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Cost of Equity Dynamics: A Comparison Across Emerging and Developed Markets

by

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Cost of Equity Dynamics: A Comparison Across Emerging and Developed Markets

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To my father who made me who I am, and for the countless sacrifices he made for me.

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It is certified that following publication(s) have been made out of the research work that has been carried out for this thesis:-

1. Raza, H. (2018). Is D-CAPM Superior to CAPM? The Case of Pakistan Stock Exchange. *NUML International Journal of Business & Management*, *13*(1) 96-106.

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Abstract

The purpose of the study is to investigate the changing dynamics of validity of CAPM in the wake of its different models. For this study various existing models have been selected and transformed to measure the cost of equity for both emerging and developed markets. In addition, industry risk premium as suggested by extant literature is examined empirically in a comprehensive setting. Although prior literature suggests incorporating industry risk premium in the CAPM framework, but no empirical evidence is currently available in this context.

For the purpose, aforementioned, the study gathers monthly data for six emerging and six developed countries from the year 2000 to 2017. Fama-Macbeth cross sectional regression is applied for calculation of estimators which is a proposed methodology to test the validity of different risk factors for capital assets pricing framework by the contemporary literature.

Results suggest that overall local, global, downside, hybrid and industry adjusted betas significantly explain the average variations of stock returns in both emerging and developed markets. So it is recommended to employ CAPMs, which have originated in the developed markets for the estimation of cost of equity in developing markets and the other way round after required modifications. Results for Local CAPM are validated for Pakistan, India, and South Africa from emerging markets and Germany and Japan from developed markets. Furthermore, results for Global CAPM are validated for Pakistan and Russia from emerging markets and Canada, Germany and Japan from developed markets. While UK and USA report a significant negative relationship between global beta and stock returns. Results for Downside CAPM are validated for Pakistan and India from emerging markets and for Canada and Japan from developed markets. Results for emerging risk premium for the Hybrid model are significantly positive for Pakistan market while industry risk premium is significantly positive for Pakistan, India, China and Brazil from emerging markets and for Canada and Germany from developed market. Although the issue of non-linearity and significance of unsystematic risk (residuals) persists.

Conclusively, CAPM is still a viable solution in determining cost of equity for most of the stock markets. Further, Extended CAPM formulated in this study is noted more sophisticated in assessing the cost of equity as compared to rest of the models.

In nutshell, this study offers a comprehensive insight for corporate manager, financial analysts, policy makers, and individual investors for estimation of cost of equity. It also offers the dynamics of cost of equity in multiple country's setting, that provide an insight for global investors, FPI holders and local and global mutual fund managers to align their investment decisions in this regard.

Key words: Capital Asset Pricing Model as CAPM, Local CAPM, Global CAPM, Modified Global CAPM, Downside CAPM, Hybrid CAPM, Industrial Risk Premium, Cost of Equity, Fama-Macbeth Regression.

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Abbreviations

BOVESPA	Bolsa de Valores de Sao Paulo, Brazil Stock Exchange
BSE	Bombay Stock Exchange
CAPM	Capital Asset Pricing Model
CML	Capital Market Line
DCAPM	Downside CAPM
GCAPM	Global Capital Asset Pricing Model
LCAPM	Local Capital Asset Pricing Model,
LSE	London Stock Exchange, UK
MGCAPM	Modified Global CAPM
EMH	Efficient Market Hypothesis
MPT	Modern Portfolio Theory
PSX	Pakistan Stock Market
SSE	Shanghai Stock Exchange
MICEX	Moscow Stock Exchange, Russia
JSE	Johannesburg Stock Exchange
TSE	Toronto Stock Exchange
NYX	NYSE Euronext, Paris Stock Exchange
FSX	Frankfurt Stock Exchange, Germany
TYO	Tokyo Stock Exchange, Japan
NYSE	New York Stock Exchange, USA

Chapter 1

Introduction

1.1 Background of the Study

The basic purpose of any firm is to maximize the shareholder's value and there are multiple factors that help to achieve this objective. However, among these, the appropriateness of capital budgeting is the most important factor. The accuracy of this decision determines firm's future cash inflow against its current limited resources. Therefore, the valuation is an integral part of almost every strategic business decision and this concept is the center of finance theory and a key for intelligent investment and financing decision making (Damodaran, 2016). It is considered as one of the complex procedure which involves several components with no consensus on derivation mechanism and a great deal of uncertainty. This uncertainty also increases when these firms get involved in global activities (Fernández, 2009).

The estimation of cost of equity remains one of the most important yet challenging job faced by corporate manager, business analyst, academics, and other market participants (Fuenzalida and Mongrut, 2010). When someone wants to assess the value of the company or acquisitions, it is not only necessary to value the cash flow of that company but also to have an estimation of the discount rate that represents the required returns of stockholders.

In past literature, academicians and practitioners used a wide variety of models, ranging from simple to complex to estimate the cost of equity. Major models that can be traced back involve the discounted cash flow model, the comparative earnings approach, dividend discount growth model, the risk premium approach, Capital Asset Pricing Model (CAPM), and Arbitrage Pricing Theory (APT) (Damodaran, 1999).

In comparative earnings approach, book value of almost similar company has been used for the calculation of cost of equity, and that company is categorized as comparable. Although this model is an easy way to calculate the cost of equity, but, the major problem is to find the comparable as none of the two companies have same fundamentals and same shareholder patterns. In addition to this, cost of equity is a market based concept which cannot be calculated from the earnings or book value of the comparable. Therefore, this cost of equity valuation approach is indifferent from market dynamics as well as resultant value may be have greater variation from industry to industry due to different tax imprecision's etc. So, this method is not appropriate for the calculation of cost of equity (Madura, 2008).

Another method that can help for the estimation of cost of equity is the risk premium approach. In this method, to arrive at the cost of equity, equity risk premium is added to long terms debts. This approach is very easy to arrive at the cost of equity and in addition long-term debt is somewhat market oriented. However, the major issues with this approach are that firstly, the company must issue the long-term debt and the secondly risk premium data are not easily accessible in developing countries.

The third method for calculating cost of equity is Gordon (1959) dividend discount model. In developing countries, this method is widely used. In this method, the cost of equity is built on the return demanded by investors. In computational manner, the cost of equity is determined as the sum of the current dividend yield and the expected dividend growth (Myers and Borucki, 1994). This is a theoretically sound technique but can be used when companies issue dividend, and the results are considered reliable only when companies' growth is constant for an infinite period. This assumption is criticized heavily as no firms have growth opportunities at the same rate for an indefinite period (Fabozzi and Francis, 1977). Damodaran (2009) also criticizes it by inferring that this assumption cannot behold especially in emerging markets. Ross et al. (2008) points out another weakness of this model that the riskiness of investors cannot be adjusted in this method. Myers and Borucki (1994) concludes that investors should not rely on dividend discount method for the calculation of cost of equity.

The next model is capital asset pricing model that is developed by Sharpe (1964), Lintner (1975) and Mossin (1966) almost at the same time, which relates the calculation of the expected rate of return on a security based on its systematic risk. According to the CAPM, only relevant risk should be accountable for the calculation of cost of equity than all the market uncertainty (Harvey, 2000). CAPM is theoretically well developed model which is highly accepted and adopted by academicians as well as practitioners. However, there are contradictions in literature on the nature of parameters to be used in CAPM along with its validity for explaining the variations of the expected risk. For this purpose, different variants of CAPM have been developed for emerging as well as developed countries, which are commonly used till today (Fuenzalida and Mongrut, 2010; Sabal, 2004).

The widely used methods for the calculation of cost of equity are CAPM and Discounted Cash Flow (DCF) (Bekaert and Harvey, 2002). In the developed world like UK, regulators most commonly use CAPM (Jenkinson, 2006). Other studies report that CAPM is by a long shot the most utilized technique for the estimation of cost of equity, particularly in large U.S. firms (Bruner et al., 1998; Graham and Harvey, 2001). Notwithstanding that, approximately 74% of respondents are using CAPM for their cost of equity estimation in a solitary overview, and 85% in the other, express that they utilize CAPM (Brigham and Ehrhardt, 2013). However, there is major variability in the operation of CAPM among practitioners in the literature (Bruner et al., 1998).

Arbitrage Pricing Theory (APT) has the same linear relationship between risk factors as used by CAPM, but APT considers these risk causes in more general way which is determined statistically. The major problem with the APT is that it has no prior specification of what exactly economic variables load and in turn represent which factor. In other words, it is not possible to decide which factors are most critical and how much they will load and why. Instead, the factor loadings are totally responsive to statistical scheme, which appears by using an approach called factor loading.

Some scholastic also express their thoughts that the APT and the Fama and French's three-factor offer relatively better theoretical premise than CAPM for the calculation of cost of equity. In addition, it is a more wise methodology for those companies that have any further tariff regulations (Franks, 2007). Although ground reality is different, as the study directed by Welch (2000) reports that for capital budgeting purposes, 75% of fund managers suggest to use CAPM, 10% prescribe the Fama and French's three factor, and 5% suggest an APT model. Another study by Pereiro (2006) reports that almost 68% of organizations use CAPM for the computation of cost of equity in Argentina.

1.2 Gap Analysis

Capital asset pricing model comes under the umbrella of Capital Market Theory, which is considered as one of the main stream of financial research, often classified into investments. It examines how financial markets set prices of securities by studying individual investors based on perceived risk and returns. The primary theoretical objective of the research in this field is to develop robust, practical, yet theoretically consistent asset pricing techniques that model the required return on all investments as a function of a relative handful of observable factors. Sharpe (1964) made main contribution in this field by publishing his work title as Capital Asset Pricing Model (CAPM). This work leads to new models such as Black (1972) develop CAPM that do not assume the availability of a risk free assets, whereas Ross (1976) come up with the arbitrage pricing theory and many others.

Academicians and practitioners both require an estimate of firm's equity in terms of cost of capital and have always relied on the Capital Asset Pricing Model (CAPM). The insights provided by CAPM help to assess the rate of return for a particular asset. Such information is critical for the investment decision taken by both corporate entities evaluating their projects and investors forming portfolios. In the corporate setting, the CAPM serves to characterize the risk of a particular project or acquisition and assign a discount rate that reflects their risk. Corporations create their value in choosing projects that have a higher promised rate of return than its risk formed by CAPM in terms of required rate of return, while in the investment setting, the CAPM helps to identify overvalued and undervalued assets as well as establish a framework to help the investor to understand the risk that he faces with a particular portfolio (Harvey, 2001).

Different variants of CAPM are developed for the estimation of international cost of equity over the period of time. Single hurdle rate approach is the simplest solution to this problem. Although it is straightforward to employ a definite rate of return for domestic and international investments but investing in a Pakistan company has a higher risk compared to investment in Morgan Stanley. One hurdle rate approach cannot run well for global business, as such approach can only be used for companies investing domestically, and having no presence internationally (Graham et al., 2006). The study by Graham and Harvey (2001) reflects that 73.5% of corporate firms and investors determine the cost of capital by using CAPM. Earlier work in this field supports the phenomena that CAPM model works well for developed economies. The performance of CAPM for under-developed and emerging markets is not pleasing. As it is seen from a low expected rate of return and in some cases even has a negative stock beta (Harvey, 2001). The negative coefficient simply means that the required hurdle rate is even less than the United State Treasury bill rate. In order to preserve the level of required cash flows, the firm can undertake project having zero return. However, there are certain financial specialists who feel uncomfortable with such approach.

Solinik (1974) provides an alternative solution to such a problem in the form of world CAPM that makes an assumption for investors to have the same baskets on investments in different countries, in a way that purchasing power parity theory (PPP) clamps globally. Initially, this model worked wonders in the corporate world. However, the existing literature in this field also report some deviation to such a bold assumption. Adler and Dumas (1983) report that purchasing power parity theory may not hold because of either change in investor's preferences, change in investor horizons, different tax treatments, and any other relevant differences. If the PPP theory is not held then the concept of one global capital asset pricing model may not sustain either.

Emerging markets are volatile than developed markets and their beta is greater than one Estrada (2007b). So the question arises, how to capture the cost of capital under such volatility when the model is only ready to develop market nearly consistent volatility. Mariscal and Lee (1993) work on cost of capital in emerging markets. Depending on them, cost of capital should be determined relative to the US Standard & Poors index instead of the global index and the sovereign risk should be used as the risk-free rate. This suggestive model is attracted by many market observers and participants due to its simplicity but still, this model is criticized due to various problems. The major problem is the inclusion of two different types and nature of risks into one linear equation i.e. equity risk is added to sovereign yield risk, which is theoretically incorrect, as they represent different risk exposure, which cannot be added up logically (Harvey, 2001).

In another study, Lessard (1996) suggests adjusting country risk into stock beta and results in a new model named as Lessards hierarchical model. This model makes adjustment for beta using the country risk premium beside the risk-free rate as did by Global CAPM. Still this current model has major issues as it's both assumptions have severe limitations. For instance, covariance of developed and emerging market stock returns may not be equal to zero and also betas of markets do not correspond to US market beta.

Another model for emerging markets as proposed by Bekaert, G.,Harvey (1995) is a blend of the world CAPM and local CAPM that shifts the weight from local CAPM to world CAPM from time to time. As the market becomes more cohesive, more weight is given to the world CAPM compared to local CAPM and vice versa. This model adds up country credit rating to capture the country risk premium. This model reflects that there are certain measures of risks which are dynamic in nature and any change to time is ex-ante, providing an ease to look forward to the future whenever risk rating changes. A lower credit rating means higher risk and vice versa. Such type of analysis is useful in providing a structure to look forward to a particular risk factor, which is important for investing in a country than the other. The major problem with it is the way to translate qualitative information into quantitative model.

Estrada (2002) develops D-CAPM model (Downside CAPM) by taking the initial observations of (Markowitz, 1959), by taking the downside risk premium instead of total risk. The author states that emerging market's investors are more attentive towards the risk for a loss rather the potential gain. So to capture such high volatility discussed earlier, Estrada (2002) takes only negative side of returns. Regardless of the fact that, the model is theoretically and statistically sound but this model has a mojor shortcoming as it considers only one feature of emerging markets, that is, high volatility, hence it is an incomplete approximation.

Lee et al. (2003) proposes the use of an implied cost of equity based on the level of market prices to drive at CAPM model. The crucial problem with this model is that it relies on forecasted cash flows and then assumes them as equal to market prices. Nevertheless, it leaves certain questions about approximation of forecasting cash flow. There are many other models that one can use to calculate cost of capital for developed and emerging economies. However, if you buy any single model; you will automatically buy their limitations too, so there is a need to evaluate and recheck their validation in different time periods and in different contextual settings. In other ways, there is still a need to develop a model that can provide better results.

Extant literature can also be seen for adjustment of an additional risk factor which explains the variations of stocks returns. Fama and French (1992) use value and size factor, which improve the explanatory power of the model, however the value and size factors are not explicitly about risk, but may be the proxies of the risk, as size is not reflective of risk factor that affects the expected returns, if it is so, all small firms may combine themselves to form big ones, consequently better predictability of their model are in dubious situation and hence limited applications (Perold, 2004).

According to the Lessard (1996), the systematic risk which is eventually converted into the expected return comprises country risk premium, world market risk premium, country economic and political risk, industry competitive risk and project specific risk. According to Bodnar et al. (2003) systematic risk is the sum of global market risk, country risk, industry risk, exchange rate risk, political and liquidity risk in any project. Harvey (2016) in a lecture titled "Alternative approaches to the cost of capital"suggests to develop a new model, whereby, one can come across the positive feature of CAPM analysis in terms of going through all of these different risk factors allowing for weights for these factors that differ across countries and times, and most importantly capture this information/trends efficiently under certain type of hurdle rate. According to the author, many risk factors should be adjusted to cost of equity models. He proposes four major risks factors; first factor should capture the global risk, the second factor should comprise emerging market risk, the third factor should include local country risk and fourth factor should incorporate industry risk.

