specific number of units at a given cost. In other words it can be calculated as the total number of units offered at the ask price plus the total number of units bid at the bid price.  

67 This argument is consistent with Jones et. al (1994) and Barclay and Warner (1993). These studies rationalize that informed traders tend to split up their orders while trading with an attempt to conceal their trading activities from the market and are observed to be active mostly in medium sized trades. Hence the number of trades has greater significance over dollar trading volume in indicating the risks associated with information asymmetry in the market. Jones et al(1994) presented that volume does not significantly impact volatility after controlling for trading frequency. Hence one can rationalize that informed traders are more closely associated with the number of transactions while uninformed traders such as uninformed institutional investors trading in large quantities have greater control over the dollar volume.

68 See for example, the asymmetric information model and the inventory model. The asymmetric information model emphasizes on the fact that market makers require compensation for trading with informed traders and hence adjust the bid and ask prices accordingly. According to the inventory model, market markers are
spread and the stock prices do not explain the impact of time varying nature of liquidity on stocks. In other words, they do not talk about the sensitivities of stocks to such variations in liquidity which has a market wide and economy wide impact although there are some evidences which demonstrate the time varying property of liquidity. The study employed four different measures of liquidity: spread, spread/price ratio, quantity depth measured by the number of shares traded and dollar depth measured by the volume traded in terms of dollars across a 240 stock sample divided into two mutually exclusive subsets. The autoregressive structure of the series of daily averages of each of these liquidity proxies was estimated to derive a series of innovations for each of these liquidity proxies after controlling for variables which are known to be associated with liquidity (For e.g. interest rates, trading volume and volatility). A positive correlation was found between the innovations of time series of each of these liquidity proxies which strongly indicates the presence of commonality in liquidity which significantly impacts all the stocks simultaneously. The study further rationalizes that this commonality in liquidity could be a systemic risk factor which is influenced by macroeconomic variables like term spread, credit spread and volatility in the yields on one year Treasury Notes.

Hasbrouck and Seppi (2001) used principal component and canonical correlation analysis and confirmed the presence of commonality in returns and order flows. Furthermore, they concluded that commonality in order flows accounted for approximately two-thirds of the commonality in returns. The sample for the study consisted of 30 Dow stocks, the data for which were extracted from the NYSE’s TAQ database for 252 days in the year 1994. In addition, the study demonstrated a distinction between variables which represent information about economic fundamentals and on the other hand those which represent non informational demands for liquidity. In other words, the model presented in the paper is as follows:

\[ x_t = \theta F_t + \varepsilon_t \]

Where \( x_t \) represents order flows arriving at time \( t \), \( F_t \) represents common factors affecting order flows while \( \varepsilon_t \) represents idiosyncratic disturbances which affects order flows which mainly arise due to information asymmetry. The paper explained that dynamic hedging strategies, tax and calendar related effects and na"ive momentum trading impacts correlated liquidity trading.

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Constrained by the level of inventory they possess and hence move the bid and ask prices to adjust their predetermined levels of inventory. Also market makers are willing to trade only limited quantities with the objective of protecting themselves against the losses of trading with informed traders who are willing to trade in bulk at the dealer’s price.
Brockman and Chung (2002) studied the nature of systematic liquidity in an order driven market structure devoid of specialists and market makers, like the Stock Exchange of Hong Kong and derive that the commonality in liquidity is pervasive across size sorted portfolios. The authors analyse more than 250 million intraday observations of around 725 SEHK listed firms over a sample period from 1996 to 1999. Similar to the approach followed by Chordia, Roll and Subrahmanyam (2000) they regress firm specific liquidity measures against market wide aggregates. The results strongly suggested the evidence of commonality though the impact was less as compared to the quote driven environment.

Fabre and Frino (2004) further confirm the existence of commonality in liquidity for a broad sample of stocks listed on the Australian Stock Exchange. Contrary to the quote driven market like NYSE the authors argue that the Australian Stock Exchange is an electronic order driven market and does not face the risk of correlated specialist inventory costs. Consistent with the methodology used by Chordia et al. (2000) the authors regress the firm specific changes in various measures of liquidity against their market wide aggregates and observe that only the largest size quintile of stocks revealed significant sensitivities to market wide aggregates while the effect was weak in case of small stocks. This is contrary to the results presented by Chordia et al. (2000) wherein they reported significant commonality in liquidity across all size quintiles with varying degrees of sensitivity from large size quintiles to smaller stocks in the descending order.

On similar lines, Pukthuanthong-Le and Visaltanachoti (2009) conducted the study for an emerging market like the Stock Exchange of Thailand and documented the existence

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70 The study highlights that lot of attention has been given to quote driven markets like the NYSE, but little emphasis has been extended towards studying the order driven markets and the liquidity constraints in such market structures. In such markets, there is no obligation on the part of the market makers to supply liquidity to the market. The trades in such markets are executed after matching of orders through an electronically operated automatic order matching and execution system. The authors stress upon that fact that unlike quote driven markets, order driven markets have no barriers of entry (via monopolistic market makers and specialists) and exit (via affirmative obligations and regulatory constraints like price change limits, trading halts, mandatory quotation periods, etc.). This enables the market makers to easily move out of the market and withdraw their positions during a liquidity crisis thereby augmenting the commonality of liquidity across stocks. On the other hand, low barriers to entry might also increase the competition among multiple liquidity traders (providers) and cause them to actively trade in the market for a higher compensation in the form of wider bid ask spreads. This in turn, would cause the commonality in liquidity to be less pervasive across such markets.

71 See Affeleck-Graves et al. (1994) for further evidences.

72 The authors quote that liquidity is more critical for an emerging market than developed markets (see Bekaert et al. (2006)) since they show greater sensitivities to changes in liquidity. In this context, Stock Exchange of Thailand seemed to be a good platform for analyzing the existence of commonality of liquidity in the emerging
of market wide commonality in liquidity which was significant across several measures of liquidity. Consistent with Chordia et al. (2000) the study also documents that commonality in liquidity is significant across all size groups of stocks and more prominently seen across large sized stocks as compared to small stocks. Lee et al. (2006) conduct a similar study and document the existence of commonality in the Taiwan OTC stock market.

