Chapter 3 – Research Objectives and Hypotheses

In this chapter, we illustrate the choice of expected variables, the construction of risk factors and the expected relationship between the risk factors and the cross section of expected returns.

3.1 Additional risk factors – role in explaining expected returns

Given the gaps in the literature as discussed above, the following are the research objectives of the study:

- To provide a comprehensive analysis of the role played by traditional Fama French factors in determining excess returns during both tranquil period and turbulent period.
- To introduce three major factors (Leverage risk, Liquidity risk and Idiosyncratic Risk) in addition to the Fama French factors and establish the economic significance of these factors by linking them to the macroeconomic variables.
- Show that the relationship is robust to economic expansion and economic contraction of severe magnitude with special reference to the recent credit crisis.
- To test for the differential impact of these factors on different categories of stocks: Conventional, Islamic, SRI, OECD markets, Emerging markets, U.S. and Non U.S. markets.
- To test for the differential impact of these risk factors across financial and non-financial stocks.

The above research objectives give rise to the following hypotheses which would be tested in the present study.

3.1.1 Leverage risk and stock returns

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. However, the relationship between leverage and stock returns in the extant literature is based upon firm-
specific leverage. The novelty in the present study is that we suggest that financial leverage is a systematic risk factor. Consistent with Ferguson and Shockley (2003), we believe that leverage significantly contributes to the systematic risk of the firm in addition to the well know Fama French Factors.

“Leveraged companies generally fall into one of the following categories:83

- Capital Intensive businesses: These companies issue large amount of debt to develop their infrastructure. E.g. telecommunication companies.
- “Rising Stars”: These are early stage growth companies that issue debt to finance their operations and develop highly promising investment projects which introduces new products into the market and establishes a strong customer support.
- “Fallen Angels”: These companies have reached their maturity stage with very limited further growth opportunities and are heavily vulnerable to debt.
- Special Situation companies: These companies use debt for special avenues like restructuring, mergers and acquisitions and privatization.”

Based on this classification, the true empirical relationship (positive or negative) between leverage risk factor and the stock returns (positive or negative) is conditional upon which category the firm belongs to (from the above mentioned four categories), different states in the economy and investors’ perception about the company’s state of affairs, profitability of the firm and availability of lucrative high NPV projects for the firm, amount of retained earnings, availability of free information in the capital markets, efficiency of the capital markets and the role of financial institutions in regulating company projects and operations of the firm, ownership structure (influence of controlling shareholders) and corporate disclosure policies.

Hence we hypothesize that

“There exists a significant relationship between leverage risk and the expected returns.”

3.1.2 Liquidity risk and expected returns

The trigger of the recent credit crisis with the outburst of the housing bubble and increased exposure of financial institutions to debt led to serious liquidity problems in the economy. This gave rise to a serious dearth in market wide liquidity and deterioration of

balance sheets. The funding liquidity crisis drove market illiquidity eventually leading to a bank run. As the number of withdrawals from the market increases, the risk perception of investors increase and investors demand a premium for investing in stocks which are highly sensitive to market wide liquidity. In other words, market wide illiquidity leads to the inability to trade when liquidity is most needed by the investor, which means that investors demand a premium for investing in stocks which are most sensitive to market wide liquidity. Under such circumstances we can hypothesize that, “There exists a significant and positive relationship between liquidity risk and stock returns.”

3.1.3 Idiosyncratic risk and expected stock returns

There has been a mix of opinions about the true empirical relationship between idiosyncratic risk and the cross section of expected returns. However, given that idiosyncratic risk stems out from the information asymmetry in the market as discussed in the earlier sections of this study, we can intuitively hypothesize that high idiosyncratic volatility leads to higher risk from an investment perspective since it is triggered by higher levels of private information (firm specific information) which is not absorbed into the stock prices. A working paper by Berrada nad Hugonnier (2010) indicates that incomplete information plays a dominant role in explaining the significant relationship between the expected stock returns and idiosyncratic volatility. Similarly, Ferreira and Laux (2007) study the relationships among corporate governance, information flow in the market and idiosyncratic risk. The paper tests a trading link hypothesis explaining how different corporate governance aspects impact the information content in the stock prices. The authors rationalize that fewer takeover restrictions leads to greater vulnerability of a takeover leading to increased levels of speculation in the market which in turn leads to greater collection of private information. Furthermore, stronger corporate governance principles lead to better disclosures to the market and hence stronger investor protection and reduced idiosyncratic volatility. Chen et al. (2010) ventured to examine the relationship between a firm’s financial distress and idiosyncratic volatility and how this interaction affects the expected stock returns. The examine CRSP and Compustat data for a sample period of 1964 – 2006 and construct portfolios by using the sequential sorting procedure on the basis of the Altman’s (1968) Z-score and Ohlson’s

84 Bank run occurs when a large number of bank customers withdraw their deposits from the bank in the event of a financial crisis where they perceive the banks to lose their solvency. As more and more people withdraw their deposits, it leads to very high illiquidity and further leads to bankruptcy.