Industry risk plays an important part in explaining the competitive environment in which a company participates. Most appraisers make an industry-based adjustment in calculating a firm's cost of equity. A practitioner using the CAPM already includes industry risk through the beta measure; however, when using the buildup method, it must be added in form of risk premium (Barad and Mcdowell, 2002). Less empirical work can be traced subject to adjustment of industry risk premium into the CAPM. Lee et al. (2003) calculate the industry risk premium for 28 industries for the G-7 countries for the period of 1990 to 2000. They report that industry premium varies industry-wise and time-wise. Five lowest risk premium industries from 2% to 3.32% are the Food, Real Estate, Chemicals, Publishing, and Utilities, while high premium industry from 6.68% to 9.42% is the Tobacco, Mining, Metals, Transport Equipment, and Paper. These results clearly indicate that industry risk premium is an integral part of estimating global cost of equity. Abuaf (2011) demonstrate that estimation of industry betas yield more robust estimates than estimating company-specific betas. They also show that betas change considerably and statistically significantly from one industry to the next but in those industry betas do not vary significantly when measured over time periods of one year, two years, and five years.

This study attempts to investigate the impact of industry risk premium for explaining the expected returns of stocks in the global CAPM environment. All of these contributions in the form of additions of new risk factors into existing models are increasing the confidence of investors on market based models. These contributions increase the predictability of realized returns by estimating the expected returns. These contributions are proving an indication that we are making progress towards the right direction in this regard. However, the need for a model which is more realistic reflection of the cost of capital still remains.

The basic purpose of this work is to examine the application of these models in developed and emerging countries with updated time period. The study also provides new insight by adjusting industry risks into the existing models which may provide more accurate predictions than others.

1.3 Theoretical Background of Study

Every investment decision is made by the firm, comprise different risk elements. The firm is always uncertain, whether, this investment generates enough return to compensate these risks. The degree of risk elements defers from domestic to International setting, developed to emerging setting, one industry to another industry's setting, as well as from one company to the other company setting. Capital market theory is seen as one of the main stream of financial research, often classified into investments. The Capital Asset Pricing theory provides the basic framework of how these different type of risk are priced into a single model. The primary theoretical objective of this theory is to set up robust, practical, yet theoretical consistent asset pricing techniques that model the required return on all investments as a function of a relative handful of observable factors. The main contribution in this field is made by Sharpe (1964) by publishing his work with the title of Capital Asset Pricing Model (CAPM). This work leads to new models such as Black (1972) developed CAPM that do not assume the availability of a risk free assets and Ross (1976) comes up with the arbitrage pricing theory, and many other different variants of CAPMs.

Çelik (2012) and Pereiro (2006) report the theoretical nature of asset pricing theory. According to Çelik (2012), the CAPM can be classified on the basis of positive and normative economics where each side has its own assumptions. If someone is considering to apply a model to value investment, and if assumptions are, true after the evaluation process of normative test, its future implication will also hold through positive test. But in most of the cases, the underlying assumption will not pass the normative test, even if someone assumes that it will hold for one period, it may not be true for another period. In other words, the theory of assets pricing is not simple to go through with as someone assumes; still there are many stock markets that have mis-priced assets and the model subsequently needs continuous improvements.

Çelik (2012) divides the capital asset pricing theory into two different sides (see the figure 1.1). The left hand side of the diagram is termed as new-classical based asset pricing models and the other side is behavior based asset pricing. Figure 1.1 is the layout of the asset pricing theory in a snapshot. The basic distinguishing point in the eyes of the financial economist from neo-classical to behavior finance is the notion concerning distribution of uncertain wealth. In neo-classical framework, all the financial decisions are made based on the Von Neumann Morgenstern utility theory of preferences for the uncertain wealth distribution and Bayesian techniques to make statistical judgments from the data. On the other hand, behavioral finance suggests that psychological phenomena exhibits the financial behavior in the markets. It makes the behavioral assumptions and propagates that people do not behave rationally instead they behave normally. Furthermore, they do not behave on Von NeumannMorgenstern utility maximization theory rather on the prospect theory based on heuristics and biases.

Present study belongs to the neo-classical side of asset pricing models as empirically only this side produces almost all the models that explain the framework for the estimation of cost of equity over certain number of years. Although behavioral finance provides strong arguments against the working of classical finance, but this side does not provide an alternative model for the asset pricing.

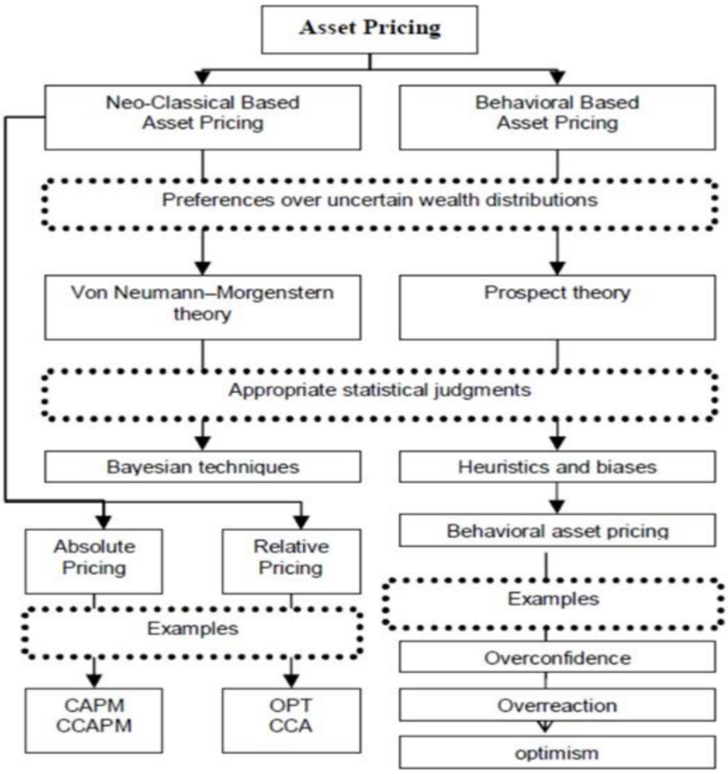

Figure 1.1: Basic Roots of Asset Pricing Theory
Source: Celik (2012)

As the scope of the study is defined to apply the neo-classical pricing model, Çelik (2012)'s study further divides these models on the basis of absolute and relative pricing phenomena. Those CAPM models whose estimation is based on a single period are known as absolute CAPM while whose estimation is based on multi-period is known as dynamic CAPM. This study further narrows its focus on the absolute capital asset pricing side due to its wide applicability in the financial market all over the world.

The theoretical development of the capital asset pricing theory is provided in table 1.1 with both absolute and relative CAPM.

Table 1.1: Major Theoretical Development of Static Capital Asset Pricing Models

Model	Originator(s)
Static CAPM (Single Period CAPM)	
Markowitz Mean-Variance portfolio theory	Markowitz (1952;1959)
Sharpe-Lintner-Mossin CAPM	Sharpe (1964), Lintner (1965), Mossin (1966)
Black Zero-beta CAPM	Black (1972)
The CAPM with Non-Marketable Human Capital	Mayers (1972)
International (Global) CAPM	Solnik (1974a), Adler and Dumas (1983)
The Adjusted Global CAPM	Sercu and Uppal (1995)
The Modified Global Model	Sabal (2002)
The Goldman Sachs' model	Mariscal and Lee (1993)
Lessard's hierarchical model	Lessard (1996)
The D-CAPM model	Hogan and Warren (1974), Bawa and Lindenberg (1977), Harlow and Rao (1989) and Estrada (2002).
The Hybrid Model	Bodnar, Dumas and Marston (2003)
Damodaran's model	Damodaran (2002)
Godfrey and Espinosa's model	Godfrey and Espinosa (1996)
Estrada's model	Estrada (2000, 2001)
The Fame-French Three Factor Model	Fama and French (1993)
The Fame-French Five Factor Model	Fama and French (2015)
Arbitrage Pricing Theory	Ross (1976)
The Three Moment CAPM	Rubinstein (1973), Kraus and Litzenberger (1976)
The Four Moment CAPM	Fang and Lai (1997), Dittmar6 (1999)
Dynamic CAPMs (Multiple Period CAPMs)	
The Intertemporal CAPM	Merton (1973)
The Consumption CAPM	Breeden (1979)
Production Based CAPM	Lucas (1978), Brock (1979)
Investment-Based CAPM	Cochrane (1991)
Liquidity Based CAPM	Acharya and Pedersen (2005)
Conditional CAPM	Jagannathan and Wang (1996)

1.4 Problem Identification

After the emergence of the notion of portfolio management in 1950s, various attempts to measure the level and association of risk and return have been made in the domain of investment portfolio management. In result, Markowitz (1952) presents portfolio theory which is recognized as the foundation of capital asset pricing theory. Most of the work in this area starts after the Sharpe (1964) paper entitled as "Capital asset prices: A theory of Market Equilibrium under Conditions of Risk". After this work, an extensive work can be witnessed in this area in two different ways; i.e. firstly, in testing the validity of this model, and secondly, in proposing a new model by using the same framework after adjustment of more related risk factors. Most of constructed models and theories for the calculation of the expected return at the start are proposed and tested in a stable and mature market where risk factor is at a minimum level. In 1990, after the emergence of the notion of globalization and network economy, the dynamics of capital markets have been drastically changed which gives birth to co-movement of exchanges and volatility spillover effects from global to local market and vis-a-vis. In consequence, existence and operationalization of expected return calculation model have become questionable. Apart from this, the results of these models have been drifted away from basic the propositions and assumptions of these models.

Due to rise in these globalization activities, the dynamics of cost of equity are also changed. Along with this, the dynamics of capital market including investment mechanism are changing everyday both at domestic and international level. Business and financial integration at firm and country level is not only reflected in the economic growth but also in stock market performance. Market integration literature shows that stock markets at country and global level are integrating with each other and reflect the stock holding patterns, investment volumes, portfolio patterns and financial performance of both domestic and foreign firms. The major problem individual and institutional investors face relates to the valuation of different types of assets along with allocating proper valuation mechanism to each. Most importantly what are the factors that result in the increase and decrease for assets' value and how these industrial factors, i.e. country specific and international level factors, are incorporated in the prices of such assets to reflect their true intrinsic value. It becomes difficult to estimate the accurate cost of equity without adjustment of these aforementioned factors thereby making it a challenging job for the entire world.

The phenomena of globalization and market integration increase the importance of valuation of securities and their trading for both developed and underdeveloped markets. It is very important to recognize the level of risk faced by the international investors which is totally different from that of domestic investors. The major challenge is that market participants are still waiting for an answer to capture and quantify these internal and external risk factors into a single model that provides a consensus among practitioners and academicians (**?**). Based on empirical evidence, the dubious involved in calculating volatility risk under such conditions for the cost of equity, may raise a question on valuation Bekaert and Harvey (2002).

Consequently, a new debate in this domain has been started for the estimation of cost of equity in developed and emerging markets. Due to variations in the estimation of models, along with high betas in emerging markets, various studies attempt to validate CAPM based models that originates two different schools of thoughts i.e. opponent and proponents. Proponents suggest using the already developed CAPMs for the estimation whereas the opponents express their concerns on the estimation by highlighting the importance of including new risk factor such as market volatility, industry risk, and country specific risk.

Literature guides to use of different models to quantify an appropriate cost of equity for international markets. All these models use the CAPM framework to price the risk of the asset and to calculate the expected return with one or more extensions in the original CAPM model. These models offer a structured approach to framing the relevant value parameters. But still most of these models have different short falls, like in Sharp-Linter CAPM, isolation assumption does not hold after extensive empirical evidence of market integrated studies. In the same vein, World CAPM as developed by Solinik (1974) addresses the weakness of local CAPM. The literature also provides an evidence that the key assumption of global model, i.e. purchasing power parity holds for all investors of the world, do not further prevail. For the reason, modified global model and adjusted global model are introduced in continuation. Such developments offer a motivation to endure working for further adjustments.

The other models developed for emerging or underdeveloped countries capture only few specifications of those markets and result in an inaccurate and more controversial cost of equity. Thus, giving rise to a major question that whether the current popular methods can be applied with more accuracy and wide applicability for the calculation of cost of equity, or if there is a need for an adjustment or substitution of entirely new techniques to capture the intricacies of the developed and emerging world Bekaert and Harvey (2002).

Some studies attempt to test the validity of CAPMs like Sabal (2004); GÖZEN (2013) theoretically and Fuenzalida and Mongrut (2010); GÖZEN (2011); **?**); Pereiro (2006) empirically analyze different versions of capital asset pricing models for the estimation of cost of equity, i.e. the local or the traditional CAPM of Sharpe (1964); the global or international CAPM proposed by Solinik (1974, 1976); the modified international CAPM model of Sabal (2002); the Goldman Sachs model suggested by Mariscal and Lee (1993); the hierarchical model of Lessard (1996); the D-CAPM model of Estrada (2002); the Damodaran (2012) model; the Godfrey and Espinosa (1996) model; and the ICCRC model of Erb et al. (1996a,b) and results indicate different value of cost of equity for different model.

Current study hinges and deliberates upon examining the implication and operationalization of specific models in specific markets by keeping the backdrop to all issues related to market risk, industry risk and country risk. This would be a step forward for firms to estimate their equity financing cost by using industry, country and market specific model proposed by this study.

The overall aim of the study is to give a comprehensive empirical overview of the multiple capital asset pricing models after estimating discount rate in developed countries like the US, UK, Canada, Germany, France and Japan, and developing countries like Brazil, India, China, South Africa, and Pakistan. The study does not embed a make-believe nor it suggests the superiority of one model over the other, but the basic purpose of this study is to point out each model's advantages and disadvantages. The study also aims to establish empirical guidelines for investors all over the world for the best selection of country specific model to maximize the worth of their investments. In this regard, the study proposes some new integrated models to estimate the cost of equity to cover maximum risk factors as identified in the literature.

1.5 Problem Statement

Academicians and practitioners are still ought to design a robust, practical, yet theoretically consistent asset pricing model. Such model will estimate the required rate of return in terms of the cost of equity across different investments as a function of a relative handful risk factors. The basic requirement that the model should serve is to characterize all probable risks that a project or investment may face and assign a discount rate that reflects those risks. Therefore, one of the basic tasks of the capital asset theory, is the assessment of these risks and providing a framework to translate such risks into the expected return.

Sharpe (1964); Lintner (1975); Mossin (1966) are the pioneers who work theoretically on the above lines and report that market's excess premium is the only risk factor and only be accounted for all the risks into expected return that leads to traditional capital asset pricing model. Many researchers subsequently validate this model empirically e.g. Douglus (1968), Black (1972), Fama and Macbeth (1973), Jones (1991), while other provide weak evidence e.g. Fama and French (1992); He and Ng (1994); and Miles and Timmermann (1996), whereas many other reject this model e.g. Roll and Ross (1994); Kandel and Stambaugh (1995). The isolation assumption of this model is highly criticized after the emergence of the notion of globalization and network economy, that opens a new arena of models in this area. These situations emerged new risk factors that result in different models with more than one risk factor. Lessard (1996) discusses different risk factors that a firm may face while evaluating its investment at local and global levels and reports five different risks i.e. world premium risk, country macro-economic and political risk, country level price risk, institutional or regulatory risk, industry level risk, and project specific risk. Solinik (1974, 1976) and Stulz (1995, 1999) work on the world premium risk and develop Global Model, Mariscal and Lee (1993) introduce the country risk variable into the Global Model and develop Goldman Sachs' model, Hogan and Warren (1974), Bawa and Lindenberg (1977), Harlow and Rao (1989) and Estrada (2004) work on the downside movement of beta and result in downside CAPM, Godfrey and Espinosa (1996), Erb et al. (1994), Lessard (1996), work on both global and emerging market risk premium and develop new models for emerging markets.