Coughenour and Saad (2004) explain the role of market makers in causing common liquidity variations in the context of the NYSE. The study quotes that the previous studies accounting for the commonality of liquidity do not explain the economic sources underlying this phenomenon. They argue that the covariation in the degree of liquidity is dependent on the capital constraints of the common specialists operating within each firm; in other words, the cost of capital of the firm. To be more precise, the authors quote that the NYSE specialists operating within each firm, share common information and capital resources leading to common liquidity adjustments in the market causing common variations in liquidity. Also, the study conjectures that the commonality in liquidity could be induced by demand generated factors or the supply generated factors. For example, macroeconomic fundamentals like interest rates, monetary and fiscal policies of the government could induce changes in the investment behavior and lead to systematic covariation in the demand for liquidity. At the same time, such macroeconomic fluctuations could also impact the risk exposure of the firm and hence affect the cost of capital of supplying liquidity for the specialists operating within each firm; this induces supply generated commonality in liquidity.

**Critique and shortcomings:**

The above studies did not empirically examine this interaction between the macroeconomic fundamentals and the supply or demand generated commonality in liquidity. The study further elaborates that the commonality in liquidity also depends on the extent of the specialist firm portfolio diversification. A specialist firm with a well diversified portfolio enjoys a lower cost of capital as a result of which they do not transmit the negative profit shock in one stock to the other stocks thereby reducing the variation in liquidity. On the other hand a specialist with major capital constraints and poorly diversified portfolio is subject to a higher cost of capital; as a result a loss on one stock immediately causes price and inventory adjustment of all the stocks leading to a high co variation in liquidity.

markets. Moreover, SET is an order driven market and exhibited different market mechanisms from the quote driven market like NYSE.
2.2.4 Role of Liquidity risk in explaining expected returns – A critical Review

While several scholars, as indicated in the earlier section have tried to conjecture the true empirical relationship between liquidity risk and the cross section of expected returns, there have been remarkable differences in the measures of liquidity which these scholars have used. In common parlance, liquidity is nothing but the ability to trade shares immediately and at low cost. However, though easy to define, liquidity is an unobservable variable difficult to measure. Prior studies have used different measures of liquidity which can be categorized as trade based and order based measures\textsuperscript{73}. Trade based measures basically include turnover ratio, trading volume, frequency of trading (in terms of number of transactions) and total value of the securities traded. However these trade based measures do not capture the cost of trading. On the other hand bid-ask spread is an order based measure which incorporates the cost incurred by an investor in trading immediately. However, bid ask spread does not segregate between the risk associated with the inventory level in the market and the risk associated with information asymmetry, which are two major components of liquidity risk. As discussed in the previous sections, while the former contributes more towards the systemic risk associated with liquidity, the latter is more closely associated with the firm specific risk. Aitken and Forde (2003) state that the correlation between these two categories which measures liquidity is insignificant. This indicates that the choice of measure of liquidity has direct implications on the conclusions regarding interaction of liquidity and the stock returns and this triggers a need to arrive at a robust measure which captures the systemic risk associated with each of the above measures of liquidity.

Chordia, Roll and Subrahmanyam (2002) focused on aggregate daily order imbalance as an instinctive measure of aggregate trading activity in the stock market. The study deciphers that order imbalances are closely related to market crests and troughs and have direct implications on market wide liquidity. As already noted, liquidity in the market is driven by two basic factors: the inventory level in the market and the risk associated with the information asymmetry in the market. A large order imbalance has direct implications on the inventory risk faced by the market makers and leads to revision of bid ask spreads and prices.

\textsuperscript{73} See Aitken and Forde (2003). The author contributes a new measure of liquidity which incorporates the bid ask spread, order depth and probability of order execution.
In addition to that, the systemic risk associated with the information asymmetry in the market is also captured by market wide order imbalance. When information is concealed from the public for a long period of time and eventually released into the market, it leads to disturbance in the inventory level which in turn leads to high order imbalance in the market leading to a market crash.

Most of the studies used market-wide volume as a measure of market-wide liquidity. However volume in itself camouflages important information associated with changing inventory levels in the market due to changing order flow in the market. Further, order imbalance exerts price pressures and hence permanently moves the market, thereby acting as a source of systemic risk; hence order imbalances have direct implications for the aggregate market apart from affecting individual stocks. Chordia, Roll and Subrahmanyam (2002) have reported strong correlations between order imbalance and various other measures of market wide liquidity like value weighted means of dollar volume traded, daily quoted spread and number of transactions reflecting a strong contemporaneous relationship between order imbalance and each of these variables. This was further confirmed by regressing value weighted market wide quoted spread against order imbalance, daily percentage change in the number of transactions, concurrent returns and concurrent market volatility. The results showed significant relationship between order imbalance and market-wide value weighted quoted spread which indicates the order imbalance had direct repercussions on market wide liquidity. Additionally, the above conclusions were validated by segregating the order imbalance into excess buy orders and excess sell orders and testing their relationship with the contemporaneous S&P returns. The results yielded significant positive relationship between the excess buy orders and market prices and a significant negative relationship between excess sell orders and prices with an adjusted R-square of 28%.

The role of market-wide liquidity in explaining stock returns has been highlighted in several earlier studies. In addition to stock specific liquidity, Amihud and Mendelson (2002) also tested the impact of market illiquidity on expected stock excess returns and witnessed a significant positive relationship between the two variables over time. The study estimated market-wide illiquidity as a simple cross sectional average of illiquidity of individual stocks over a period of time. This indicates that investors demand additional premium as compensation for the risk undertaken due to anticipation of higher market illiquidity. As discussed earlier, this concept of market-wide illiquidity seems to be more relevant in
the context of systematic risk, especially when we find clear cut evidences of such systematic risk during various periods of crisis like the October 1987 stock market crash and the recent credit crisis of 2007. Most of the crisis periods were associated with steep decline in market liquidity resulting in drastic changes in the stock prices.

