Chapter 7 Conclusion and Scope for Future Research

The extant literature in the area of asset pricing which has evolved over many years of research focuses on the market factor and the Fama French factors to explain the cross section of expected returns. Subsequently, several additional variables like momentum, liquidity, leverage and idiosyncratic volatility were known to explain the cross section of expected returns. However, establishing these additional risk factors as systematic risk factors generating economy wide effects was still a challenge, which we consider in our study.

7.1 Expected contribution to the literature

7.1.1 Leverage risk as a systematic risk factor

The novelty in our present study is that we suggest that financial leverage is a systematic risk factor. Consistent with Ferguson and Shockley (2003), we believe that leverage is a better proxy for the distress risk that significantly contributes to the systematic risk of a firm. Further, leverage risk factor has macroeconomic implications, just like the Fama-French factors -SMB and HML. Adding to this, Molina (2005) accorded evidence to the hypothesis that leverage as endogenous variable impacts the default probabilities of a firm as represented by the firms’ credit rating. This suggests that leverage levels contribute significantly to the distress risk of the firm. To support this hypothesis, it has been noted earlier that firms with excess leverage were hard hit during the recent credit crisis. There was plenty of evidence of such systemic risk in the recent financial crisis, for example, when debt markets such as the commercial paper market, the repo market, and short-term bank borrowing virtually dried up. Altogether, increased leverage of the hedge funds, the insurance agencies, and the excessive leverage in the real estate market, coupled with a liquidity crisis, took a heavy toll on the global economy. Anecdotally, leverage became a source of risk and its effects spilled over to the economy like a contagion.

Through this study we endeavor to establish that leverage risk is not a firm specific risk, but a systematic risk factor which has primary relevance in asset pricing theory. We also show that the leverage risk factor has direct linkages to important macro economic variables (which represent the macroeconomic environment in which the firm operates) like GDP growth rates, percentage changes in inflation rates, changes in the unemployment, percentage industrial production growth rate and short term interest rates.
7.1.2 Liquidity risk as a systematic risk factor

Though several studies have dealt with the evidence of liquidity risk as a priced factor, there has been no established literature which attests the reasons behind such liquidity risk in the context of the broader environment in which the firm operates. Most of the studies attribute this to the existence of correlated inventory costs and inventory risk of the specialists operating in a quote driven market like NYSE. Some studies characterize such commonality as an outcome of asymmetric information risk which might be common among the specialists (for e.g. prior knowledge about the introduction of a new technology into the market by informed traders may lead to correlated demand for such stocks\textsuperscript{110}). However exploring what external factors cause such inventory risk is important to ascertain that such liquidity risk is indeed a non diversifiable risk factor. We contribute to the existing strand of literature by analyzing the liquidity risk factor from the macroeconomic point of view. We prove that such liquidity risk is driven by the underlying macroeconomic fundamentals which provides a strong basis to believe that market wide liquidity is a price factor and forms part of systemic risk of the firm which is non diversifiable.

Secondly, the time span of most of the studies which explain the role of liquidity risk or commonality in liquidity has been restricted. We extend our contribution by using a longer sample period and investigating whether the effects of liquidity risk has been persistently significant especially in the periods of financial crisis. Moreover there is no study till date which has empirically tested the effects of liquidity risk in the light of the recent credit crisis and we make an effort to efficiently articulate this aspect in our study. This is important because the impact of liquidity risk was a prime concern among the financial managers during this period.

7.1.3. Idiosyncratic risk as a systematic risk factor

In this study, we develop a better and a more comprehensive measure of idiosyncratic risk by incorporating the effects of firm specific characteristics to arrive at a comprehensive measure of idiosyncratic volatility. Our measure of idiosyncratic risk factor is derived from such measure of idiosyncratic volatility. Macroeconomic news has a major impact on the volatility of stock returns and the idiosyncratic risk factor is expected to be indicative of such macroeconomic effects in the economy. We test for the relationship between the idiosyncratic

\textsuperscript{110} See Chordia et al. (2000) for further explanation.
risk factor and macro economic variables to test the economic significance of idiosyncratic risk factor. This portrays idiosyncratic risk factor as a systematic risk factor which has significant importance in the context of a comprehensive asset pricing model which explains the expected stock returns.

7.2 Summary and major findings

Firstly, we initiate our analysis with the sample description and the initial analysis of the explanatory risk factors used in this study (See chapter 4). We explain the construction of risk factors, SMB, HML, LEV, LIQ and IV using the independent sorting procedure (on the basis of size, book to market equity, debt to equity ratio, liquidity risk and idiosyncratic volatility) as explained in Fama and French (1993). We estimate idiosyncratic volatility using several firm specific variables which affects information flow in the market like size, book to market ratio, leverage, liquidity levels and liquidity risk, momentum and market betas.