All of these contributions in the form of additions of new risk factors into existing models are increasing the confidence of investors on market based models. Many researchers like Lessard (1996); Bodnar et al. (2003), and Harvey (2016) advise to adjust industry risk premium into the CAPM framework. Barad and Mcdowell (2002) report that most of the financial appraisers make an industry-based adjustment in calculating a firm's cost of equity. Practitioners using the Capital Asset Pricing Model already include industry risk through the beta measure; however, when using the buildup method, it must be added in the form of a risk premium.

Nevertheless, with all of these contributions and suggestions, the models are still lacking in the form of adjustment of industry risk premium. This study attempts to adjust industry risk premium into the existing models in the form of a risk premium that provides more explanatory power to the existing models. Study also provides the dynamics of cost of equity over the different years and different markets which are yet not attempted in any study.

1.6 The Dynamics of Cost of Equity in Emerging and Developed Markets

Past literature clearly distinguishes the developed and emerging markets on the basis of different characteristics i.e. liquidity, efficiency, volatility, efficiency, knowledgeable and rational investors, and trading volume. According to Harvey (2004), developed markets have more liquidity, efficiency, knowledgeable and rational investors and trading volume while less volatility and vis-a-vis.

Capital asset pricing theory suggests that these differences are characterized on both markets and should be priced accordingly. This means emerging markets due to higher volatility, low volume and low efficiency, should be translated into higher expected returns and vis--vis to the developed markets. In addition, emerging markets are characterized by a high degree of country risk, economic risk, industry risk, financial risk in the form of currency devaluation, high movements of exchange rates, failed economic plans, and reforms in the capital market. Past studies on integration also indicate that emerging markets are becoming more integrated into the global capital market. It happens even so, although, many emerging markets can now be seen growing exponentially in terms of companies' listing, market capitalization, trading volume and foreign direct investment (Gözen, 2012; Harvey, 2000; Bekaert et al., 1996; Erb et al., 1996a,b).

Thus, the higher degree of risk typically related to emerging markets suggests a higher expected rate of return in these markets. However, some researchers like Bekaert and Harvey (1995a) suggest that this may not necessarily be true. Therefore, the main motivation for this research provides fresh evidence on the risk and return characteristics of emerging and developed markets across the time.

1.7 Research Questions

The following research question have been formulated for this study.

1. What is role of industry risk in determining the cost of equity in developed and emerging market?

2. Do various risk components follow additive model or multiplicative model?

3. Which capital asset pricing model(s) is more appropriate in capturing the cost of developed and emerging markets?

4. Do the asset pricing model(s) developed in US perform appropriately in emerging market?

5. Can the asset pricing models developed specifically for emerging markets be applied to developed markets?

1.8 Research Objectives

Objectives of the study are as under.

1. To propose a new analytical framework by considering industry risk factors for estimating the cost of equity in emerging and developed markets.

2. To examine empirical performance of the proposed models and of the selected existing asset pricing models.

3. To examine the dynamics of the cost of equity for both developed and emerging markets.

1.9 Significance of the study

Financing cost is a significant phenomenon for both firms and the economy overall. It affects the investment decisions of the firms and subsequently the economic growth of the country. The cost of equity can be characterized as the return demanded by investors for providing capital along with risk of waiting for such return. According to capital asset pricing model, the cost of equity consists of the market excess premium over and above the risk related to the security compared to risk free rate.

Initially, theories and the models for estimation of cost of equity have been emerged from developed countries especially from the United States and UK. These countries have a long history of capital market, so models developed here are based on strong capital market structure. Most of the researchers use these models whether their market is developed (capital based) or not. For the calculation of cost of capital, the most frequently used models are CAPM and APT.

These models are good for developed capital market, but now in USA and UK the calculation of cost of capital is a conflicting point. Some researchers propose

CAPM and the rest proposes multi-risk version of the CAPM, and multifactor models.

There is massive disagreement as to which model should be used internationally to capture the distinct fundamentals of developed and emerging countries. Multiple authors have pointed out the strengths and weaknesses of these models and suggested incorporating country and industry specific risk factors with global and emerging market risk factors. This study attempts to bridge this gap by revisiting mostly used models and extending these models to end up more consistent yet theoretical models.

The emerging markets are volatile markets so their beta is sufficiently greater than one and could be as 4 or 5 (Soeriowardojo, 2010; Harvey, 2000). This definitely has the wider effect as it increases the hurdle rate dramatically (Harvey, 2004). The basic idea is how to capture this type of volatility into a single model. Many authors try to capture this phenomenon and the required risk up to a certain level. The basic idea of this study is that a model should be extended by inclusion of more risk factors that increase the power of return predictability and minimize the error between estimated and realized return.

This study provides a significant contribution towards existing literature by estimating renowned capital asset pricing models and test their robustness for both developed and emerging markets on recent data. The major contribution of the study is to extend some of these models by adding other risk factors that will enhance the models predictability theoretically as well as empirically.

The study is useful for firms, individual investors, stock brokers, fund managers and other market participants. This work increases their quality of decision making about their investments into different securities that help maximizing wealth. Capital market participants would be more aware about securities pricing and there would be more accuracy than before while computing the expected returns.

The study, in addition, enhances their current knowledge on capital asset pricing models not only theoretically but also empirically. Currently no other study provides such comprehensive empirical support on these models despite of the theoretical comparisons.

1.10 Plan of study

The study is organized as follows. The next chapter discusses the theoretical foundations of capital market theory, different models developed with the passage of time, and their empirical findings. The third chapter discusses the data description and explain how the data analysis is carried out through research methodology section, followed by empirical finding in chapter four and the last chapter covers the conclusion and recommendation part of the study.

Chapter 2

Literature Review

The work of CAPM is fundamentally built on two theories i.e. market efficiency theory, and modern portfolio theory. The market efficiency theory can be subdivided into the random walk hypothesis and efficient market hypothesis (EMH). The earlier work of Bachelier (1900) provides the basis of EMH, inferring that stocks generate a random process based on Gaussian or Normal standard distribution so the future movements of stock prices can be established. But the opponent stream claims that history repeats itself so one can predict future prices out of historical movements (Fama, 1965).

The market efficiency also plays an important part in understanding the movements of future prices. According to this theory, if any new information is disseminated and known to every investor, it creates no variations in prices and such information is reflected into stock prices eventually (Samuelson, 2016). There is still a position that information may be processed in different ways, leading to the disagreement about the company's future prices (intrinsic value), and thus variability of prices creates a random walk in the market. Consequently, still no one is in a position to beat the market and earn extra return. Further, return becomes the only function of risk associated and according to the investors own's utility function it in turn becomes the firm's cost of doing the business.

Markowitz (1952) suggest that the riskiness of any security can be determined by the standard deviation of that security returns, and thus higher standard deviations constitute the higher risk and vice versa. While in a portfolio setting, when two are more assets combines, although their return has additive function but standard deviation of that portfolio is not the simple sum of its parts, but its decrease if the assets are not perfectly positively correlated. Markowitz (1952) also discusses about the efficient frontier curve that guide about the best investment strategy based on lower possible risks and higher expected returns in assets. The Markowitz frontier is the combination of different portfolios, and investors are called upon to select the most appropriate portfolio according to their risk and return pattern. The same plan of action is also proposed by Tobin (1958).

The cost of equity or the expected rate of return, is a key indicator for investment decisions of the firms. In order to calculate the cost of equity, generally, capital asset pricing model(s) has been employed in finance literature. The genesis of the model is basically based on the risk and return to equilibrium. In the prior literature, various forms of CAPM have been used by academicians and practitioners. Mechanism of cost of equity calculation gave birth to a vast variety of knowledge both in the form of model development and their empirical testing. The portfolio theory by Markowitz (1952) and the work on liquidity preference behavior towards risk in Tobin (1958) provided the fundamental foundation for the Capital Asset Pricing Models.

The Markowitz's portfolio theory provides a very tedious way for the risk reduction. Sharpe (1964) developed a more efficient linear model where the return is calculated in a single index model and is based on the market fundamentals. Jones (1991) more precisely explains that it will take any variable that explains the variations of mean returns and not only the market index and the beauty of model is that, it can easily be extended to the portfolio. Sharpe (1964) probably the first who specifically shed the light on the relationship of asset prices to different types of risks. According to the author, there is no consistent relationship between total risk and expected return relationship. However, author report the consistent linear and positive relationship between expected returns and systematic risk (Beta).

The systematic risk is the slope of regression that indicate the overall movements in the markets so usually termed as market risk.

The remaining chapter provides the literature review on different capital assets pricing models, starting with the introduction, discuss assumptions, provide formula, and past review over the different years and in different contextual settings.

2.1 The Local CAPM Model

2.1.1 Introduction, History and Major Assumptions

CAPM is an delicate theory with abstruse foundations and implications in pricing mechanism and investor behavior (Perold, 2004). The very first capital asset pricing model (CAPM) is proposed independently by Sharpe (1964); Lintner (1975) and Mossin (1966), and is immediately greeted by the academic community. Although practitioners took longer to accept this model but were ultimately accepted almost universally as a simple and powerful tool for everyone interested in investments or in the working of capital markets. The reason for this enthusiasm is not hard to find as it is for the first time, that both researcher and practitioner have a model that estimates tentative predictions about risk and return characteristics of individual assets.

CAPM is a general framework to evaluate risk and assign the reward for such risk bearing in the shape of the expected return. This theory enables us to identify why government bonds have lesser return than stocks as well as why two different stocks have different returns. This theory also discusses why expected return changes over the different period of time. This theory begins with various assumptions: (1) Investors are utility maximizer, risk averse and belong to only single period. (2) There is a perfect financial market where there is no transactions cost, no taxes or other market imperfections. All assets are perfectly divisible and are marketable. There is a good thing competition and all investors are price taker. (3) All investors have homogeneous expectations about future (4) In this perfect market, risk free asset exists, and anyone can borrow and lend unlimited amounts at any time at the risk free rate (5) investors hold a well diversified portfolio.

Capital asset pricing theory provides insights that help us to assess the fair price of assets in the stock market. Such risk and return information are critical to both participants in finance, equally. Corporations and investors need this information for their investment horizons. Such information helps them to evaluate their investments and make better decisions about different alternative. The identification of over-value and under value phenomena in portfolio investment setting is also an output of this theory. Overall, capital asset pricing theory is an integral part of valuation by assessing the risk and replying them with appropriate expected return at both ends; as firms as well as on investors level.

2.1.2 Theoretical Discussion and Formula

It is a traditional approach to calculate the cost of equity developed by Sharpe (1964); Lintner (1975) and Mossin (1966). The premise of local CAPM model is that the required rate of return or cost of equity is dependent on market premium multiplied systematic risk plus the risk free rate.

$$E(R_i) = R_i^L + \beta_i^L * (R_M^L - R_i^L) \tag{2.1}$$

Where:

R_i^L: Risk-free rate of the estimation country

β_i^L: Market systematic risk of the estimation country

$(R_M^L - R_i^L)$: Market risk premium of the estimation country using country market index

and

$\beta_i^L = \frac{COV(R_i^L, R_M^L)}{Var(R_M^L)}$

The major advantages of this model are that it is based on a simple formula and studies also reflect that this model produces good results when applied on developed markets. This lucid model also has weaknesses. It has less realistic assumptions such as all investors have the same information set, investments horizon and expectations but also in particular every parameter of this model related to the developed market. Securities traded in stock market have different fundamentals for both developed and emerging markets. Specially in case of emerging markets, there is high volatility, less liquidity, difficult to find the companies in many lines of business and mostly their indices are influences by few stock that makes it very difficult to estimate average returns of those stocks with acceptable confidence interval, as in case of developed countries stock markets.

Kohers et al. (2006) investigate the same issue by taking 26 emerging and 23 developed market as sample over the period from 1988 to 2003. Results confirm that emerging markets exhibit more riskiness than that of developed markets in most of the time as well as its expected return are also higher.

This model also assumes isolated and segmented markets, but opponent on account of numerous market-integrated studies, claims that this assumption cannot be acknowledged. CAPM also assume that market risk premium is the sole risk factor that estimates the required return. However, the result can be repudiated on the grounds that this factor is generally negative when applied to the emerging market due to its distinct characteristics (i.e. high volatility, low liquidity and less availability of historical data). The study by Bekaert and Harvey (1995a); Harvey (2005) also indicates that this model cannot be applied when a company is dealing internationally.

Douglus (1968) is the probably the first who test the validity of CAPM, and report that beta is statistically significantly explaining the expected returns of US market but results also reports that intercept is statistically significantly different from zero and as well as different from the risk free rate. Residuals of terms are likewise significantly explaining the variations in returns and have correlation with the beta. These findings are contradicted from the basic CAPM assumptions. A significant intercept term suggests that mis-pricing is a consistent issue in this market which results inefficiency of the market. The significance of residuals may be due to the use of individual security data which can be controlled by using a portfolio of stocks.

Black (1972) test the traditional CAPM for all securities listed on the New York Exchange for the period 1926 to 1966. They form portfolios for all stocks and a regression has been undertaken on excess portfolio returns with respect to excess market returns. The results indicate that high beta securities have significantly negative intercept than the low beta securities, which indicate that relationship between risk and return is not strictly proportional, which mean that there exists a non-linear relationship between risk and return than as CAPM assumed. This study opens ample empirical evidence support for further studies to test the validity of CAPM.

Fama and Macbeth (1973) developed a new methodology to check the risk and return relationship. It is based on the cross-sectional statistical framework that estimates the time variant to overcome the problem of autocorrelation in residuals. They have developed this methodology that estimates a month to month cross sectional regression that produce the time lag betas. They sorted individual securities to form portfolios to overcome the problem of reduced beta range and statistical power caused by use of portfolio betas in the test of CAPM. They also report a positive tradeoff between risk and return and found that beta is the only relevant measure of risk for investors in asset pricing. Pasquariello (1999) revisited the Fama-Macbeth three-step methodology utilizing the same data set and analyzed it with a modified econometric model of CAPM reports a positive relationship between beta and expected returns. Non-linearitys and non-beta measures of risk are also significantly priced in equation.

While using a sample of 788 US firms listed in NYSE from 1960 to 1978, Blume and Friend (1973) created portfolios by applying stratified sampling. They explore the capital asset pricing theory in terms of risk and return relationship. They have found a biased capital asset pricing model on the basis of such methodology. They found CAPM is not compatible with short selling. Their arguments in this regard, based on the strict rules of short selling procedure, which creates hindrance and against the equilibrium CAPM which requires less risk in borrowing than lending.

Moreover they have found CAPM to be valid if the investment portfolio of each investor free of any short sale position. Applying a linear combination of market and zero beta portfolio to the investor's portfolio the study revealed that the assumption of short selling CAPM proves to be less restrictive as compared to assumption of the risk free rate. Furthermore, their results are in line with CAPM version of Black (1972) about the risk-return relationship.

Empirical validity of CAPM has been tested by Black (1972) by using a simple regression model for time series data. Covered a time period of 40 years from 1926 to 1966, the study analyses monthly data of US based firms quoted on the NYSE. Their study revealed a significant difference in their intercept as compared with the risk free rate. Results also reveal a time varying intercept, which has a negative relationship with systematic risk (beta). In addition they have found a negative intercept when beta risk exceeds than 1 and a positive intercept when beta is lower than 1. Contrary to that Sharpe and Cooper (1972) reports different results while applying the same methodology.

Lau et al. (1974) examines the CAPM validity while analyzing Tokyo Stock exchange (TYO) by using a sample of 100 listed firms from 1964 to 1969 a period of 5 years. The results exhibit CAPM validity in the Tokyo stock exchange. Moreover, investors in the TYO are compensated for bearing the systematic risk and past performance of the risk can be applied to anticipate the future level of risk. In addition, study also reports that, during this span of time, US investors earned a higher return than that of Japan's investors.