85 Larcker and Lys (1987) indicate that the speculators who trading during takeovers are better informed than the rest of the investors which means that they have possessed more private information.
(1980) O-Score and subsequently on the basis of idiosyncratic volatility. They concluded that there is close interaction between distress risk and idiosyncratic volatility. In such cases investors demand compensation for trading in such stocks with higher idiosyncratic volatility, indicating a “significant relationship between idiosyncratic risk and expected stock returns.”

3.2 Risk factors and macroeconomic fundamentals

3.2.1 Leverage risk and the macroeconomic fundamentals

Talavera (2004) examined the relationship between optimal level of leverage and macroeconomic uncertainty by estimating the interaction of macroeconomic variables and capital structure indicators. In this study the author suggests that firms tend to alter their capital structure decisions in tandem with the level of macroeconomic uncertainty. In other words, they test a hypothesis of the relationship between the optimum debt levels and levels of macroeconomic uncertainty like changes in money growth and inflation levels. The author concludes that an increase in macroeconomic uncertainty is accompanied by a decrease in debt levels of a company (because the managers become more vigilant and skeptical about over issuance of debt) indicating a negative relationship between the firm’s financial leverage and the macro economy at large. The paper illustrates that changes in macroeconomic uncertainty (say changes in monetary policy) directly impacts the cost (or the discount rate) of investment projects (including the firm’s future profits) and the ease of obtaining funds from external suppliers of finance. This paper clearly establishes a roadmap to provide evidence for the existence of a significant relationship between the macroeconomic indicators and the capital structure decisions of the firm. However contemplating leverage as a systemic risk factor which is linked to the underlying economic fundamentals remains an unexplored territory. Given the absence of adequate research in this area and with special reference to the recent credit crisis, this part of the study portends a deviation from the existing literature and tries to accentuate leverage factor as a systemic risk factor having a major impact on expected stock returns and crucial macroeconomic implications which affects the underlying fundamentals of the firm.

A number of researchers argue that “deeper the decline in GDP, peak to trough, the more rapid the post recession rebound.” A recent report suggests that this is the case only if there is a significant increase in the private sector liabilities. According to the report, a 0.3% drop in employment rate requires the real GDP growth to rise above 3% which in turn demands a 5% rise in the private sector liabilities. The evidence for this can be witnessed in

the slow moving recoveries following the 1980, 1991 and 2001 recessions; the slowness has been attributed to low levels of private liabilities as well as industrial production during these periods. This supports a significant relationship between the leverage risk factor and the GDP growth rate and the industrial production growth rates.

The credit crunch of 2007 was however a different kettle of fish. With a meteoric rise in private sector debt of about $43trillion (3 times the GDP), before re-leveraging, the developed economies needs to de-leverage and private entities need to restructure their debt. Since rapid de-leveraging process has gained paramount importance in the current adverse situation, it is overly optimistic and utopian to witness an increase in private sector borrowing in the near future. The de-leveraging process results in a decrease in the risk levels associated with excess leverage and hence the risk premiums. Hence given that GDP growth rate and the industrial production growth rate is closely related to the leverage risk factor, the likelihood of growth to remain below-potential for a protracted period is high.

Next, when inflation is uncertain, investors demand an inflation risk premium to compensate for the inflation risk. Changes in inflation induce volatility in the returns on debt and hence there is a leverage risk premium. Whether the relationship between inflation and leverage risk premium is positive or negative depends on the interaction between inflation, taxes (corporate tax and personal tax), expected return on assets, and the amount of debt used in the project. According to Armitrage (2005), as inflation increases, the real tax adjusted weighted average cost of capital decreases because higher inflation alleviates the corporate taxes on the firms’ real profits and increases the tax advantage on debt. However in the presence of personal taxes, higher inflation causes an increase in the tax rates on real returns to debt. This increases the leverage risk of the firms which are heavily dependent on debt and thus demand a premium over firms which rely less on external debt.

A study by Mian and Sufi (2009)\textsuperscript{87} contemplated that the 2007 economic crisis was strikingly characterized by increased debt levels in the overall economy including the household debt. The household debt to income ratio witnessed a stupendous increase from 1950 to 2001 and exponentially increased from 2001 to 2007. Mian and Sufi (2010) further confirm that this stupendous increase in the household debt levels was a major contribution to the onset of recession. The study also documented “weak consumer demand for durable goods in high debt countries”. According to the rationale presented by the authors, during the

credit crisis since cost of debt increased significantly due to high levels of debt in the economy, it lead to substantial reduction in the income at an aggregate macroeconomic level. This led to reduction in the purchases of the end product by the customers which in turn triggered unemployment. An article by The Local Futures Group\(^{88}\) indicated a consistent rise in unemployment due to deteriorating consumer confidence and aggregate demand across all major sectors. This has led to rigorous cost cutting decisions by the companies especially labor costs, by cutting down on the number of working hours leading to job losses and increasing unemployment.