Another important aspect highlighted by the study is that in addition to the compensation demanded by the investors due to expected market illiquidity, there is a “flight to liquidity” effect from less liquid stocks to more liquid stocks during such crisis periods. This indicates that the severity of the impact of expected market-wide liquidity on expected stock returns is more in case of low liquidity stocks than highly liquid stocks. For a stock with lower liquidity, while a decline in market-wide liquidity lowers the stock price, there is a further decline in the stock prices due to the flight to liquidity effects from low liquidity stocks to high liquidity stocks. On the other hand, a highly liquid stock is less likely to get significantly affected by a decline in the expected market-wide liquidity due to the increasing demand for such stocks during such periods (as explained by the flight to liquidity effects). Hence the impact of market-wide liquidity on the expected returns (and hence the premium demanded by the investors) varies over time as well as across the cross section of stocks.

A seminal paper by Pastor and Stambaugh (2003) investigated the role of market-wide liquidity as a state variable which explained asset returns. Considering the correlation in the fluctuations of liquidity across various assets, this empirical study examines whether market wide liquidity is priced. The study rationalizes that higher sensitivities of assets to aggregate market liquidity can result in higher premiums for holding such assets. This is because, in the event of a decrease in the overall wealth of an investor, he needs to liquidate some portion of his assets to replenish his cash reserves. Under such circumstances, higher sensitivities to aggregate market liquidity would make liquidation costlier and investors who have already suffered a drop in their overall wealth are averse to such higher costs. Hence holding such assets demands a premium. The market wide liquidity was measured as a simple average of individual stocks’ liquidity measure. The Pastor-Stambaugh measure of liquidity was calculated for each stock using the within month’s daily returns and volume and estimating the average effect that a given signed volume (the sign is the same as the sign of the return on day $d$) in day $d$ has on the return for day $d+1$. This measure basically focuses on

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74 Low liquidity stocks are generally characterized by stocks which are smaller in size. Smaller stocks have wider bid ask spreads and are more vulnerable to changes in the market wide liquidity than bigger stocks.
the tendency of the order flow to move in a particular direction and its impact on the asset prices. Stronger volume-related return reversals characterize lower liquidity levels. Using a sample period from January 1966 to December 1999, the study finds a significant positive relationship between the aggregate market wide liquidity and stock returns. The liquidity risk factor produced abnormal returns as high as 7.5 percent per year in a model that included the market factor, other Fama French factors and momentum.

Fernando (2003) manifested a clear line of demarcation between the risk associated with the level of liquidity and the liquidity risk in the market. The author emphasized that heterogeneity among the investors gives rise to idiosyncratic liquidity shocks which is directly reflected in the trading volume. Thus trading volume has direct association with the state of liquidity in the market and investors can preferably diversify such risk by investing in suitable securities. On the other hand, the author strongly supports and provides evidence that systematic liquidity risk arising from market-wide liquidity shocks do not bear a direct relationship with the trading volume and such risk directly impacts the prices and returns irrespective of the state of liquidity in the market. Such risk cannot be diversified by the investors. The extent of benefits to the investors in case of the risk due to idiosyncratic liquidity shocks depends on the level of liquidity in the market since such risk has a differential impact on the investors on the basis of their investment behavior (e.g. risk averse or risk taking). On the other hand, the impact of systematic liquidity risk on stock prices remains analogous across all the investors irrespective of the type of the investor since such risk is correlated across all investors. The author further explains that even if there is some component of idiosyncratic liquidity shocks which is common across all assets while being idiosyncratic across investors, such risk can still be diversified as long as those assets are freely traded in the market.

Gibson and Mougeot (2004) used monthly data for the period January 1973–December 1997, consisting of a total of 300 observations with respect to changes in the standardized number of shares in the S&P 500 index as the aggregate market wide liquidity proxy and examined whether the market wide liquidity is priced in the US market. The authors explain that in the event of a financial crisis when the market faces stringent credit conditions, investors aggressively trade in the safest and most liquid securities which increase the demand for such assets and hence increase the prices as compared to the less liquid securities. If the investors expect future market wide liquidity to be low, then they tend to
raise the current market prices so as to gain better returns in the future as compensation for the decreased market-wide liquidity. Hence the authors contemplate a negative relationship between the market-wide liquidity and the stock returns. The authors also testify the use of the proxy for the market wide liquidity which has been used in the study. According to the authors, classical market microstructure measures like the bid-ask spread, depth of the market and the other intra-day liquidity measures were rather driven by short term illiquidity in the market and mostly induced by asymmetric information. Hence, the need to present market wide liquidity as a risk factor over longer time horizons and mostly caused by aggregate inventory shocks in the market is well fulfilled by a broader measure like aggregate change in the standardized number of shares in the S&P 500 index. The study also supports the findings of several authors in that the liquidity risk caused by asymmetric information in the market can be mostly diversified by the investors.