Roll (1977) has questions the earlier empirical work on CAPM. This study requires to re-evaluate the literature on support of CAPM. His study criticize CAPM in two ways; first he questions the efficiency of the mean variance portfolio and second the unavailability of mean efficient portfolio in real world as no stock index included all the possible securities like stocks, bonds, real estate, precious metals etc. While comparing Sharpe-Lintner CAPM and zero-beta CAPM of Black (1972) on the basis of capital asset pricing theory, the results are in conformity with Blacks version of CAPM and not favours of the CAPM version of Sharpe-Lintner. In another study Gibbons and Ferson (1985) take a sample of 30 companies of

Dow Jones stock exchange over the sample period of 18 years from 1962 to 1980. His study is based on Rolls critique i.e. the presence of an unobservable market portfolio while relaxing the assumption of constant risk premium. The study supported the time varying risk premium CAPM.

Numerous studies have found a weak relationship between beta and expected return in CAPM. For example, Cheung and Wong (1992) work on the validity of CAPM over a period of 1980 to 1989 and report that found it to be less supportive. Similar findings have been dacumented by Cheung et al. (1993) while analyzing stocks listed in Korean and Taiwanese stock exchanges. Groenewold and Fraser (1997) work with an APT version of CAPM in Australia from 1983 to 1993 for 10 years. His findnings reveal that the theoretical model of CAPM could not be valiated. Similiary, Gómez and Zapatero (2003) could not find proof of CAPM in Amrican equity market and his study showed insignificant results with basic CAPM. However, by adding active management risk- an additional beta, his study exhibits some predictive power of CAPM. Michailidis et al. (2006) and Hui (2008) have failed to demonstrate the validity of CAPM in Greek stock and Japanese stock market respectively. On the contrary Hansson and Hordahl (1998), have found some supportive evididence on the validity of CAPM while using the data on 80 firms listed in the Swedish stock market from 1977 to 1990. However, his findings are comparatively different and surprising as compared to studies conducted by researchers in other parts of the world.

Moreover, Avramov and Chordia (2006) investigate the validity of major risk factors size, book to market, dividend yield, default risk spread, treasury yield, term spread, growth, and the market premium for the NYSE-AMEX over the vast range of 3,123 real-time funds data on stocks. Results reveal that equity premium is insignificant to predict the stock returns. While other risk factors report a positive and significant relationship with the realized returns.

Accordingly, Banz (1981) study provides another conclusion that size is a more important factor than the excess market return, and it exists from last forty years in NYSE firms. Study further discuss that smaller firms outperform the larger ones in terms of risk-adjusted returns which make CAPM is a misspecified model.

the Study produces inconclusive results in regard to size either an independent risk factor per se or it may be just the correlated variable to actual unknown risk.

Taking a sample of US stock listed in NYSE over a time period of 27 years from 1962 to 1989, Fama and French (1992) have found no validity of CAPM while considering the cross-section of stock return and risk. When they extend their sample and go back to 1941 up to 1989, again they cannot find any supportive evidence of beta to explain the cross-section of stock returns. Moreover, their study reveals certain variables like size of the firm, book-to-equity ratio, earning-price ratio and debt-to-equity ratio are found to be statistically significant while explaining cross sections of stock returns.

Contrary to findings put forward by Fama-French, Kothari et al. (1995) reveal empirical support of CAPM. While explaining his argument they find out annual time series regression is more supportive as compared to monthly time series regression. Their findings reveal a risk premium of 6% to 9% annually on an estimated beta. Their study also provides the size effect of average stock returns. They find Fama-Frenchs fails to validate CAPM due to selection bias in COMPUSTAT data. In response, Fama and French (1996) conducted another study and reported an insignificant explanation of the cross section of realized stock returns by the CAPM in both yearly and monthly betas. Contrary to the Fama and French (1992), Daniel and Titman (1997) argue that size and book to market ratio cannot be characterized as proxies of unknown systematic risk. The significance of these variables are not due to their correlation but the result of covariance of returns.

Based on Kothari et al. (1995) claim of selection bias in the data by Fama and French (1992), Campbell and Limmack (1997) made the point the problem of curatorship bias. They argued that in previous studies only high performing firms were included and they ignore poorly performing firms while making their samples. Therefore results attained in the form of higher returns for portfolios with high book-to-market ratio firms. However, this argument has been empirically disproved by numerous researchers e.g. Davis (1994), Chan et al. (1991), Cohen and Polk (1996) and Barber and Lyon (1997).

In another study Lakonishok et al. (1994) discuss the explanatory power of co-variance structure which determines asset returns. Their study further revealed that asset returns covariance along with other market portfolio or macroeconomic factor has more ability to explain the cross section of asset returns. Moreover, Gangemi et al. (2000) also investigate the impact of macroeconomic factors in the explanation of the stock returns for Australia equity market. Results indicate that exchange rate is the only factor that impacts the country beta in all other macroeconomic variables.

Chou et al. (2004) analyze the predictability of the size and book to the mar-ketthe ratio from 1982 to 2001 for NYSE. These ratios have less explanatory power in relation to the original study period. Authors also report that size only shows significance in the month of January, whereas book to market is significant throughout the year.

A model propose by Hur and Kumar (2007) for correction of bias i.e. errors with respect to cross sections, in determining CAPM validity tests. They argue that these biases exist due to a wrong estimation of beta and incorrect portfolio grouping procedure based on covariance of estimated betas with estimated alphas. While analyzing US listed firms in its equity market for the last 75 years from 1931 to 2005, they have found significant application of CAPM theory. The results attain after controlling the size and correcting the bias in the proposed manner. Suh (2009) argue that in a highly volatile market environment, the CAPM parameters surpass Fama-French 3 factor model parameters.

Lo and MacKinlay (1990) analyze the CAPM theory while focusing on the issue of data snooping in its empirical testing. They argue that portfolio formed for testing the CAPM validity is based on prior information of size or price-earnings ratio instead of economic theory. The logic of portfolio formation based on previous information is termed as data snooping. They report that the invalidity of the CAPM theory is largely due to this data snooping bias. A comparative study conducted by Van Vliet et al. (2011) while comparing CAPM and Fama-French three and four factors reveals that empirical validity for the multifactor models is due to sensitivity with respect to the sample period. He further argues that these evidences prove the data snooping hypothesis or small stocks features like their transaction costs and liquidity. To answer the question of data snooping Ansari (2000) document that such problem will ever come through the use of different market locations i.e. countries, for collecting data sets for empirical testing.

Black (1993) demonstrate that researchers are trying to report findings of CAPM validity according to their own view. For that purpose they are just going for data mining same or different variables with different time periods. The outcome of such practice results in some findings statistically significant by chance as suggested by the probability theory.

? come up with another justification in terms of behavioral finance. They argue that inflated returns on portfolios consisting of growth and value stocks are based upon the investors expectations. They censure investors inability to differentiate between good firms and good stocks. Same misjudgment of stocks by investors are pointed out by Jegadeesh and Titman (1993) in terms of the momentum effect. However, Porta et al. (1997) argue that return differences has been significantly explained by earnings surprise particularly for value stocks over the growth stocks.

Paavola (2007) states that either CAPM is mis-specified or the empirical tests for the validation of CAPM are faulty. He further argues that theoretically CAPM is explained in terms of expected risk and expected return, whereas its empirical tests are mostly based on realized risk and return. He also criticizes Fama-MacBeth in term of its methodology and criticises that it ignores sampling error. His study is based on a sample period of 17 years from 1987 to 2004, where he analyses the validity of CAPM, APT and Consumption CAPM in the Finnish equity market. The results of his study reveals both CAPM and APT are equally effective while explaining the cross section of expected stock returns. Moreover, the explanatory power of larger portfolios over performs than that of small portfolios. He explains as the larger stocks drive the market and set the market direction and prove their superiority. His findings are consistent over GMM and OLS White standard error estimation etc.

Akdeniz et al. (2000) analyze the stock returns and beta in their ex-ante form and consequently investigate the CAPM in its theoretical dimensions. Moreover, a positive linear relationship has been observed between beta and expected return in his study. Pettengill et al. (1995) make arguments in support of CAPM and claim that it predicts a positive risk premium. However, these market risk premium are positive or negative over the different time period. Generally in the cross sectional methodology, for validity of CAPM is usally foucs on the average of all cross sectional time periods regardless of ups and downs in the market. Therefore the refined version of CAPM validity test for cross sections of returns based upon the dummy variable after controlling for positive and negative realized risk premiums. Taking the same methodology Hung et al. (2004) validate CAPM beta in U.K. equity market. He also states that while controlling different risk premium in up and down markets, beta is capable of determining the cross section of U.K. stock returns.

Narasimhan and Pradhan (2003) conduct the study to inquire into the validity of conditional CAPM in the Indian equity market. With a sample of 100 firms which have been allocated into 5 portfolios covering a time span of 12 years from 1990 to 2001, they estimate three variants of the conditional CAPM. Their findings confirm the validity of the largest stocks portfolio only while rejected the empirical validity of conditional CAPM for all other set of stocks. They also criticize the Fama-MacBeth cross sectional methodology and claimed it to be one of the reasons for poor performance of the CAPM. Along with that, they have found empirical evidence of constant beta conditional CAPM and constant price risk conditional CAPM. Moreover, they report an opposite relationship exists between size and beta. On the basis of such findings, their study reveals that small stocks portfolio betas remain constant as compared to large stocks portfolio betas which vary over time.

Basu and Chawla (2010) check the validity of CAPM on the Indian equity market by taking 50 stocks divided in to 10 portfolios for a time period of 5 years from 2003 to 2008. They have not found any evidence of CAPM validity in the Indian equity market. While checking the validity they report a negative relationship between risk and return. Moreover intercept term is found to be very large which further invalidate CAPM in Indian market environment. Though in some cases their findings discover that the residual variance is statistically significant but overall their result prove insignificant for the Bombay stock exchange.

Another study carried out on the Bombay stock exchange by Choudhary and Choudhary (2010) by using an extended data set of 278 listed firms for a period of 13 years from 1996 to 2009. Their results are consistent with previous work of Basu and Chawla (2010) and cannot validate CAPM in Indian market. However, unlike Basu and Chawla (2010) they find residual variance significant enough to account for the cross section of excess stock returns. Moreover they discover a linear relationship between risk and return as proposed by CAPM. Ansari (2000) also came up with the same findings which revealed in validity of CAPM in the Indian equity market. These findings contradict previous work of Varma (1988) and Srinivasan (1988) who claim the validity of CAPM in the Indian equity market.

Ning and Lui (2004) check the validity of CAPM in Shanghai stock exchange and come up with the findings that a non linear relation exists in risk and return and residual variance priced significantly. Their findings negate the earlier work of Xue and Zhou (2001) which validate the CAPM and are claimed that by the time investors become rational in Shanghai stock exchange.

Another study by Ali and Chowdhury (2010), who investigate the validity of CAPM by using Fama-Macbeth methodology. For this purpose, the study takes 160 listed firms of Dhaka stock exchange over a sample period of 10 years from 1998 to 2008. They argue that beta is not the only risk factor that determine the stock returns in the Dhaka Stock Exchange and the relationship between risk and return was weak and non-linear.

Moreover, evidence from an other emerging market, Ward and Muller (2012) test the CAPM on the Johannesburg stock exchange for the period 1986 to 2011. The results report the insignificant and negative results which indicate that beta is an inappropriate risk factor for the determination of expected returns in JSE.

The literature put forward in this section suggests that the empirical findings on the validity of the CAPM are generally uncertain. The uncertainty exists due to the gap that prevails between the theoretical assumptions of the CAPM and its empirical testing methodology.

Although, the CAPM is quite easy to understand from its formula, but empirical testing of CAPM is a complex procedure. For example, from the definition of capital asset pricing model, it generates the required rate of returns, but to test model, there is a need to use historical returns. To test such ex-ante model with the help of ex-post returns, someone must take heroic rational assumptions of entire phenomena. So investors are making independent estimation of expected returns and do not depend over a specific time period and follow the average behavior of realized returns.CAPM is a single period model but the expected returns are calculated from several months realized returns historical data, or even years.

Another problem that arises from the above implication is the empirical testing of the CAPM model. One of the issue is likely to be sensitivity that arises from selection of time spans especially the beginning and ending time period and the number of observations. Such time frame may or may not have a large fluctuation in the risk-free rate and there may be substantial macroeconomic disruption during that time. It may generate very noisy results of suspicious economic significance or non-significance. In addition, issues may also arise by taking assumption of stationarity for realized returns that is a required assumption for testing time series data. Usually, this assumption is violated while testing the CAPM due to shortage of historical data. CAPM also make another assumption about risk free rate. Risk free needs to be non-stochastic and fixed in repeated sample as well as market risk premium and asset coefficient remain unchanged for the entire testing period. Finally, one should take the near proxy of the market portfolio to calculate the market premium, but true market portfolio is not observable according to Roll (1977).

Several researchers also examine the theoretical and empirical validity of CAPM after relaxing these assumptions. Black (1972) study pointed out that a new model can be developed without risk free assets and his study concludes that by doing so the new model explains better results than the original CAPM. In addition to that, Myers (1972) presents his work that by adding a new non-marketable human capital asset into the original CAPM provide the same linear substitution between beta and expected returns, however, such relationship is less accurate if all assets are marketable.

Mixed evidence for the validity of CAPM can be seen in Pakistan Stock Market. Rizwan Qamar et al. (2014) work on checking the validity of capital asset pricing models on 10 companies for the period ranging from 2006 to 2010. They use monthly returns and results reported that this model does not apply as it is unable to explain the expected returns of Pakistan Stock Exchange. Wu et al. (2017) check the validity of capital asset pricing model on 306 firms from 18 industries over the period for 2001 to 2014 by using Fama-Macbeth regression. Results are included on the monthly data that indicate that even the basic assumptions of higher risk higher return is not fulfilled in this stock market. They also reported that CAPM is not applicable for listed companies of Pakistan Stock Market. They revisited the whole model on industry portfolios but results have no improvements.

Javid and Ahmad (2009) work on multi-factor capital asset pricing models and reports that multi-factor CAPM is explaining the stock return variations. They utilize economic variables that show that variations in returns are well explained by consumption growth, inflation money rate and the term structure of interest rates while excess market return, variations in oil prices and exchange rate are weak predictors. They conclude their finding that macroeconomic variables are also the superior predictor of stock returns.

In another study, by the same authors, **?** attempt to investigate the validity of CAPM in explaining the basic risk and return relationship on individuals stocks traded in Karachi Stock Exchange on a daily and monthly data over the range of 1993 to 2004 for a sample of 49 companies. They estimate the time variant beta with macroeconomic variables like money rate, term structure of interest rates, inflation rate, and foreign exchange rate, growth in industrial production, growth in real consumption, and growth in oil prices. Results confirm that these macroeconomic variables strengthen the applicability of CAPM in Pakistan Stock Exchange.

Iqbal and Brooks (2007) investigate the empirical validity of capital asset pricing model for explaining the returns of firms listed at the Karachi Stock Exchange for the daily, monthly and yearly data ranging from 1992 to 2006. Fama-Macbeth regression is conducted on individual as well as portfolios and three time in variant betas is calculated in first step after controlling for size and thin trading. The results indicate a positive but non-linear relationship between risk and return for more recent years where there is a high level of liquidity and trading activity than other years.

From Indian Stock Market, Bajpai and Sharma (2015) test the capital asset pricing model for the Indian equity market for the data ranging from Jan-2004 to Dec-2013 with rolling regression methodology taking as 3 year window. According to the authors, this methodology produces more robust results for traditional CAPM than any other methodology. Results also point out that CAPM is properly explaining the risk return relationship in Indian Equity Market.