Next, in line with studies which establish a relationship between the stock returns and the Macroeconomy, we move further to test whether these explanatory risk factors have a significant relationship with the underlying macroeconomic variables. As explained in Chapter 3, we consider the following macroeconomic fundamentals to test the significance of relationship between our additional risk factors (i.e. the leverage risk, liquidity risk and idiosyncratic risk) and the underlying macro economic variables.

6. Growth in Gross Domestic Product
7. Growth in Industrial Production
8. Change in monthly unemployment rates.
9. Changes in the monthly rates of inflation (WPI and CPI)

Using several lags of the explanatory risk factors to extract the maximum information content embedded in these factors, we finally conclude that all the risk factors bear a significant relationship with the Macroeconomy.

Finally, we arrive at the comprehensive asset pricing model which includes leverage risk, liquidity risk and idiosyncratic risk in addition to the market factor and the Fama French factors and test for the significance of the model during tranquil and crisis periods. We also test the robustness of the results by considering various stylized portfolios. In short, the study concludes with the following major findings:
The traditional Fama French factors and the market factor donot suffice to explain expected returns both in the tranquil period and the crisis period. this indicates that the positive alphas generated by portfolio managers during these periods is not due to their efficiency in picking the right stocks for the portfolios; rather it was due to the arbitrage opportunities present due to mispricing of stocks.

Three important additional risk factors, leverage risk, liquidity risk and idiosyncratic risk extend a significant contribution in addition to the traditional risk factors in explaining expected returns.

This relationship is robust to economic expansion and economic contraction of severe magnitude with special reference to the recent credit crisis.

There is a significant change in the impact of each of these systemic risk factors across the tranquil and the volatile periods. The sensitivities to liquidity risk generally increased during the crisis period (in case of non financial stocks) while the sensitivity to leverage and idiosyncratic risk generally decreased during the crisis period. This indicates that liquidity risk has emerged as a major significant variable which proxies for the distress risk associated with higher sensitivities to market wide liquidity.

The relationship also holds true across various stylized portfolios like portfolios consisting of small and big stocks, low book to market stocks, high book to market stocks, stocks with low debt equity ratio, stocks with high debt to equity ratio, stocks with low liquidity risk and high liquidity risk and finally stocks with low idiosyncratic volatility and high idiosyncratic volatility.

Financial stocks behave differently to these systematic risk factors (the market factor, Fama French factors and the additional risk factors). The role of leverage risk as a proxy for distress risk factor is more prominently seen in case of financial stocks than non financial stocks.

All the risk factors have economic significance since they bear a direct relationship with the macroeconomic variables like

- Growth in Gross Domestic Product
- Growth in Industrial Production
- Change in monthly unemployment rates.
- Changes in the monthly rates of inflation (WPI and CPI)
- Changes in the monthly short term interest rates.
7.3 Implications for portfolio managers

Reilly and Brown (2006) define active portfolio management as “an attempt by the manager to outperform, on a risk adjusted basis, a passive benchmark portfolio.” By efficiently making use of the anomaly based strategies considering various risk factors which are believed to have a direct impact on stock returns, the portfolio managers can control a better proportion of investor wealth and outperform the passive benchmark indices. In practice, a fund manager uses the Fama French factors and the traditional CPM as a guide to produce superior returns on different portfolios. However ignoring important factors like leverage, liquidity risk and idiosyncratic risk may pose a serious challenge for the portfolio managers to achieve outstanding returns.

7.4 Limitations and Scope for future research

The present study focuses on stocks listed on the Dow Jones Global Index to arrive at a comprehensive asset pricing model from an international perspective. The comprehensiveness of such a global index to include all the major markets in the world is assumed due to data constraints.

Secondly, in the light of several reforms like removal of trade barriers and free flow of funds across borders, global integration is increasing at an active pace leading to high levels of correlation risk across different markets. We donot consider such correlation risk in the present study. Whether the Fama French factors and the additional risk factors capture such correlation risk is still a mystery unsolved. This is important because there is a plethora of research in the field of international finance portraying the importance of such correlation risk. Higher the sensitivity of a nation to such correlations, more vulnerable the nation would be to succumb to world wide fluctuations in the economy. Hence it becomes an important variable in the context of international asset pricing research and whether such risk is subsumed in the Fama French factors and the additional risk factors is a gap in the literature which needs to be fulfilled.