A theoretical study by Baker and Stein (2004) provides a completely different line of reasoning based on investor behavior to explain the relationship between market wide liquidity and the cross section of expected returns. According to the study, in the presence of market frictions (like short sale constraints), there exists a certain class of overconfident irrational investors who overreact or under react to the information being floated into the market which leads to positive or negative “sentiment shocks” in the market. An important assumption behind this rationalization is that overconfident investors observe the trading activities of other informed investors and tend to erroneously over react or under react to the information since they consider themselves to be more informed than other traders in the market. This adjusts the prices and hence regulates liquidity in the market. In the presence of short sale constraints, such overconfident investors trade in the market, when their sentiment is positive resulting in the over valuation of securities. On the other hand when their sentiment is negative, it leads to undervaluation of the market and keeps them out of the market. Under such circumstances, the informed traders enjoy more liquidity in the market. The amount of liquidity in the market indicates the presence or absence of such irrational investors and hence the intrinsic value of securities traded in the market. The study demonstrated that turnover had considerable forecasting power (which was economically large) for year ahead returns.
Acharya and Pederson (2005) explain that Liquidity is risky and has a commonality; it varies over time both for individual stocks and for market as a whole. The possibility that liquidity might disappear from the market and may not be available is a big source of risk to an investor. The paper tried to present how asset prices are affected by liquidity risk and commonality in liquidity. In this model, a security’s required rate of return depends on its expected liquidity, i.e. level of liquidity as well as its sensitivity to the market return and market liquidity. They introduced a Liquidity adjusted Capital Asset Pricing Model to explain the cross section of expected returns. The study concluded that “illiquid securities also have high liquidity risk, i.e. high sensitivity to market liquidity. In particular a security which is illiquid also tends to have high commonality in liquidity with the market liquidity i.e. high sensitivity to market liquidity, its return is highly sensitive to market liquidity, and its liquidity is highly sensitive to market returns. While this collinearity is particularly interesting it also complicates the task of distinguishing statistically the relative impacts of liquidity, liquidity risk and market risk on asset returns.” In short, they found that liquidity adjusted CAPM did a better job than the traditional CAPM in terms of $R^2$ and $p$-values in the specification tests”.

Critique/Shortcomings:

The above studies clearly portend liquidity risk as an economy wide risk factor which impacts cross section of expected returns. However, there is no sufficient basis to explain that such commonality in liquidity which influences stock returns are derived from the underlying economic fundamentals and has a direct relationship with the economy as a whole. Such an analysis is important in the light of studies like Fama and French (1995) which provide economic rationale for establishing the fundamental relationship between the expected returns on an asset and the economy wide risk factors.

2.3. The role of idiosyncratic risk and expected returns – A critical review

In an efficient market, information is quickly absorbed into the prices as a result of which these prices represent the fair intrinsic values of the asset. Rational investors trading in the market help in the creation of an efficient market by generating profits due to mispricing, until such mispricing disappears. Such rational agents are termed as “arbitrageurs”. In practical situations, not all agents are perfectly rational and there is a large body of literature which supports the existence of irrational investors (Barber and Odean (2000), Odean (1998)
and Agnew (2005)). Notwithstanding the activities of irrational investors, the markets would still remain efficient if the profit motivated rational traders generate a counter price impact thereby enjoying fully the benefits of market inefficiency. However, in the presence of high arbitrage costs, such rational traders are prevented to trade against such inefficiencies. As a result, “some dollar bills are left on the floor because they are too costly to pick up”.

Such arbitrage costs are usually the end result of transaction costs like brokerage fees and commissions and holding costs like opportunity cost of capital and most importantly, “idiosyncratic risk”. Securities with high transaction costs and holding costs probably manifest greater idiosyncratic risk. Direct transaction costs can be explained through bid ask spreads and brokerage commissions while indirect transaction costs are the end results of delayed processing of transactions and adverse price impacts which is reflected in the dollar trading volume.

What causes idiosyncratic risk? Several studies have supported the existence of a significant relationship between the book to market value and the cross section of expected returns. However the rationalization behind the existence of such relationship varies across various studies. One of the major strands of literature suggests that higher premiums on high book to market portfolios are a result of significant mispricing in the market correlated across all the stocks. But if such mispricing exists in the market, then it offers an excellent opportunity for the arbitrageurs to generate significant profits and eliminate such mispricing. However in the practical scenario it is often not possible for arbitrageurs to completely eliminate mispricing.

Explaining this phenomenon, Shleifer and Vishny (1997) portend that arbitrageurs are generally under- diversified since they have access to only limited number of projects; hence they care about idiosyncratic risk. According to them, high arbitrage costs increases the volatility of arbitrage returns (referred to as arbitrage risk) and hence restricts the activities of the arbitrageurs. Furthermore, they portend that the knowledge and the resources to conduct arbitrage and take large positions in the market are restricted to very few professionals, high specialized investors who are mostly poorly diversified. Hence one can conjecture that

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idiosyncratic risk is a major factor driving such arbitrageurs and causes volatility in the arbitrage returns. They further argue that noise traders play a major role in shifting the prices of the securities away from their intrinsic values thereby preventing the arbitrageurs from earning significant profits in the short run. Since arbitrageurs are more concerned about the short term performance, they hesitate from investing in stocks with high idiosyncratic volatility. Hence the expected idiosyncratic volatility of a given stock for a given time horizon becomes an important factor which determines which mispriced stocks to be invested in.

Supporting this claim, Ali et al. (2003) demonstrated that book to market effect is greater for stocks with higher idiosyncratic volatility and suggested that such idiosyncratic risk extends a major contribution to the mispricing related to the book to market effect. Using a sample of all firms listed on NYSE and AMEX for a sample period from 1976 to 1997 the study proclaimed significant explanatory power of idiosyncratic volatility on stock returns in addition to book to market equity and size. This explains that systematic volatility in the stock returns demands compensation or can be eliminated by hedging; however, idiosyncratic volatility cannot be diversified and increases the total risk of the stock for which arbitrageurs do not get compensated.

A.S Au et al. (2009) supported the above claims and proved that there exists a high correlation between idiosyncratic risk and short selling. Using a 3 year sample period for the UK stocks, the authors demonstrate a negative relationship between short selling and abnormal returns for stocks which exhibited high idiosyncratic risk. This further affirms that idiosyncratic risk posed a major challenge to arbitrageurs.