Basu and Chawla (2010) conduct their research on the validity of capital asset pricing model for the period from 2003 to 2008 in a portfolio setting. Their results indicate that the traditional model of capital asset pricing model completely fail to explain the expected return in the Indian Equity Market. They also report that there is a negative relationship between risk and return. Authors have suggested exploring multiple variants of model particularly with respect to emerging markets than these developed market models.Hussain and Ul Islam (2017) also provides the similar results that CAPM is not a valid model for testing the risk and return relationship in Indian Equity Markets. They use Fama-Macbeth methodology over the data from 2003 to 2015 on Nifty 100 index.

Lazar and Yaseer (2012) test the validity of CAPM for Bombay Stock exchange for the period ranging from 2001 to 2009. The results indicate that the market premium is explaining the 65% of the variations in portfolios with returns that clearly validating the applicability of CAPM in this market. Raja et al. (2017) also support the above findings and his study validate CAPM on three industries i.e. Banking, IT, and Automobile.

Jagannathan and Wang (1996) to investigate the systematic risk and returns relationship in NYSE and AMEX from 1962 to 1990 by using monthly stock returns. They modified the CAPM by including the human capital index for measuring aggregate wealth. Their results report a significant aforementioned relationship. Filho (2018) work for the Brazilian stock market to check the validity of conditional CAPM by using macroeconomic and financial variables. Theirs results validate that Jagannathan and Wang (1996) CAPM is perfectly applicable for determining the cost of equity of Brazilian companies.

Many other researchers also work on Local CAPM model like Iqbal and Brooks (2007)on Lahore Stock exchange, Pakistan; Ali and Chowdhury (2010) on Dhaka stock exchange, Alam et al. (2015) on Chittagong Stock Exchange, Lee et al. (2016) on Kuala Lumpur Stock Exchange, Chan and Faff (2003) work on Australian Stock Exchange, Australia; French (2018) work on New York Stock Exchange, US; Qin (2007) work with model on Oslo Stock Exchange; Tambosi Filho (2018) apply on Brazil Stock Exchange; Xue and Zhou (2001) apply on Shanghai Stock Exchange; and Erasmus (2011)apply on South African Stock Exchange. All of these studies provide an insignificant result of CAPM on respective equity markets. Such insignificant results open the new debate and paved the way for exploring new models in the literature.

2.2 The Global CAPM Model

2.2.1 Introduction, History and Major Assumptions

Global (also sometimes pronounced as International) model for estimation of equity return is initiated by Solinik (1974, 1976, 1983), Grauer et al. (1976),Stulz (1981) and Adler and Dumas (1983) on the assumptions that all markets are integrated and it is possible to construct a single cost of equity model that will capture all related risk associated to all stock markets. This model is well received by both academician and practitioners. Subsequently empirical work on international asset pricing model is being investigated to examine whether there is one or several equity risk premiums all over the world. Moreover studies also investigate the nature of integration or diversification in international stock markets. This motivates many researchers and they initiated new empirical testing on Global Capital Asset Pricing model.

Grauer et al. (1976) is probably the first person who starts thinking the concept of the global stock market where all stock markets are integrated and investors can invest in any stock market to diversify its portfolio. His work can be said as a predecessor to the single-factor Global-CAPM. Grauer et al. (1976) who build an international CAPM on the same theoretical foundations as local CAPM. The integral assumption of the model is as same as Local CAPM like the assumption of a perfect capital market with no taxes, transaction costs, no barrier to investment and all market are fully integrated.

Another important fact regarding investors choice is presented by Karolyi and Stulz (2002). With respect to internationally diversified portfolio, investors are only intended to be interested in real returns offered by financial assets. For that purpose they are interested in measuring their risk up to the degree to which their investment contributes to the variance of the return. This support the argument of all investors homogeneous expectations and therefore invested in the same consumption opportunity as claimed by Purchasing Power Parity (PPP).

Stulz (1981, 1995) has argued that the national market index should be considered as compared to a global market index in the CAPM applications especially for firms which trade their shares in the integrated international financial market. This argument is based on the assumption that since firms may differentiate in their correlation with a global index as compared to a national index, therefore this choice of index theoretically influence a firm's estimated cost of equity, which is also demonstrated by author in giving one example of a firm, Nestle. However, the question arises for the generalization of the results as local CAPM claimed in the Stulz (1999) study is based on the Swiss stock market which is very small as compare US stock market having a large sample of listed firms.

2.2.2 Theoretical Discussion and Formula

The major limitation of local CAPM model is that stock markets have no integration, which is well-address in Global CAPM. According to the supporters of Global CAPM, all investors have the same baskets of securities and purchasing power parity theory hold all over the world. In other words that all stock markets are integrated and it is possible to estimate a single capital asset pricing models which is as follows:

$$E(R_i) = R_i^G + \beta_i^G * (R_M^G - R_i^G) \tag{2.2}$$

Where:

R_i^G: Global Risk free rate

β_i^G: Beta of security to global market index

$(R_M^G - R_i^G)$: Global Market premium

and

$\beta_i^G = \frac{COV(R_i^G, R_M^G)}{Var(R_M^G)}$

Many authors have documented their findings that global model demonstrated surprisingly low returns almost less than twenty-five percent in global equity markets, and reported that volatility level in some markets remains significantly higher than others. Roll (1992) summarize all these studies and examine out their probable causes for apparently different results. Author reports three separate yet primarily technical inferences in his work. Their first finding is that some stock market indices are more diversified than others. In addition, industrial structure of every country is highly important for predicting behavior of stock prices movements. Moreover, volatility of exchnage rate is also one of the cause for abnormal returns behavior in some countries than others. So results conclude that a global model need adjustments to work for expected equity returns.

The earlier testing on Global-CAPM can be seen by Stehle (1977) using the Fama-Macbeth (1973) cross sectional regression, for evaluating the US stock over a period of 1956 to 1975. Global portfolio is created by equally weighting the stock returns of Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Switzerland, the UK and the US.The results are estimated on both Local-CAPM and Global-CAPM and they find out that both betas are positive but statistically insignificant. These results are regarded as the issue of multicollinearity as US index that is more than 40% correlated with the world portfolio.

Jorion and Schwartz (1986) investigate the same issue for the Canadian market over the period of 1963-1982 by a sample of 750 firms. Their results also show that Global CAPM is not held in Canadain Market. Heston and Rouwenhorst (1994, 1995) revisited the impact of industrial structure on global stock market return's and volatility. However their study ended up with a different conclusion from Roll (1992) work. They come up with findings that a low predictability prevail in country's indices is because of return variation belongs to a specific country, instead of technical nature of indices. Their work suggest that equity markets are not perfectly integrated, and there is an apparent benefit of global diversification and investment in such global portfolios.

Sercu and Uppal (1995) also worked on Global CAPM for well diversified investors. According to this model, international investor needs to incorporate all the risk that arises from purchasing power deviations. Therefore the resultant model come up with adding the element that gauge exchange rate risk among local currency with the base currency of a developed country usually US. However, researchers point out that in the long run purchasing power parity theory hold, so there is no need for adjustments on these risk. Although Adler and Dumas (1983) emphasis the need for revaluation of integration assumption with some sophisticated stochastic process, which according to him is not possible until goods market should be considered along with financial markets.

While analyzing currency global capital asset pricing model O'Brien (1999) use 6 techniques to calculate the cost of capital for emerging stock markets. The study report that up till now there is no single unified method to analyze the risk of emerging markets. However, they come up with findings that in order to get international diversification, investors go for Global CAPM otherwise apply local CAPM.

Moreover, Machado et al. (2013) investigate ICAPM over the Brazilian stock market for the period of 1988 to 2012. Results indicate that beta is significantly positively explaining the variations in the stock returns for interest rate, inflation and gold price while negative for exchange rate.

Polakow and Flint (2015) test the global risk factor for the determination of average stock returns of the South African equity market. Results report a positive but moderate to poor performance of the global risk factor in determination for stock returns. However, South African stock market responses to every major international momentum like sub-prime mortgage crises 2008.

In another research Harris et al. (2003) extended the previous literature based on global CAPM and domestic CAPM and suggested their proxy for the ex-ante expected returns. While comparing them with ex-ante expected return estimates, they noted that global CAPM has been surpassed by local CAPM. However, they could not find much difference between two asset pricing models and found it indifferent to choose when discussing large US firms.

Moreover, Harvey et al. (2002) work in an innovative way to see which risk factors have more determining power than other by using the latent factor technique. Results indicate that global risk premium has more loading than any other risk factors. They build a new model by using two risk factor, global and foreign exchange risk, which explain the variations in the international portfolio and fixed income portfolios significantly.

The discussion on global CAPM and domestic CAPM has also been done by Koedijk et al. (2002) who examined global CAPM and domestic CAPM in term of estimating cost of capital. For this purpose they differentiate a multi-factor global CAPM and single factor domestic CAPM. Based on such assumptions, their study revealed that domestic CAPM rarely results in variation in the estimate of the cost of capital as compared to multi-factor global CAPM. This further confirms the home bias puzzle.

From recent work, Godeiro et al. (2016) investigate the validity of international CAPM on a sample of 14 developed and emerging countries. The time varying beta has been calculated by using the MSCI world index through the GARCH estimation. Results indicate a higher beta than 1 in all emerging countries except Chile, as compared to developed ones. Moreover, ICAPM cannot explain the variations of stocks returns and higher risk cannot necessary mean higher expected returns. moreover, Kan et al. (2017) work on the different model's performance and results reveals inter-temporal international CAPM exhibits better explanatory power than rest of all.

The mixed results regarding the validity of Global CAPM, open horizons for the researcher to re-investigate phenomena of global risk premium and furnish update findings on both developed and emerging market. Therefore, this study investigate the Global CAPM validity and makes its contribution into the existing body of knowledge.

2.3 The Modified Global Model

Sabal (2002) argue not to include country specific risk into systematic risk while determining equity cost. He claims country risk is different for each industry specifically if it belongs to emerging economies. Moreover, it is not essential that systematic risk for every company is unchanged. Based on these arguments, he constructed a modified version of CAPM. This model does not account for country risk in the determination of the discount rate. The model which is suggested by Sabal (2002), is given as under:

$$E(R_i) = R_i^{S\&P} + \beta_i^{S\&P} * (R_M^{S\&P} - R_i^{S\&P}) \tag{2.3}$$

Where:

$R_i^{S\&P}$: US Risk free rate

$\beta_i^{S\&P}$: Beta of security to US market index

$(R_M^{S\&P} - R_i^{S\&P})$: US Market premium and

$\beta_i^{S\&P} = \frac{COV(R_i^{S\&P}, R_M^{S\&P})}{Var(R_M^{S\&P})}$

This model has been discussed by several authors theoretically but none of them up estimate it empirically i.e. (Fuenzalida and Mongrut, 2010; Gimpel, 2010; **?**; Gözen, 2012; GÖZEN, 2013; Hamard and Lamothe, 2009; Kanaryan et al., 2015; **?**).

Bekaert and Harvey (1995b), further confirms that when Global CAPM is applied on emerging markets stocks along with regressing global market proxy like MSCI World Index, betas are either negative or close to zero. They also report that Global CAPM should be avoided when an investor considers to make investments in un-integrated markets. The reason behind such advice is the existence of local factors and the low correlations that exist between various emerging and developed markets, as explained for expected returns. They also suggest that the practitioner should confirm that the available market is totally integrated into the world market, when they apply the method of asset pricing based on the Global CAPM. This is one of the reasons for rejection of Global CAPM as ignored integrated market assumption.

In contrary to this, Semenyuk (2016) work on the modified CAPM after the adjustment of country and industry risk premium over the Ukraine stock market by using 10 years data from 2006 to 2016. Results indicate that adjustment of the new risk factors, results has more predictive power and significant in explaining the variations in the stocks returns.

2.4 The Goldman Sachs' Model

Mariscal and Lee (1993) introduce the country risk premium known as country yield spread. This spread tells the yield difference between emerging market sovereign bonds and US Treasury bond. They have supplemented this spread of Global CAPM in order to find the cost of equity for the developing economies. This model became very popular among researchers and famous with the name of Goldman Sachs' model. In order to increase the accuracy of cost of equity estimation in emerging markets they further add country spread variable to the expected equity returns. This is further supported by Bekaert and Harvey (1995b) who report that a low correlation exists between equity returns of developed and developing markets. Therefore a global CAPM while considering it as an international yardstick which also take into account the developed market indices, would offer expected equity returns for developing markets which are lesser than what actually observed (Harvey, 2001). Therefore by incorporating country risk premium, Mariscal and Lee (1993) and others group of researchers acquire those values of expected equity returns which are closer to what is instinctively required by practitioners.

$$E(R_i) = R_i^{US} + \beta_i^{S\&P}(R_M^{S\&P} - R_i^{US}) + (R_i^{ME} - R_i^{US}) \tag{2.4}$$

Where:

R_i^{US}: US Risk free rate

$\beta_i^{S\&P}$: Beta of security to US market index

$(R_M^{S\&P} - R_i^{US})$: US Market premium

and

$\beta_i^{S\&P} = \frac{COV(R_i^L, R_M^{S\&P})}{Var(R_M^{S\&P})}$

$(R_i^{ME} - R_i^{US})$ is the Country Risk premium as sovereign risk differential

Fuenzalida and Mongrut (2010) work on the Goldman Sachs Model for the valuations of emerging markets by using a sample of investment banks and consulting firms. In this model, regression is applied between stock returns and returns on the S&P 500. Beta which is obtained through such method is multiplied with a risk premium of the S&P 500 index. In the final step, to control low cost of equity, a country risk premium will be added. This premium which is based on Emerging Markets Bond Index Plus (EMBI+), is shown as JP Morgan. The result report significant relationship between obtained beta and stock returns. Zenner et al. (2008) documented its application like measuring the spread among yields on sovereign debt securities emitted by the country, for international trade as well as calculating yields on US Treasury instruments with similar maturity.

Sovereign yield spreads is also adjusted under the guidelines of Mariscal and Lee (1993) by many other researchers, like Damodaran (2005) and Bekaert et al. (2014, 2016) , they all show that cross sectional as well time series variations of Sovereign yield spreads can explain the variations in stocks returns so they should be priced. However, literature indicates that simply adding sovereign spread into model, results in double counting of global systematic risk, which is already reflected in the model.

Although there are certain issues which create hindrance while applying Goldman Sachs model. As noted by Bekaert and Harvey (1995a) and Fuenzalida and Mongrut (2010), they also termed this method as an ineffective in terms of theoretical foundations. As argued by Sharpe (1964); Lintner (1975); Mossin (1966) that beta in CAPM is the absolute measure of risk for any asset when priced as an element of an efficient portfolio. Therefore, no need of including any additional risk (Fama and Macbeth, 1973).

The latest work can be seen by Sanvicente et al. (2017), who use this model for the estimation of the cost of equity for the Brazilian market. According to authors, country risk premium play an important role for determination of cost of equity when the markets are less integrated. Study use monthly data of 57 stocks which are actively traded in Brazilin stock market for the period of 2004 to 2014 using emerging market bond index as a proxy for the country risk premium. The results indicate that the country risk premium is not explaining the returns of stocks.

The above limitation can be seen already adjusted by Lessard (1996), who recommend to adjust the country risk premium on the stock beta than on risk free rate. Lessards hierarchical model, which is a multiplicative model, that multipy the two beta $\beta_i^{EM} \times \beta_i^{US}$ with the emerging market premium risk and following model is reported as in equation 2.7.

Although theoretical foundations seems weak for Goldman Sachs model, but as it is highly welcome by practitioners, this study re-investigate the issue empirically to provide more insight on the subject matter.