Finally, it is widely known that monetary policy of a nation has a direct impact on the macroeconomic variables and the effects of such policies are mainly transmitted across the economy through changes in the short term interest rates\(^{89}\) which in term affects bank reserves. As the monetary policies of a nation become more stringent, the subsequent changes in the short term interest rates will increase the interest expenses of the firm which in turn affects the firms’ net cash flows adversely. Furthermore, Hu (1999) confirmed that “changes in the monetary policies are expected to have stronger effects on investment for highly leveraged firms than for less leveraged firms.”

### 3.2.2 Liquidity risk and the macroeconomic fundamentals

Financial frictions like asset bubbles and liquidity spirals affect not only the financial sector but also the macro economy as a whole. It questions market efficiency and the actions of the regulatory bodies to control financial markets. Especially during the recent financial crisis, the effect of lowering liquidity in the market was vehemently felt; when the crisis hit not only the banks and other financial institutions but spread across all the economies rounds the globe. It also had a major effect on the real economic activity. According to Chudik and Fratzcher (2010), “…even after an initial decoupling of emerging market economies, global economic activity became temporarily highly synchronized in the second half of 2008 and first half of 2009”.

The standard IS-LM analysis ascertains that an increase in the demand for money in the economy leads to lowering of liquidity levels in the economy for the purchase of goods which in turn triggers a downfall in the economic activity. With the drying up of liquidity in credit markets and interbank markets, there were acute restrictions to flow of capital to the

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\(^{89}\) Refer Cook and Hahn (1989). The authors indicate that changes in the fed funds rate did not cause major changes in the long term real interest rates which are relevant for funding fixed capital investments.
real side of the economy which led to the downfall of major companies operating in the economy. Furthermore, due to high exposure of funds to liquidity and leverage risk the financial crisis of 2007 led to a massive retraction of funds and capital flows from the highly risky securities to safer avenues; this phenomenon is traditionally known in finance as the “flight to quality effect.” Hence there was a phenomenal change in the liquidity in the market which had a significant impact on the real side of the economy. After the collapse of Lehman Brothers in September 2008 the economic downfall gained acceleration and spread to various parts of the world. The subsequent recessionary periods in the advanced economies adversely impacted the global trade which in turn had a significant detrimental effect on the economies of the Emerging Markets due to their high dependencies on foreign trade.

3.2.3. Idiosyncratic risk and macroeconomic fundamentals

A paper by Ozenbus and Portes (2007) attempts to understand the relationship between idiosyncratic volatility and a firm’s financing decisions and its impact on the macro economy at an aggregate level. If there is a steep decline in the GDP levels and Industrial production levels in the economy, the firm’s productivity levels fall because of reduced investment activities triggered by higher borrowing costs. Increased cost of borrowing increases firm specific risk and hence higher idiosyncratic volatility. Officer (1973) argues that market volatility is more significantly observed during market downturns which indicates that there is a significant relationship between the variation in macro economic variables and stock market volatility. Hamilton and Lin (1996) used a regime switching model and examined the joint behavior of stock returns and changes in the industrial production and concluded that “economic recessions explain about 60% of the variation in stock market volatility.” Campbell et al. (2001) portend that idiosyncratic volatility is more prominently seen during economic downturns and is one of the major indicator of a recession and hence can forecast economic activity. Thus the firm specific volatility or the idiosyncratic volatility is expected to exhibit some predictive power for macro economic variables like changes in GDP growth rates, changes in industrial production, changes in inflation, changes in unemployment rates and changes in monthly short term interest rates.

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90 See e.g. Adrian and Brunnermeier (2009), Brunnermeier and Petersen (2010), Shin et al. (2010), Borio (2009)

91 Adapted from “How linkages fuel the fire: The transmission of financial stress from advanced to emerging economies”. World Economic Outlook, April 2009.
Following the above discussion, we validate and substantiate the existence of leverage risk, liquidity risk and idiosyncratic risk factor as systematic risk factors, it is essential to draw a link between these factors and the underlying macroeconomic fundamentals. We consider the following macroeconomic fundamentals to test the significance of relationship between our additional risk factors (i.e. the leverage risk, the liquidity risk and idiosyncratic risk) and the underlying macroeconomic factors.

1. Growth in Gross Domestic Product
2. Growth in Industrial Production
3. Change in unemployment rates.
4. Changes in the rate of inflation (WPI and CPI)
5. Changes in the monthly short term interest rates.

In short, we hypothesize that,

“There exists a significant relationship between our risk factors (leverage risk factor and the liquidity risk factor) and each of these macroeconomic indicators”.

3.3 Hypotheses

To sum up, we list the following hypotheses which will be considered for analysis and testing in our present study:

Hypothesis 1: Leverage exhibits a significant positive relationship with stock returns and forms part of systematic risk of a stock.
Hypothesis 2: There exists a significant and positive relationship between liquidity risk and stock returns.
Hypothesis 3: There exists a significant and positive relationship between idiosyncratic risk and the stock returns.
Hypothesis 4: Leverage risk, liquidity risk and idiosyncratic risk when used in conjunction with the market factor and Fama French factors contribute significantly to the model.
Hypothesis 5: There is a significant relationship between each of the additional risk factors (leverage risk, liquidity risk and idiosyncratic risk) and the following macroeconomic fundamentals.

1. Growth in Gross Domestic Product (Quarterly)