Roll (1988) challenged the ratification of various financial economists who postulated that most of the asset price movements can be attributed to expected corresponding movements in the pervasive economic factors, the external environment of the firm and the firm specific information appearing in the financial press. The paper offered a simple empirical investigation which attested that the various explanatory factors which included the broad economic influences, industry influences and the news events specific to the firm explained less than 40 percent of the monthly return volatility for the sample of largest firms in the U.S. market. The author discovered that though there were some firms with impressive

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78 Pontiff (2006) further extends that irrespective of the level of diversification and the availability of arbitrage opportunities, arbitrageurs are still exposed to a high degree of idiosyncratic risk which is uncorrelated to the market wide systemic risk.
R-squares, on the whole, CAPM and other traditional multifactor models were losing their explanatory power to explain expected returns.

Ferriera and Laux (2007) study the relationship between corporate governance policy of the firm and the idiosyncratic risk. The authors conjecture the existence of a direct link between corporate governance and flow of information in the market which in turn influence stock price volatility. This is because weak corporate governance, say, absence of sufficient anti takeover provisions generates incentives for collection of private information which makes the stock returns highly volatile. When informed investors trade on such private information, they increase idiosyncratic volatility. Mashruwala, Rajgopal and Shelvin (2006) refer to the accrual anomaly authenticated by Sloan (1996) and offered potential explanation as to why arbitrageurs exhibit reluctance to fully exploit the accrual anomaly.

How is idiosyncratic risk related to expected asset returns? Malkiel and Xu (1997) note that there exists a significant correlation between idiosyncratic risk and firm size and idiosyncratic plays a significant role in explaining cross section of expected returns. Subsequently, Malkiel and Xu (2002) explain that a certain group of investors who are called as “constrained investors” do not hold the market portfolio because of several reasons like high transaction costs, information asymmetry, restrictions by various financial regulatory bodies like restriction on short sales, taxes, lack of liquidity in the market, imperfect divisibility of the securities, etc. This gives rise to idiosyncratic risk and demands a premium. Another plausible explanation extended by the authors focuses on diversification with the assumption that the actual market portfolio consists of only tradable securities, hence the market portfolio can be observed. When the constrained investors do not hold all the securities in the actual market portfolio, the risk premia associated with such portfolio would be higher than that indicated by the traditional CAPM model which assumes that all the investors hold the actual market portfolio. The study forms idiosyncratic volatility estimates from both the market model and the Fama French 3 factor model by extracting the root mean square residual estimates from the regression. The cross sectional results in the study conclude that even after controlling for other factors like size, book to market ratio and

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79 Sloan (1996) showed that investor attach irrationally high (or low) values to stocks on the basis of information reflected in accruals and cash flows of companies and form future expectation accordingly. When this mispricing is corrected, it gives rise to abnormal returns (high or low depending on the intrinsic values). Subsequent studies focus on the reasons behind the reluctance on the part of arbitrageurs to take trading positions and gain advantage of accrual mispricing.
liquidity, idiosyncratic volatility is more powerful in explaining the cross section of expected returns as compared to market betas or size measures.

Goyal and Santa-Clara (2003) tried to look at average stock risk in addition to market risk. The average stock risk was measured as the cross sectional average of the variances of returns of all stocks traded during the month. The authors rationalize that investors hold non traded assets (less liquid assets) which increase the risk of their portfolio. When the risk of the non traded assets increases, investors are less willing to hold other traded risky assets. Some of the examples of non traded assets include human capital and private businesses. Human capital represents the income which investors get in the form of salaries and wages. Depending on the ability of the company and the quality and skills individuals possess, they get returns in the form of salaries and wages. The stock price indirectly is affected by the quality of human capital of the company. Human capital is firm specific because its value is in the form of salaries and wages plus the quality of employees which in turn depends on the company which employs workers. To the extent that human capital is firm specific, its value fluctuates on the basis of the value of the company that employs the human capital. For e.g., a software company like Infosys may provide a better salary for the same amount of work as compared to a domestic software firm. Private businesses are again part of firm specific risk. Human Capital and private businesses constitute a large part of the portfolio of investors. Entrepreneurial risk is a large source of un-diversifiable risk which is closely correlated with the common stock returns. The study detected a significantly positive relationship between the average stock returns and lagged return volatility indicating that idiosyncratic risk played an important role in asset pricing.

In response to the above study, Wei and Zhang (2005) argued that there is no substantial evidence to prove the existence of a positive relationship between idiosyncratic risk and expected returns and the studies supporting this proclamation are mainly driven by data in the 1990’s. The authors used monthly data from an extended sample period of August 1963 to December 2002 and discovered insignificant evidences of the existence of a positive relationship between the value weighted average return of all the stocks and lagged equally weighted average volatility (which represents an aggregate of idiosyncratic risk of individual stocks) as portrayed by Goyal and Santa-Clara (2003). The value weighted return (calculated in excess of risk free rate) for a particular month \( t \) is weighted by the market value of each stock traded on the NYSE, AMEX and NASDAQ for the particular month. The authors reported that the magnitude of the slope coefficients indicating a positive relationship
between the value weighted average return and the lagged equally weighted average idiosyncratic volatility deteriorates by approximately one-third during the sample sub period 1963.08 to 1989.12 while the significance level of the slope coefficient drops by about two thirds. The results for the extended sample period were shown to be weaker. The paper also tested the economic significance of the positive relationship between the value weighted average returns and the equally weighted average volatility and found that the benefits of the simple timing strategy as proclaimed by Goyal and Santa-Clara (2003) did not exist sustainably after 1975.