2.5 The Downside CAPM

2.5.1 Introduction, History and Major Assumptions

Roy (1952) is probably the first who talk about the downside risk and argues that investor major concern is protection of its principle and he accepts any minimum level of return that promise to protect its original amount. Roy (1952) named that least acceptable return as the adverse level and the resolving technique as safety-first technique. Markowitz (1959) well verse about investor skewed behavior towards the downside risk. Therefore, he suggests using downside risk for making investment decisions. Based on his work, there are two ways to measure downside risk; one is from below mean deviation calculate semi-variance and other through target return deviations. He also suggest that at time returns are not distributed normally, than downside measure offers superior results. Further literature on semi-variance can be attributed from work of Quirk and Saposnik (1962), which concluded their study that semi-variance is superior theoretically than the variance. Mao (1970) also concludes his work that investors are only interested in downside risk than total risk.

Numerous studies also compare the mean-variance and mean-semivariance methodologies to calculate the downside risk. Jahankhani (1976) compare two different models; mean-variance CAPM and mean- semivariance CAPM, the results of these models indicate the significant relationship between beta and return, but mean semi-variance produced superior results than others. However, due to small sample period (1951-1969), results is regarded as a sample biased.

Harlow (1991) reported that investors are interested in measuring downside risk, as it is based on simple theoretical assumptions and more closely reflects their risk perception. This is why investment strategies depicted through portfolios using variance which are offering low realized returns as compared to strategies based on downside risk exposure. This also proves the superiority of downside beta framework for investor's point of view when the risk-return tradeoff is required. Moreover, this framework results in more protection of downside risk with some of the high level of average returns by offering significantly high allocation to the bonds.

Addressing downside risk, another methodology put forward by Fabozzi and Francis (1977) by taking and testing beta as random coefficient. For that purpose they analyzed beta for both up and down market and found no considerable difference. Kim and Zumwalt (1979) also came up with same findings except the study results in two-beta model disparity because of ups and down market. They also mentioned that upside risks are priced negatively whereas for downside risk investors are extra rewarded.

Alexander et al. (1982) documented that random beta coefficient as discussed by Fabozzi and Francis (1977) was an overestimation and therefore criticized but later on Chen (1982) in his study address this issue and concluded that the problem lies due to multicollinearity, which is overcome through time varying regression.

Another methodology is suggested by Estrada (2002) to measure of downside risk. He suggested calculating the ratio of semi-standard deviations of asset returns on the average asset returns and semi-standard deviation of market returns with respect to the average market return. While concentrating on 28 emerging markets indices. The study documented a weak correlation between emerging market shares and the world market portfolio; therefore he suggested partial integration between the two markets. In addition, he discovered risk based measures show high correlation with market mean returns. Moreover, his findings also draw an insignificant relation between beta and return along with statistically significant downside beta with returns.

The reason for such disparity is due to incapability of the world market portfolio to explain the stocks returns of emerging markets. This is also reported by Harvey (2000) and his study also suggested the downside betas is more related to emerging market, although this relationship is weak for developed markets.

2.5.2 Theoretical Discussion and Formula

Lower partial moments models are also constructed for capturing the higher volatility of emerging markets. In these models CAPM has been widened into Downside CAPM by Hogan and Warren (1974); Bawa and Lindenberg (1977); Harlow and Rao (1989) and Estrada (2002). This study is only focusing on the Estrada model because this model has more recent empirical support than other models.

Estrada (2002) developed D-CAPM model (DownSide CAPM) by taking the initial observations of Markowitz (1959) that he said in his work that emerging markets investors are more attentive towards the risk for a loss than to the potential gain. So to capture such high volatility discusses above, Estrada (2002) take only negative side of returns.

The idea of the Down-CAPM framework documented a correlation between stock returns of emerging markets with the downside risk of the local market. Due to that, Estrada (2002) developed a variant of the capital asset pricing model, which named as D-CAPM. The Downside Capital Asset Pricing Model uses the same Global capital asset pricing model by only substituting downside beta against security beta which is calculated by using the concepts of partial standard-deviation and co-semivariance.

The required D-Beta is estimated by using following formula:

$$\beta_i^D = \frac{S_{iG}^{\mu}}{S_i^{\mu}\ S_G^{\mu}} = \frac{\varepsilon[Min[(R_i - \mu_i)0]\ (Min(R_G - \mu_G))}{\sqrt{E(Min[(R_i - \mu_i)0])\ E([Min[(R_G - \mu_G)0])}}$$

S_i^{μ}: Partial standard-deviation of given Stock

S_G^{μ}: Partial standard-deviation of MSCI as global index

S_{iG}^{μ}: Co-semi-variance of the securitys returns in relation to the global market index of MSCI

And so cost of equity is estimated by using following equation:

$$E(R_i) = R_i^G + \beta_i^D * (R_M^G - R_i^G) \tag{2.5}$$

This methodology over performs the past methods for measuring the cost of equity by many ways. First, it accounts for downside risk that arise due to more volatility in emerging markets and which investors want to avoid. Secondly it also addresses the partial integration idea among markets which are required among integrated markets and segmented markets. Although Global CAPM is being superior by offering low slope of the cost of equity as compared to D-CAPM, but the D-CAPM still holds for emerging market by offering lower magnitude. Although D-CAPM show superiority over the Local and Global model in terms of empirical and statistical estimation but address only one feature of emerging markets that are high volatility (negative skewness) and ignore others like political instability etc., therefore considered as an incomplete approximation.

In another study Estrada (2002)analyzed Downside CAPM (D-CAPM) in both developed and emerging markets settings. For that purpose he selected a sample of 23 developed economies and 27 countries from emerging economies. For each return study finds CAPM beta and downside beta with respect to the MSCI World Index. The study show significant of all beta coefficients with downside beta is being the most significant with explanatory power of almost 47%. In order to check the model superiority between DMs and Ems in terms of their explanatory power, he splits his sample into developing markets (DMs) and (EMs). Interestingly significance of all risk factors has been reported in an emerging market but no risk factor is found to be significant, though downside beta has still held highest explanatory power. Furthermore, the robustness test revealed that mean returns are less sensitive to changes in CAPM beta than downside of similar magnitude.

In another study, Estrada and Serra (2005) investigated cross section analysis on 1600 companies stocks return from 30 different countries for the of 25 years. According to them, economically significant is more important for practitioners than statistical significance.For cross sectional analysis, they apply Fama-MacBeth methodology and GMM. They report that risk variables and cross sectional returns of stocks have weak explanatory power. According to authors, the reason of this failure is due to variation exist in cross sectional from one country, to another country. Though, the results of the study revealed that global downside beta has more power to explain the cross section of stock returns in a significant way when stocks are imbalanced for every five years.

Chong and Phillips (2012) used sortino ratios for the calculation of downside risk. This study reports that value drive from traditional beta is quite different from value drive from downside beta. They also reported that valuations based traditional beta would produce the more value when the market show higher downside risk but it produce lower value when less downside risk. Author concludes that downside risks are not correctly reflected in the capital asset pricing model.

Harvey and Siddique (2000) reports that cross-sectional variation could be better explained though skewness is significant for both size and book-to-market as well.Their study and Dittmar (2000) study both highlight that higher moment CAPM model performs well than the traditional model.

Post and Vliet (2004) and Hafsa and Hmaied (2012) both paper discussed about the inability of skewness and kurtosis to predict stocks returns in higher moments. Post and Vliet (2004) concluded their study that skewness was violated the risk aversion assumption for predicting the cubic asset kernel. While Hafsa and Hmaied (2012) criticized the kurtosis, and implies that investor dislike extreme moments in both negative and positive skewed not as a researcher said in negative sacredness. Their study concluded that downside risk and higher order co-movement. Both should be considered in the valuation of the cost of equity. Their study also reports that normal beta is failed to explain the returns but downside beta has much explanatory power but the sign of coefficient is negative than theory. According to authors, this may be due to immaturity of the French market.

Ang et al. (2006) calculated the expected return by the downside as well as co-skewness methods. They reported that the expected return is higher with downside beta than with co-skewness and the risk premium was also different. They also documented that the risk premium which is captured through downside beta was dissimilar from the risk premium connected through co-skewness. They documented CAPM beta underperforms as compared to the downside beta as former fails to explain the cross section of average stock returns. The superiority of downside beta is evident through its higher explanatory power among the cross section of stock returns. However, the resulted coefficients estimate showed opposite directions from hypothesis. This may be resulted due to immature French equity market.

Another comparison between CAPM and downside CAPM is conducted by Nikoomaram (2010). For that purpose he selected the automobile sector of Iranian equity market. His findings also confirm the superiority downside CAPM (D-CAPM) over the traditional CAPM.

Teplova and Shutova (2011) compared among CAPM with downside CAPM and CAPM with higher movement in Russian stock exchange. For that purpose he focuses on economic cycles and divided his study into two spans; One for boom from 2004-2007 and one in recession from 2008-2009. For analysis they applied Fama and Macbeth (1973) two-stage estimation methodology. The findings revealed that unconditional CAPMs provide significant results for boom period along with low prediction power, however, the results statistically in significant for the recession period. They finally suggested for application of higher movements downside CAPM which portray their superiority in terms of explanatory power than that of any other models.

Houda and Dorra (2012) also checked the applicability of downside beta and higher order co-moments in downside framework. For that purpose he selected French equity market for 23 years time span started from 1987 till 2009. The findings revealed that combining both models i.e. downside and higher co-moments downside framework will be desired strategy when the stock returns are not normal.

Chong and Phillips (2012) also analyze and estimated cost of equity with the help of downside capital asset pricing model (CAPM). The findings reveal that based on downside CAPM betas the cost of equity shows high value especially when downside beta was greater and show lower in value when there is low risk.

Another detailed study conducted by Dobrynskaya (2015) in US equity market to check the explanatory power of both upside and downside beta in terms of profitability. While considering of three markets NYSE, AMEX and NASDAQ in US, he applied momentum strategies by developing 10 equally weighted and value weighted momentum portfolios. The findings revealed downside CAPM over performance while explaining the returns of momentum portfolios.

Ormos and Timotity (2017) was taking Central, Eastern and Western European markets to perform the empirical analysis by applying expected downside risk. The findings revealed that ERD method proves superiority over all other risk factor while explaining the returns. Moreover, dollar denomination valuations have more explanatory power than local currency.

Momcilovic et al. (2017) analyze CAPM in terms of mean variance and semi-variance risk on the mean returns in Slovenia, Croatian and Serbian capital markets settings. Although both factors showed more explanatory power in a positive manner while explaining mean returns belong to these markets but still downside risk show superiority as compared to traditional beta while explaining more variance.

Literature regarding assessment of downside risk based asset pricing models in Pakistan equity market is lacking behind as compared to other parts of the world. As the previous chapter shows many of the international evidence on downside risk based asset pricing models and also proves its superiority over other models. Moreover, downside risk based asset pricing models has more capacity to address investors behavior as compared to CAPM in traditional mode. In addition literature also pointed out the shortcoming of Pakistani data in terms of its stock returns which are not distributed normally. This further increase the need of for downside risk framework of asset pricing in Pakistan settings where researchers encounter returns distribution problem.

One of major contribution from emerging market can be seen by Rashid and Hamid (2015) conduct mean-variance and semi-variance analysis on Pakistan Stock Exchange with specifically focus on its financial sector. The data has been gathered from year 2002 up to 2012 for 10 years time span. They have applied different models Bawa and Lindenberg (1977); Harlow and Rao (1989), and Estrada (2002) to calculate downside beta. They further applied traditional CAPMs beta, downside and upside betas for sub-periods using Fama-Macbeth (1973) regression. Their findings revealed a negative association between risk and return which negating the CAPM theory. It further reveals that Bawa and Lindenberg (1977) and Harlow and Rao (1989)s beta offer the positive and significant association between risk and return. On the other hand beta suggested by Estrada (2002) shows mixed relationship between risk and return i.e. both positive and negative in some sub-periods. The study overall came up with the findings that traditional CAPM could not address certain issues, so it is not suggested for determining the risk and return relationship in Pakistan Stock Exchange as compared to downside CAPM which outperform in prediction in the same relationship.

2.6 Godfrey and Espinosa's Model

Godfrey and Espinosa (1996) conducted study while focusing on limitation of above model and suggested a new model as stated below. They mainly emphasis to apply adjusted beta which is reported in the form of relative volatility ratio (RVR).

Godfrey and Espinosas model is as follows:

$$E(R_i) = R_B^{US} + (R_B^{EM} - R_B^{US}) + (R_M^{US} - R_B^{US})(0.6)[\frac{\sigma_i}{\sigma_M^{US}}] \tag{2.6}$$

Where:

R_B^{US}: US Risk free rate

$(R_B^{EM} - R_B^{US})$: Emerging Market Premium to US market index

$(R_M^{US} - R_B^{US})$: Global Market Premium to US Market

$[\frac{\sigma_i}{\sigma_M^{US}}]$: Relative Volatility Ratio (RVR)

The model transforms the country risk premium into the risk-free rate. In addition to its brings RVR value from Erb et al. (1994) model, which says that nearly 40% of the disparity exist in emerging markets are explained through its credit quality. This study accounts for the major reason that authors apply an 'ad hoc' correlation coefficient of 0.60. This adjusted beta into new Ad-hoc value, of decreases the beta value. However, the inclusion of sovereign yield spread into the risk-free rate creates some serious issues in this model and considers to be wrong without taking any relevant assumption.

Furthermore, there is no theoretical justification for taking 0.6 arbitrary adjustment of correlation coefficient. Even though this model was famous among practitioners at the end of the last century.

2.7 Lessard's Hierarchical Model

Lessard (1996) focused on several ways for adjusting risk that is prone to the emerging market while working on value of offshore projects. He further reported firms normally use high discount rates for their offshore projects with arbitrary basis, as the information for such adjustments are not factual. This practice might mislead the practitioners and managers to give priority to one project over the others. There is a big list of risk like world premium risk, country macro-economic and political risk, country level price risk, institutional or regulatory risk, industry level risk, and project specific risk which a firm faced while considering investment at the international level.

According to Lessard (1996), the adjustment of country risk premium on the risk free rate has been criticized much by previous researches so its better to make its adjustments on stock beta. The study further documented that stock sensitivity to US market is equal to the stock sensitivity of emerging market and reciprocate emerging stock sensitivity towards US markets. In other words, no relation has been observed in the emerging market between stock returns and the estimated error term. Moreover, returns are best explained by the returns of US markets.

Lessard (1996) provides the following multiplicative model for calculating the cost of equity:

$$E(R_i) = R_B^{US} + \beta_i^{EM} \times \beta_i^{US}(R_B^{EM} - R_B^{US}) \tag{2.7}$$

Where:

R_B^{US}: US Risk free rate

$(R_B^{EM} - R_B^{US})$: Emerging Market Premium to US market index

β_i^{EM}: Beta of Emerging Market to Local Market Index

β_i^{US}: Beta of US Market to Local Market Index

However, several researches signified that this assumption might not be held as the association between betas cannot be fulfilled:

$\beta_i^{EM}\beta_{EM}^{US} \neq \beta_i^{US}$

This assumption may be proved to be a serious drawback of this model but still this model is appreciated and gain popularity among a group of investment analysts and individual investors. The reasons being it boosts the sensitivity of the stock relative to emerging market by offering its adjustments with the help of the slope of the emerging markets in relation to US market.

2.8 The Hybrid Model

Hybrid model copes partial integration condition and stated that country risk premium can be set in an additive way. According to the Bodnar et al. (2003), both local risk factors as well as global risk factors are important in setting stocks prices in emerging markets. The major benefit of this techniques that it will capture both emerging as well as global risk premium that enhance the validity of calculation of cost of capital.

$$E(R_i) = R_f^L + \beta_i^G(R_M^G - R_f^G) + \beta_i^{EM}(R_M^{EM} - R_f^{EM}) \tag{2.8}$$

Where:

β_i^G: Coefficient of the Stock in relation to Global Market

β_i^{EM}: Coefficient of the Stock in relation to Emerging market

$\beta_i^{S\&P} = \frac{COV(R_i^L, R_M^{S\&P})}{Var(R_M^{S\&P})}$

$\beta_i^{EM} = \frac{COV(R_i^L, R_M^{EM})}{Var(R_M^{EM})}$

Global and Local risk premiums are calculated on the basis of their respective risk free rate. The major benefit of this techniques is that it captures both emerging as well as global risk premium that enhance the validity of calculation of cost of capital. Inclusion of both emerging and global risk factors also become the major problem of this model. For example, for the valuation of cost of equity of a specific firms, if its internal factors like country specific risk factors are more significant than its external global risk factors, the resultant estimated risk premium will be negative, then after addition into final formula, the required rate of return may decrease instead of increase, disguising the investor to demand low returns instead of higher.