Drew, Naughton and Veeraraghavan (2004) focused attention on the relationship between idiosyncratic volatility and the cross section of expected stock returns for the stocks listed in the Shanghai Stock Exchange. In accordance with the study by Kang, Liu and Ni (2002) the authors observe that the stock markets in China bear a negative correlation with those of United States and hence investigating the role of idiosyncratic risk for the Shanghai Stock Exchange is quite an agreeable proposition especially when this market lacks sophistication unlike developed markets. Also, in accordance with Malkiel and Xu (2000) the authors portent that when investors are constrained from holding the market portfolio, total risk exposure assumes prime importance and not only the systematic risk or the market risk factor. The study used the mimicking portfolio approach of Fama and French (1996) to determine whether idiosyncratic volatility is systematically priced in a multifactor asset pricing framework containing firm size and the market factor as other independent variables impacting the stock returns. Based on the results obtained from the monthly returns and the market values of all the stocks listed on the Shanghai Stock exchange over a period of 1993 to 2000, the study tested a multifactor asset pricing model incorporating the market factor, SMB and the idiosyncratic risk factor as independent variables affecting the cross section of expected returns. In short, the following model was empirically tested:

\[ r_{pt} - r_{ft} = a_p + b_p (r_{mt} - r_{ft}) + s_p smb_t + h_p hivmliv_t + e_t \]

where \( r_{pt} \) and \( r_{ft} \) denote the portfolio returns and the risk free rate at time \( t \) respectively. SMB is the risk factor associated with size in the context of the Fama and French model and HIVMLIV is the mimicking portfolio constructing by buying high idiosyncratic volatility stocks and shorting low idiosyncratic volatility stocks. The respective factor loadings indicate the coefficients of the time series regression. The study indicated a positive relationship between idiosyncratic volatility factor and the expected portfolio returns.
Ang, Hodrick, Xing and Zhang (2006) examined the pricing of aggregate volatility risk on the cross section of expected returns. The objective of the study was to investigate the pricing of stochastic volatility of the market with respect to cross section of expected returns. The authors hypothesize that aggregate volatility which indicates the commonality of volatility across stocks is a priced risk factor. The results exhibited a significant volatility risk premium of -0.08% per month. However the authors could not explain the reasons for the negative risk premium of idiosyncratic volatility on the cross section of expected returns.

Fu (2009) attempted to establish the true empirical relationship between idiosyncratic risk and expected stock returns. The objective of the study was to examine the time varying property of idiosyncratic risk and to explain the relationship between idiosyncratic risk and cross section of expected returns. The authors suggest that the time varying property of idiosyncratic volatility makes it unsuitable to use one month lagged idiosyncratic volatility as a proxy for idiosyncratic risk as used by Ang, Hodrick, Xing and Zhang (2006). The time varying property of idiosyncratic volatility can be captured by using an E-GARCH Model that uses out of sample data to arrive at expected idiosyncratic volatilities which could be used to proxy for idiosyncratic risk of the firm. The hypothesis of the study is that there exists a positive relationship between idiosyncratic volatility and stock returns (given that idiosyncratic volatility adequately proxies for the idiosyncratic risk of the firm). The sample in the present study includes stocks listed on NYSE, AMEX and NASDAQ from July 1963 to June 2006. EGARCH (p,q) (where 1<=p<=3, 1<=q<=3 chosen on the basis of Akaike Information Criteria) specification was used to arrive at the expected idiosyncratic volatility as follows:

\[
\ln(\sigma_{it}^2) = \alpha_i + \sum_{l=1}^{p} b_{il} \ln(\sigma_{i-t-1}^2) + \sum_{k=1}^{q} c_{ik} \left( \frac{E_{it-k}}{\sigma_{it-k}} \right) + d_{ik} \left( \frac{E_{it-k}}{\sigma_{it-k}} - \left( \frac{2}{\pi} \right)^{1/2} \right)
\]

The above time series regression was run using daily data for each month to obtain the monthly estimates of standard deviation of regression residuals, these estimates were multiplied by the square root of the number of trading days in that month to reduce the impact of infrequent trading. Once the estimates of idiosyncratic volatility for each stock were obtained, cross sectional regressions were run using these estimates and other explanatory variables like size, book to market, turnover, coefficient of turnover and momentum variables and the time series averages of the slopes were reported. In the
following cross sectional regression run for each month using all the stocks, the
dependent variable was the percentage monthly return on the stock $i$ for the month $t$.

$$R_{it} = \gamma_{0t} + \gamma_{1t}E_{t-1}[IVOL_{it}] + \sum_{k=2}^{K} \gamma_{kt}E_{t-1}[X_{kit}] \epsilon_{it} \quad : \quad i = 1,2,3,\ldots,N, \quad t=1,2,\ldots,T.$$  

$E_{t-1}$ is the expected value of the variable as on month $t-1$. IVOL is the idiosyncratic volatility of the stock and $X$ represent other explanatory variables as follows: Market betas, size (ln(ME)), ln (BE/ME), RET(-2,-7) which is the compound gross return from month t-7 to t-2, TURN which is the average turnover and CVTURN which is the coefficient of variation of turnovers in the past 36 months. The correlations between these explanatory variables were checked and there was no extreme case of multicollinearity. The month by month cross sectional regressions from July 1963 to December 2006 of individual stocks were carried out and the time series means, standard deviations and t-statistics of each of the estimated slope coefficients from 522 monthly estimates were calculated. The results indicated a significant positive relationship between the expected idiosyncratic volatility and the cross section of expected returns.

**Shortcomings:**

Given the above indicated studies, it is difficult to reconcile these results because different studies use different measures to estimate idiosyncratic risk yielding contrasting results. For e.g. Ang et. al (2006) used past idiosyncratic volatility to arrive at the expected idiosyncratic volatility for the current period and indicated a negative relationship between idiosyncratic risk and expected return. Fu (2009) argued that past idiosyncratic volatility is not a true measure for idiosyncratic risk because idiosyncratic volatility is time varying in nature. They used E-GARCH model to estimate conditional idiosyncratic volatility and indicated a positive relationship between idiosyncratic risk and expected returns. Several authors (Boehme, Danielsen, Kumar and Sorescu (2009), Drew et. al (2004) ) use standard deviation of excess returns to proxy for idiosyncratic risk; however this measure does not consider the time varying component of idiosyncratic volatility. In addition to this, the reason why idiosyncratic risk has a significant impact on asset returns has not been explicitly discussed in any of the earlier studies.