Bruner et al. (2008) tested different models while testing CAPM issues. The most considerable model in their research is a hybrid model that has been applied on both emerging and developed economies. The study revealed hybrid model power of explaining 64% of variations in developed and emerging countries securities returns.

Pereiro (2001) conduct a study while being focused on high volatility, instability in time, and unreliable historical averages of emerging markets for calculating beta. Under such situation he preferred hybrid model as put forward by Lessard (1996). This model offer 2nd low cost of equity that is 13.9% after Global CAPM for Argentina stock market settings. The study further suggests applying different model for the gauging the cost of equity.

Estrada (2007a) applied four models like Lessard Model, the Godfrey and Espinosa Model, the Goldman Sachs Model, and the Salomon Smith Barney model for the estimation of discount rate of Argentina oil sector. The finding reveals 8.2% cost of equity which is estimated through Lessard Model.

Fuenzalida and Mongrut (2010) in Latin American settings applied nine different versions of CAPM. The results revealed that among all models Lessards models response which shows its soundness theoretically, but at the same time it produces vague results. This may be due to the nature of an emerging market where partial integration may not be necessarily linear and preservative. Moreover, systematic risk failed to explain variations in returns as compared to risk.

Moyo (2018) works on the number of CAPMs (i.e. Local CAPM, Lessard model, the Godfrey and Espinosa model, the Goldman Sachs model, the Gamma model and the Salomon Smith and Barney model. Using) for the estimation of the cost of equity for both emerging and developed market. They take South African making investment in developed (Ireland) and emerging country (Turkey) and vice versa. Results reveal that Godfrey-Espinosa and Goldman-Sachs models produce estimate similar cost of equity for both Turkey and South Africa. Results also reveal that investors are demanding more return while investing in emerging market than developed markets. Irish firms provide mixed results as their cost of equity and standard deviation are higher than Turkey. This is due to their high country risk and industry risk which are not controlled in the models.

2.9 Summary of Extent Literature

In the previous sections, the study has come across extensive review of literature and finds mixed evidence on the validity on different variants of CAPM in the different parts of the world i.e. both developed and emerging stock markets. In relation to model(s) failure, different researcher provides different reasons. For Example, according to Roll (1977) and Naqvi (2000), misspecification of CAPM is responsible for its failure, however, Solinik (1974); Stulz (1981) report that isolation assumption is the main cause. Furthermore, Sercu and Uppal (1995), conclude that non-adjustment of exchange rate risk between local currency is also the reason for its failure, while Estrada (2002); Bodnar et al. (2003); Mariscal and Lee (1993), arguing that the failure is due to non adjustment of partial integration property when such model used in emerging markets. Moreover, Lessard (1996) report the failure of CAPM is due to non-adjustment of country specific risks and so on.

According to Roll (1977); Naqvi (2000), another reason of failure lies in it methodology. Therefore different methodologies are suggested to check the relationship of risk and return in CAPM framework (For instance, (Stehle, 1977; Fama and Macbeth, 1973; Fama and French, 1992; Engel and Rodrigues, 1989; Bodurtha and Mark, 1991; Ng, 2004; Harvey, 2001)). In order to test whether beta is significantly rewarded among risk factors, Cederburg and O'DOHERTY (2016) suggest to use

Fama and Macbeth (1973) cross sectional regressions. According to these authors, Fama and Macbeth (1973) framework can yield a broader assessment of the empirical success of the CAPM in pricing and accommodate the diverse sets of risk factors. Some authors also report the issue of serial correlation and non-normality in this methodology (For instance, (Rashid and Hamid, 2015; Prakash et al., 2003; Chunhachinda et al., 1997; Ang et al., 2006; Cederburg and O'DOHERTY, 2016)) and suggest to use generalized method of moments to estimate the beta. Although, much of issues can be care of, if beta in first step of regression is calculated for each time period (Engel and Rodrigues, 1989; Ghysels, 1998; Ang et al., 2006; Cederburg and O'DOHERTY, 2016). Some also recommend to use of non-parametric techniques, like Kayahan and Stengos (2007), investigate the risk and returns relationship in CAPM framework by using the Maximum Likelihood technique. According to the authors it provides a better explanation of aforementioned relationship by controlling the model misspecification but literature have not enough evidence on this.

While explaining cross section of stock returns, CAPM shows a poor performance. Literature also suggest though CAPM is not showing sustainability everywhere but still have considerable liking and interest for researchers, academicians and professionals. This model is widely used for the estimation of cost of equity (Bekaert, G.,Harvey, 1995) In developed world like UK, regulators most commonly use CAPM (Jenkinson, 2006). Bruner et al. (1998) and Graham and Harvey (2001) survey and find out that CAPM is widely used method among practitioner as well as academician in U.S. firms. In addition to that, almost 74% practitioners in US, use CAPM while estimating cost of equity (Brigham and Ehrhardt, 2013).

The aforementioned CAPM are contaminated with mix results across various study settings. Based on this premise, it is important to re-investigate and re-visit these models in an extended settings. Therefore, the study takes into account stock markets belongs to both emerging and developed economies.

Chapter 3

Research Methodology

This chapter provides the detail of data, statistical methodology, and different capital asset pricing models, for the estimation of beta and eventually for calculation of cost of equity. Section 3.1 of this chapter presents the detail of data selection, data sources, and data time-frame. Section 3.2, discuss the detail of Fama and Macbeth (1973) methodology, section 3.3 provide methodological detail of selected capital assets pricing models, section 3.4 discuss the new risk factor i.e. industry risk premium and see methodological working for industry index and section 3.5 concludes the chapter.

3.1 Data Selection and Description of Data

The aim of this study is to present a comprehensive empirical review of capital asset pricing models for the estimation of firm's cost of equity for emerging as well as developed economies. For this purpose, study considers different capital asset pricing models that are currently used for the estimation of cost of equity and discuss enhancement by extending some of those models with the adjustment of industry risk premium. For this purpose, study incorporate maximum range of the time and maximum viable firms to provide a comprehensive empirical review.

Two tier sample selection procedure is adopted in this study. In first tier, study need to take decision about which class of financial markets should be the part of sample. For this purpose study selected both developed and emerging markets. The basic reason is obvious i.e. it capture a comprehensive and important view to both stable as well as more opportunistic investment patterns of the world. While in second tier of sample selection, study need to take decisions of which countries should be the part of analysis from each class.

There are 23 developed markets that are representative as MSCI developed market index while 24 emerging markets as MSCI emerging market index. Study considers these markets as populations. Selection of sample from these markets is based on sequential sample selection method developed by Chromy (1979). Under probability 10%, author recommended 6 markets as sample out of 24 markets. The selection of 6 markets is built on their market capitalization to that index. The study has taken six countries from developed market and six countries from emerging markets. Pakistan, India, China, Brazil, Russia, and South Africa representing the emerging markets. From last decade, BRICS plus Pakistan economies exhibit a fast growth and provide more opportunities for investors. Many experts claims that these stock markets may be regarded as backbone of global economy as well (Morazán et al., 2012). Whereas USA, UK, Canada, Germany, France and Japan represents developed markets. These countries are the part of G-9 markets. These countries are the seven major advance economies as reported by International Monitory Fund. Study selected these countries as sample due to the said reason, as these stock markets are more contributor than others and investors seem more interested to invest in these markets. Furthermore, Morgan Stanley Composite World Index will serve as a proxy for the returns on the world market portfolio, while MSCI-Emerging index is invoked as a proxy for the returns on the emerging market portfolio.

Data has been collected from Bloomberg and Thomson Financial DataStream of non-financial companies comprises of six emerging markets and six developed markets for the period of June, 2000 to June, 2017. Past literature indicates different criteria for firm selection and for estimation of capital asset pricing models. Spiegel and Wang (2005); Avramov and Chordia (2006) suggested to include only those firms, which have at least last 60 months history. This study use the same criteria for firm selection.

The data range of different countries and number of firms in the sample are given below.

Table 3.1: Country wise Data Description

Region	Country	Start Date	End Date	No. of Firms
Emerging	Pakistan	7/16/2000	5/16/2017	118
	India	7/1/2000	5/1/2017	821
	China	7/1/2003	6/1/2017	706
	Brazil	7/1/2002	5/1/2017	142
	Russia	1/1/2010	6/1/2017	327
	South Africa	7/1/2002	7/1/2017	210
Developed	US	7/1/2000	6/1/2017	895
	UK	7/1/2000	5/1/2017	198
	Canada	7/1/2000	5/1/2017	184
	Germany	7/1/2001	5/1/2017	356
	France	7/1/2000	5/1/2017	187
	Japan	4/1/2002	5/1/2017	1366

3.2 Fama-Macbeth Methodology

Fama and Macbeth (1973) cross sectional regressions is applied for calculation of estimators which is a recommended methodology for testing the validity of different risk factors for capital assets pricing framework (Cederburg and O'DOHERTY, 2016; Fama and French, 2015). The Fama and Macbeth (1973) is a two-step regression, a practical way of testing different risk factors that may explain the average return of stocks. In the first step, study each security's return is regressed against one or more risk factor over time to determine the beta for all periods. In the second step, the cross section of portfolio returns is regressed against the factor exposures, at each time step, to provide a time series of risk premium coefficients for each factor. The insight of Fama and Macbeth (1973) is to then average these coefficients, once for each factor, to make the premium expected for a unit exposure to each risk factor over time.

The Fama-MacBeth two-step regression is a practical way of testing different risk factors that explain the average return of stocks. In the first step, each security's return is regressed against one or more risk factor over time to identify the beta for all periods. In the second step, the cross section of portfolio returns is regressed against the factor exposures, at each time step, to provide a time series of risk premium coefficients for each factor. The insight of Fama-Macbeth is to then average these coefficients, once for each factor, to give the premium expected for a unit exposure to each risk factor over time.

In equation form, for n portfolio or asset returns and m factors, in the first step, the factor exposure β_s are obtained by calculating n regressions, each one on m factors (each equation in the following represents a regression):

$$R_(n,t) = \alpha_n + \beta_{(n,F_1}F_{1,t} + \beta_{n,F_2}F_{2,t} + \ + \beta_{n,F_m})F_{m,t} + \epsilon_{n,t} \tag{3.1}$$

The second step is to compute T cross-sectional regressions of returns on the m estimates of the β_s calculated from the first step. Notice that each regression uses the same β_s from the first step, because now the goal is the exposure of the n returns to the m factor loadings over time.

$$R_{i,n} = \lambda_{n,0} + \lambda_{n,1\hat{\beta}}F_1 + \lambda_{n,2\hat{\beta}}F_2 + \cdots + \lambda_{n,m\hat{\beta}}F_m + \epsilon_{n,1} \tag{3.2}$$

Where the returns R are the same as those in equation 3.1, λ are regression coefficient that are later used to calculate the risk premium for each factor, and in each regression i goes from 1 through n.

In the end, there is m + 1 series for every factor, each of length T. If the ϵ are assumed to be i.i.d, calculate the risk premium λ_m for factor F_m by averaging the mth λ over T, and also get standard deviations and t-stats.

Root mean square error method is used to compare the predictive ability of asset pricing models under the guidelines of Simin (2008) and Giacomini and White (2006). This technique calculates the average square distance between the expected return and the realized return through time of the asset pricing model.

The lower value of RMSE indicates, the better model over the other.The major advantage that this technique has over the others is that it takes into account the decomposition of squared error and square biased by the forecasted error.

$$RMSE\ (\hat{R}_i) = \sqrt{\frac{E[(R_i - \hat{R}_i)^2]}{N}} \ = \sqrt{\frac{(var(\epsilon_t)) + [bias((\epsilon_t)]^2}{N}} \tag{3.3}$$

where:

R_i is the realized return and $\hat{R}_i$ is the expected return.

3.3 Overview of Selected Stock Exchanges

3.3.1 Developed Markets

New York Stock Exchange (NYSE) is ranked as 1^{st} in overall stock markets of the world with a market capitalization of \$19.6 trillion as on March, 2018. Almost more than 2800 companies are currently registered with this market with 1.46 billion shares of trading each day. It is managed as a private organization before 2005, while become a public after the acquisition by Archipelago. The New York Stock Exchange working with five different markets namely as NYSE, MKT, Arca, and Amex Option. Large and medium companies are listed with the NYSE while smaller is listed with the NYSE MKT. NYSE trades many asset classes like equities, bonds, exchange traded funds known as Arca and options.

London Stock Exchange (LSE) is ranked as fifth in overall stock markets of the world with a market capitalization of \$3.61 trillion as on March, 2018. The FTSE-100 (Financial Times Stock Exchange) is a main index containing 100 blue chip companies of LSE. This market trade many asset classes like equities, bonds, exchange traded funds, globally deposits the receipt, covered warrants and options. Almost more than 2,600 companies from 60 countries are listed on this market.

Toronto Stock Exchange (TSX) is ranked as ninth in overall stock markets of the world with a market capitalization of \$2.07 trillion as on March, 2018. A bid from the London Stock Exchange was announced on Feb. 9, 2011 to merge with TMX Group to create a combined entity of $5.9 trillion with a new name as London-Toronto market exchange. But this deal is disapproved by the shareholder of TMX. Almost more than 2207 companies are currently registered with this market. The S&P/TSX Composite Index is the main index consisting of 250 big companies representing almost 70% of total market capitalizations.

Frankfurt Stock Exchange (FSX), Germany is ranked as 10th in overall stock markets of the world with a market capitalization of $1.77 Trillions as on March 2018. DAX index is the main index of this market, consisting of 30 blue chip companies. This market is trading with two different venues namely as Xetra, and Brse Frankfurt. Xetra mainly trade equities and exchange traded funds, while Brse Frankfurt is a trading avenue for private investor.

Euronext Paris, France stock market, which is formerly known as the Paris Bourse, which is a subsidiary of Euronext NV, and the second largest stock market after London Stock Exchange in Europe. In Sep. 2000, four stock exchanges merged namely Brussels, Lisbon, Amsterdam to form Euronext NV. This market majorly divided into three sections; Premier March includes the large French and foreign companies and large bonds, the second one is March, for medium sized companies, and third one is Nouveau March list with fast-growing start up companies.

The Tokyo Stock Exchange is ranked as 3rd largest stock exchange out of the stock exchanges with the total market capitalization of $5.12 Trillion as on March 2018 with overall 3618 registered companies portfolio. It is also the largest stock market in Asia. Different companies in this market are traded into different sections. The first section deals mainly large companies of 2032 in numbers, second sections deals with mid-size companies of 525 in numbers, than Jasdaq and Mothers section deal with emerging companies consisting of 708 and 41 in numbers and last with Pro Market section that is working with the London Stock Market, and deals with less viable companies with flexible capital provisions of total 19 in numbers.

3.3.2 Emerging Stock Markets

The Paksitan Stock Exchange (PSX) which is the first and oldest market in emerging economies (Javid and Ahmad, 2009). PSX has come into existence in January 2016, when Government of Pakistan merged three other stock exchanges namely, Karachi Stock Exchange, Lahore Stock Exchange, and Islamabad Stock Exchange. In May, 2017, PSX is re-classified by Morgan Stanly Composite Index Emerging and FTSE classifies it as an emerging secondary market. The total market capitalization is 84 billions involving 559 listed companies as of March, 2018. PSX was ranked the best performing stock market by the years 2009 to 2015 with overall return of 26% a year.