2.4 Risk factors and economic fundamentals

Lakonishok, Shleifer and Vishny (1994) made an attempt to explain why value strategies work by testing the hypothesis along two dimensions. One of the arguments of the
contrarian model was that glamour stocks are those stocks which have performed well in the past and are believed by the investors to perform well in future. Similarly value stocks are those stocks which have performed poorly in the past and are expected by the market to perform poorly in the future as well. In short value strategies work because market extrapolates past performance too far into the future. Past performance and expectation of future performance are two distinct characteristics of value and glamour stocks which were tested by Lakonishok, Shleifer and Vishny (1994). Past performance was measured using information on past growth in sales, earnings and cash flow while expected future performance was measured by multiples of price to current earnings and cash flows. As a first step they examined whether value stocks outperformed growth stocks. The classification of stocks were done based on past growth and expected future growth and it was found that value strategies largely outperformed which was consistent with the hypothesis of the contrarian model. The next question asked was whether value stocks were fundamentally riskier than growth stocks. To be fundamentally riskier value stocks must underperform growth stocks with some frequency especially during bad economic states like extreme down markets and economic recessions. They tested the betas and standard deviations of value and glamour strategies and concluded that there was little evidence to prove that value stocks were fundamentally riskier than growth stocks. Because of the value stocks were riskier than the growth stocks then they should have had high betas and standard deviations, which was not the case.

"Then how have the value strategies continued to work if value stocks were not fundamentally riskier?"

In response to the above posed question, Fama and French (1995) tried to provide an economic foundation for the empirical relation between the average stock returns, size and book to market equity and they provided empirical evidence to prove that size and book to market equity are related to profitability. It has generally been seen that there is a gradual convergence of growth rates of earnings of low and high book to market equity stocks post portfolio formation. Fama and French (1995) indicated that the market understands the convergence of earnings growth rates and makes unbiased forecasts of earnings growth. To explain the convergence of earnings growth of high and low BE/ME firms, Fama and French (1995) explained that in case of low book to market equity stocks there is improved

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80 Performance of a stock is measured in terms of earnings, sales growth etc. Performance of a strategy is measured in terms of returns generated.
profitability (measured in terms of earnings/book equity) prior to portfolio formation which deteriorates gradually thereafter. The reverse is the case for high book to market equity stocks wherein there is improved profitability post portfolio formation. However, rational asset pricing theory says that high book to market equity firms have lower earnings post portfolio formation while low BE/ME firms exhibit higher earnings. Why then, does low BE/ME firms have lower profitability as compared to high BE/ME firms in the later years after portfolio formation? Fama and French (1995) explain that book equity grows faster for low BE/ME firms relative to earnings after portfolio formation due to which their profitability (EI/BE) deteriorates. In other words, in case of low BE/ME firms, the earnings grow at a faster rate as compared to book equity in the years prior to portfolio formation, but book equity grows more rapidly than earnings in the later years after portfolio formation causing the profitability of these firms to decrease. The reverse is the case for high BE/ME firms, wherein book equity gradually diminishes at a faster rate than earnings in the later years as a result of which the profitability increases.

To support the risk-based explanation of Fama and French (1993), Fama and French (1995) tried to provide an explanation based on economic theory by examining whether there was any link between risk factors in returns and earnings. Stock prices generally represent the present value of all the future expected net cash flows to the shareholder. Thus Fama and French (1995) measured the relation between returns and common factor in net cash flows by measuring shocks to expected net cash flows and the common factors in the shocks. Changes in the earnings yield measured by EI/BE (ratio of economic income over book value of equity) was used as a proxy for shocks to expected net cash flows. The common factors for earnings shocks were constructed in a similar manner as the common factors for stock returns. The change in EI/BE was represented as $\Delta Y$ which was regressed on market, SMB and HML factors for earnings shocks; in other words the model tested was:

$$\Delta Y(t + 1) = \alpha + \beta_1 \Delta R_{\text{Mkt}}(t + 1) + \beta_2 \Delta R_{\text{SMB}}(t + 1) + \beta_3 \Delta R_{\text{HML}}(t + 1) + e(t + 1)$$

Mkt represented the sum of EI (economic income measured as earnings after depreciation, taxes, interest and preferred dividends) over the sum of BE (book value of equity), SMB was the size factor in $\Delta Y$ measured as the simple average of $\Delta Y$ for the small stock portfolios minus the average for the big stock portfolios. Similarly, HML represented the difference between simple average of $\Delta Y$ between the high BE/ME stock portfolios and the low BE/ME

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81 Economic income was measured as the earnings after depreciation, taxes, interest and preferred dividends.
stock portfolios. The results indicated that like the stock returns, there exists market, size and book to market factors for earnings shocks which behave in a similar manner as those in stock returns. The above tests were also repeated by taking different measures of earnings shocks like earnings before interest and growth rate of sales which behaved in a similar pattern as EI/BE.

The results of Fama and French (1995) built upon the hypothesis that common factors in fundamentals drive risk factors in stock returns. To test this hypothesis they performed time series regressions, regressing annual returns on the size-BE/ME portfolios on (i) portfolio specific changes one year ahead in fundamentals and (ii) the changes one year ahead in the market, size and book to market factors in fundamentals. The results were consistent with the hypothesis that market and size factors in fundamentals are related to market and size factors in returns.

Another study by Liew and Vassalou (2000) made an attempt to link return based factors to future growth in the macro economy. They consider three characteristics: size, book to market equity and momentum which have been documented to explain asset returns and construct return based factors, SMB (small minus big), HML (high minus low) and WML (winners minus losers) for securities of ten developed markets which included Australia, Canada, France, Germany, Italy, Japan, Netherlands, Switzerland, the United Kingdom and the United States. They constructed 27 value weighted portfolios using these return based factors and calculated the factor returns for quarterly, semiannual and annual rebalancing frequencies. Independently of the rebalancing frequency, the sorting of stocks for portfolio formation was done based on a sequential sorting procedure (unlike the independent sorting procedure used by Fama and French) using six month prior values of book to market equity and market capitalization subsequently to ensure that information was available to the public before forming the portfolios. Past years’ (12 months) average returns were examined to construct the momentum factor (WML). The sequential sorting procedure used in their study was not as advantageous as the independent sorting procedure and was likely to give biased results which were specific to the sorting order used. However the validity of results was established by reversing the sorting order and repeating the tests which gave qualitatively same results. In order to study the returns on trading strategies at different states of future economic growth they classified the economic conditions into “good states” and “bad states”. They used quarterly observations of growth in GDP and subsequently sorted them into “good states” which included those states that exhibited the highest 25% of future GDP growth and “bad states” which included those states with lowest 25% of future GDP growth. To study the
returns on trading strategies in each of these states they associated next year’s growth in GDP to past year’s annual return using quarterly observations. The results indicated that the returns on HML and SMB are positively related to future growth in the macro economy. In other words, high portfolio returns preceded periods of high GDP growth and low portfolio returns preceded periods of low GDP growth. The above results were validated using univariate regressions and multivariate regressions which included the market factor and thus supported the risk based story of Fama and French.

On similar lines, Simpson and Ramchander (2008) tried to examine how the factor premiums relate underlying economic fundamentals. They used monthly data of stocks listed on NYSE, AMEX and NASDAQ over a twelve year time period from 1991 to 2002 and formed 25 portfolios by intersection of quintiles of stocks sorted on the basis of size and book to market equity. To measure the shocks in the economic fundamentals, they used unanticipated component of 23 different macroeconomic announcements which were periodically released every month from 1991 to 2002. The forecasts of macroeconomic news releases were obtained from Money Market Services. The surprise element or shocks in each of these macroeconomic announcements which formed the independent variable was calculated by subtracting the forecasted value from the actual value. The value of surprise element was normalised by its standard deviation to provide a standardised measure so that impact of each of these 23 macroeconomic announcements on the dependent variable could be compared. The 23 macroeconomic announcements were divided into 5 broad categories – consumer demand, inflation, interest rates, economic growth and real estate, which explained different states of the economy in different ways. The performance of CAPM and the FF model with respect to explaining the surprises in the macroeconomic announcements was analysed\(^8\) to compare the impact of these macroeconomic shocks in both the models in terms of their beta coefficients. The results provided overwhelming evidence in favour of the FF model and suggested that FF model is superior to CAPM in explaining the impact of macroeconomic variables.

2.5 Gaps in the literature

\(^8\) Wald tests were performed the compare the coefficients for both the models, i.e. the CAPM and the Fama French 3 factor model. The joint significance of SMB and HML can be tested using such tests and their performance with the traditional CAPM can be tested by analysing their additional explanatory power over the market factor.
Considering leverage risk, the impact of over exposure to debt market (indicating a source of systematic risk in the context of an asset pricing model) has not been explicitly explained till now. The Fama French model assumes that book to market equity factor absorbs the effects of leverage. However Fama and French (1993) deals with the market leverage and the book leverage, which does not closely represent the debt market exposure of the firm (See Penman et. al (2007)). As indicated earlier, Penman et. al (2007) demonstrates that enterprise book to price ratio has a significant positive relationship with the expected stock returns while the “leverage” component of book to price ratio which corresponds to the financing risk, does not exhibit a significant relationship with the stock returns. Moreover the relationship between financial leverage and stock returns was negative. This result, according to the author indicates that given a certain level of operating risk of the firm, additional financing risk does not affect the expected stock return which goes against the basic principles of finance which say that as financing risk increase, returns are expected to rise. Penman et al (2007) does not supplement any credible reasoning to explain the negative relationship between the leverage risk and expected stock returns. They attribute the negative relationship to possible errors in measurement of leverage on the balance sheet, mispricing of leverage by the market or due to the omission of important risk factors which bear a negative correlation with leverage.

With respect to the liquidity risk exposure of a firm, prior literature used conventional measures like bid ask spread and share turnover ratio as a measure of liquidity to study its impact on the cross section of expected returns. However inferences drawn from using such measures of liquidity as share turnover ratio could be distorted since Johnson (2008) provided strong evidence to the fact that share turnover/ dollar volume traded and bid ask spread are unrelated over time. Similarly, Amihud and Mendelson (2002) prove that residual risk of a firm subsumes the effects of bid ask spread which provides a hint to the fact that liquidity level of a stock might be related to the firm specific risk of a firm instead of acting a systematic risk factor. Such firm specific risk induced by changes in the liquidity levels of individual stocks can be diversified by constructing appropriate portfolios. A number of studies have tested for the significance of relationship between liquidity risk and expected returns. However whether this liquidity risk assumes the form of an economy wide systematic risk factor is still not clear. We attempt to fill this gap in the present study.

Referring to the literature on Idiosyncratic risk and its impact on stock returns, it is difficult to reconcile the results and inferences because different studies use different measures to estimate idiosyncratic risk yielding contrasting results. For e.g. Ang et. al (2006)
used past idiosyncratic volatility to arrive at the expected idiosyncratic volatility for the current period and indicated a negative relationship between idiosyncratic risk and expected return. Fu (2009) argued that past idiosyncratic volatility is not a true measure for idiosyncratic risk because idiosyncratic volatility is time varying in nature. They used E-GARCH model to estimate conditional idiosyncratic volatility and indicated a positive relationship between idiosyncratic risk and expected returns. Several papers (Boehme, Danielsen, Kumar and Sorescu (2009), Drew et. al (2004) ) use standard deviation of excess returns to proxy for idiosyncratic risk; however this measure does not consider the time varying component of idiosyncratic volatility.