India National Stock Exchange (NSE) is ranked as the 12th largest stock exchange with a market capitalization of $2.27 trillion as of April, 2018. Almost 7800 companies register with NSE of which only 4000 trade.NSE allow trading in equities, corporate bonds, mutual funds, exchange traded funds, equity derivatives, currency derivatives and interest rate swaps. Nifty 50 indexes are one of a major index of NSE, comprises of 50 stocks out of 12 sectors.

The Shanghai Stock Exchange (SSE) is the 4^{th} largest stock market with a capitalization of $4.45 trillion to almost 1302 companies listing. The SSE composite is the main index that indicates the performance of the stock market. SSE Index has all listed stocks, A and B shares.After 28 years of emergence, SSE market show highly rapid growth with stocks, bonds, funds and derivatives products by using highly efficient and technological system of trading.

Brazil Stock Market is ranked 19^{th} largest stock market based on capitalization as $8.38 Trillion as on March, 2018. This market was the 13th largest market at the end of 2011, but due to economic slump and political problems, its capitulation shrunk against US dollar largely. Bovespa is also known as Ibovespa is the main index of this market. This index consists of 52 stocks out of 450 total listed companies.

Moscow Stock Exchnage, is the 22^{nd} largest stock market with a capitalization of $6.43 trillion as of March, 2018. This exchnage is established as a result of two big exchanges namely, the Moscow Interbank Currency Exchange (MICEX) and the Russian Trading System (RTS) on Dec. 19, 2011. This market offer different platform of trading markets, namely as equity and bond market, foreign exchnage and money market, derivative market, and commodities market. The Moscow Exchange Indices (MOEX) is main stock index consisted on 30 largest and most liquid stocks.

Johannesburg Stock Exchange (JSE) is the 17^{th} largest stock market with a capitalization of $10 trillion as of March, 2018. It is the largest stock exchange in the African continent. There are five different securities that is trading on this market namely equity market, bond market, financial derivative market, commodity market and the currency market. FTSE/JSE Africa all share index is the primary index of this market coving almost 99% market capitalization.

3.4 Industry Equally Weighted Index

One of the study objectives is to introduce industrial market premium as a new risk factor into the existing CAPM framework. Industry risk factor plays a significant role in determination of future cash flow of any investment, so it needs to be accommodated while constructing a discount rate. For this purpose, the study needs to construct industry weighted index for the selected countries over different time frame. The study adopts the same methodology as used by the MSCI for the construction of MSCI-Equally Sector Weighted Index.

This index uses free float methodology. The stocks are weighted relative to their free float-adjusted market capitalization and then assigned an equal weight (i.e. 1/N, where N is the number of Stocks) to each sector to drive on desired industry weighted index. The selection of the firms into the industry index is based on maximum sector approximation approach where index is calculated on all possible retrievable companies belonging to that sector and analyst believe this would be a good representation to capture the industrial risk premium (Pereiro, 2001).

This study uses the same methodology, to construct an equally weighted industry index but using 'Industry Classification Benchmark' (ICB) which is used by

DataStream platform whereby study retrieves the data. There are multiple levels on ICB, study use level 4 (See Appendix 1) classifications for the aforementioned.

3.5 Extended Capital Asset Pricing Models

The Local CAPM is the traditional approach to calculate the cost of equity, almost simultaneously developed by Sharpe (1964); Lintner (1975); Mossin (1966) [For detail reading, please revisit Literature Review chapter, section 2.1].

The major limitation (Isolation Assumption) of local CAPM model is addressed by Solinik (1974) when he proposed Global CAPM [For detail reading, please revisit Literature Review chapter, section 2.2]. According to this model, all investors have the same baskets of securities and due to this purchasing power parity theory hold all over the world. In other ways that all stock markets are integrated and it is possible to estimate a single capital asset pricing models.

Sabal (2002) argues that country risk is on one hand not to be same for each industrial sector of an emerging country, and on the other hand it is not necessarily systematic risk for every company so for this reason it should not be included in the equity cost. On these lines, he developed a modified version of CAPM, whose main characteristic is that it does not explicitly include country risk in the discount rate [For detail reading, please revisit Literature Review chapter, section 2.3].

Mariscal and Lee (1993) find out a major limitation of Global and Modified Global model in terms of their applicability for emerging market based on the level of integration and suggest a new model 'Goldman Sachs model' that is based on partial integration, which is a common characteristics of emerging stock market (Bekaert and Harvey, 1995a), for the estimation of cost of equity. These researchers added emerging market premium ($R_B^{ME} - R_B^{US}$) into existing Global CAPM. This addition increases the hurdle rate that is seem to capture high volatility of these markets [For detail reading, revisit Literature Review chapter, section 2.4]. According to Harvey (2001), the major problem with this model is that they added country yield spread into equity market premium which is not worth as both represent two different types of risks. The second problem is that country yield spread is going to be add alike in all stocks, which is not appropriate as each stock may have a different slope in relation to country-risk, and the last problem is that as risk-free rate is no longer risk-free so the separation property of the capital asset pricing model does not hold. This model has also some limitation that it can only be applied if a sovereign yield spread is available for that country.

Downside beta found to be a new solution for capturing the partial integration of emerging market by by Hogan and Warren (1974); Bawa and Lindenberg (1977); Estrada (2002). Although this model is empirically and statistically sound and produce better estimates then Local and Global model[For detail reading, please revisit Literature Review chapter, section 2.5], but still model considering only one feature of emerging markets that is high volatility (negative skewness), but it does not take into account the others features of emerging markets like political instability, etc., hence it is an incomplete approximation (Fernández, 2001).

Hybrid model copes partial integration condition and stated that country risk premium can be set in an additive way. According to the Bodnar et al. (2003), both local risk factors as well as global risk factors are important in setting stocks prices in emerging markets [For detail reading, please revisit Literature Review chapter, section 2.8].

The look for a superior model that gauge cost of value is still going strong. A risk factor that explains the variations in the cost of equity can be part of the model in the CAPM framework citepEstrada2002a,Soeriowardojo2010. It should be sound, on the basis of finance theory as well as statistical grounds that capture all the associated risks while making investment in local or global environment. Past researches explain different risk factors in this regards, but common of them all are global risk factor, emerging market risk factor, country risk factor, industry risk factor and project risk factor (Harvey, 2016; Lessard, 1996). This study incorporates industry risk premium into the existing models by using the same framework as suggested by CAPM.

3.5.1 Extended CAP models for Emerging and Developed Markets

3.5.1.1 Extended Hybrid and Lessard Model

This study is proposing an addition of industry risk factors into the existing hybrid model proposed by Bodnar et al. (2003). Their study suggest, while evaluating cost of equity for firms who are working in emerging market, basic two risk should be take care of, one is global risk and other is emerging market risk, but this study suggest that company should also take care of the dynamics of industrial risk which is also an important phenomena as discuss earlier.

$$E(R_i) = R_f^G + \beta_i^G(R_M^G - R_f^G) + \beta_i^{EM}(R_M^{EM} - R_f^{EM}) + \beta_i^{IND}(R_M^{IND} - R_f^L) \quad (3.4)$$

Where:

β_i^G: Coefficient of the Stock in relation to Global Market

β_i^{EM}: Coefficient of the Stock in relation to Emerging market

β_i^{IND}: Coefficient of the Stock in relation to Industrial Index

$\beta_i^{MSCI} = \frac{COV(R_i^L, R_M^G)}{Var(R_M^G)}$

$\beta_i^{EM} = \frac{COV(R_i^L, R_M^{EM})}{Var(R_M^{EM})}$

$\beta_i^{IND} = \frac{COV(R_i^L, R_M^{IND})}{Var(R_M^{IND})}$

$(R_M^G - R_f^G)$: Excess Global Market Premium

$(R_M^{EM} - R_f^{EM})$: Excess Emerging Market risk premium.

$(R_M^{IND} - R_f^{IND}$: Excess industrial risk premium.

All the beta's are calculated in a multivariate CAPM framework,by a rolling regression on last 36 months, which calculate each month beta over the range of data. Study also exclude any of risk factor on the basis of their insignificance over all the range of data to check the other variable contributions. For example, in a multivariate model testing, if world beta or emerging market beta become insignificant, than industrial CAPM is also tested in bivariate CAPM framework.

Study also use multiplicative beta framework as suggested by Lessard (1996), for the calculation of cost fo equity by using following model.

$$E(R_i) = R_B^G + \beta_i^G \times \beta_i^{EMR} \times \beta_i^{IND}(R_B^{EM} - R_B^{US}) \tag{3.5}$$

For developed countries, emerging market risk is not included in the model, so the new model are tested with global market risk and industrial risk as describe below.

$$E(R_i) = R_f^G + \beta_i^G(R_M^G - R_f^G) + \beta_i^{IND}(R_M^{IND} - R_f^{IND}) \tag{3.6}$$

Where:

β_i^G: Coefficient of the Stock in relation to Global Market

β_i^{IND}: Coefficient of the Stock in relation to Industrial Index

$\beta_i^{MSCI} = \frac{COV(R_i^L, R_M^G)}{Var(R_M^G)}$

$\beta_i^{IND} = \frac{COV(R_i^L, R_M^{IND})}{Var(R_M^{IND})}$

$(R_M^G - R_f^G)$: Excess Global Market Premium

$(R_M^{IND} - R_f^{IND}$: Excess industrial risk premium.

Multiplicative beta framework as suggested by Lessard (1996), for the calculation of cost fo equity by using following model for developed countries .

$$E(R_i) = R_B^G + \beta_i^G \times \beta_i^{IND}(R_B^{EM} - R_B^{US}) \tag{3.7}$$

All these adjustments in the form additional risk, enhance the predictive power of existing models. Gimpel (2010); Damodaran (2016); Erb et al. (1996b) and Pereiro (2001), all argued that inclusion of additional risk into the CAPM framework may double count the risk. Therefore to avoid this problem, solution provided by Pereiro (2001) is used and correct the systematic risk by (1-R^2), where R^2 is the coefficient of determination.

3.6 Testing of CAPM Validity

To test the all variants of CAPM, a number of sub-models have been developed. Each sub-model is tested by using different statistical equation to check the validity of CAPM. The first model is developed to test the basic risk and return relationship. For this purpose, beta is regressed against their mean excess returns by using the following equation;

Model 1:-

In first model, excess security average returns are cross sectionally regressed against market systematic risk. The expected results is that risk premium positively and significantly explains the variations of average stock returns.

$$R_i - R_f = \lambda_o + \lambda_1 \beta_i + \mu_i \tag{3.8}$$

This beta is already estimated through rolling regression by using 36 months window on each month from different risk factors as discussed above. In this step, each time period beta is regressed against the excess stock returns, and results are average out and reported for lambda's, SE and t-stats.

Model 2:-

The second model is developed to test the non-linearity of the CAPM, for this purpose β^2 is added to the first equation.

$$R_i - R_f = \lambda_o + \lambda_1 \beta_i + \lambda_2 \beta_i^2 + \mu_i \tag{3.9}$$

The required result are the positive and insignificant that indicate the linear and positive relationship between risk premium and stock returns. The negative value and significant show the mispricing in the stock market. The positive and significant results may be due to the misspecification in low and high beta stocks (Hwang et al., 2012).

Model 3:-

In the third model, adequacy of beta has been tested along with basic risk and return relationship, for this purpose residual term has been added to original model. The significant of the residual term would indicate that traditional beta and downside beta is not the only variable that explain the variations of mean returns and vice versa.

Risk factors that are part of the model are only risk factors that describe expected return in CAPM framework. So residual term should be insignificant, but if significant, it may mean that idiosyncratic risk may influencing the average expected returns.

$$R_i - R_f = \lambda_o + \lambda_1\beta_i + \lambda_3\hat{\mu}_i + \mu_i \tag{3.10}$$

Model 4:-

There exists a linear and positive relationship between systematic risk and expected Return which has linear relationship and model risk factors are the only risk factors that explain the variations of expected return.

So the fourth model has been tested the joint hypothesis for CAPM. All the above factors have been accumulated to test the joint effect of all factors on the mean returns of firms in cross sectional setting.

$$R_i - R_f = \lambda_o + \lambda_1\beta_i + \lambda_2\beta_i^2 + \lambda_3\hat{\mu}_i + \mu_i \tag{3.11}$$

Model 5:-

For Semi-variance beta, one more model is developed to test the performance of the market during rise, upside beta is tested in the CAPM framework as fifth model.

$$R_i - R_f = \lambda_o + \lambda_1\beta_i^D + \lambda_2\beta_i^U + \mu_i \tag{3.12}$$

The term $R_i - R_f$ is the average excess return on each security.

Chapter 4

Results and Discussion

This section starts with explaining the basic characteristics of stock returns and different risk factors in the form of their stationary, descriptive, and correlation analysis. Then the validity of different risk factors has been given on the basic of different asset frameworks, and at the end dynamics of cost of equity are provided for those models which are significantly explaining the returns for the given stock returns for each emerging and developed market. Empirical evidence of capital asset pricing model for emerging economies is given first following by the evidence for developed markets (Jagannathan and Wang, 1996).

4.1 Empirical Evidence from Emerging Stock Markets

Empirical evidence for a different version of capital asset pricing models is provided for each market one by one. To provide analytical view on the variables, descriptive analysis and correlation analysis are provided in the first stage that follows the results of Fama-Macbeth regression and ends on the dynamics of the cost of equity.

4.1.1 Data Analysis for Pakistan Stock Exchange (PSX)

4.1.1.1 Descriptive Analysis for PSX

Descriptive analysis for stock returns and excess market premiums for the Pakistan Stock Market is exhibited in table 4.1. The mean value of stock return indicates that investor may earn an average .9 percent monthly returns investing in shares of PSX. This earning may fluctuate by 17.7% which depicts that investment in stocks pertains high risk as compared to its return. Likewise minimum return i.e. 44 percent and maximum return i.e. 518% are reported in investment in stocks. On the other hand value of PSX Market return is 1.4% monthly pertaining 8.6% volatility. Its depicts that market movement is asymmetric in nature. Subsequently, in the range of 24% to -44.9% market returns are being reported in the study.

Returns of stocks are highly leptokurtic (Kurt = 92.624) and partially skewed (Skew = 1.266). PSX market returns are least leptokurtic in distribution shape (Kurt = 8.52) and negatively skewed (Skew = -1.239).

Industry wise returns i.e. a proxy for industry market premium reports 1 percent on average return earned by an investor explaining 8.7% deviation. Prospective investor may earn maximum 144.7 percent monthly returns and may bear loss of 126.8 percent. These returns are highly leptokurtic in distribution shape (Kurt = 42.091) along with nominal skewness (Skew = 0.298).

Table 4.1: Descriptive Analysis for PSX

Variables	**Means**	**Std.Dev**	**Min**	**Max**	**Skew.**	**Kurt.**
Pak-Stock Returns	0.009	0.177	-4.459	5.189	1.266	92.624
Pak-Market Returns	0.014	0.086	-0.449	0.241	-1.239	8.52
Pak-Industry Returns	0.01	0.087	-1.268	1.447	0.298	42.091

4.1.1.2 Correlation Analysis

Table 4.2 depicts the relationship between stock return and various types of market returns i.e. Global market premium, Emerging market Premium, Local market premium and Industry market premium. This exhibits that there is a significant and positive correlation between stock return and Global Market premium, Emerging market Premium, Local market premium and Industry market premium.

There exits a positive and significant relationship between firm's stock returns and MSCI Global stock return with a value of 0.075, MSCI Emerging market return as 0.073, US market stock return as 0.1, Local market stock returns as 0.088, but insignificant and positive with Industry Stock return as .317.

Furthermore, this also depicts the financial integration between the global market and PXS. Correlation analysis is also be used to see the level of integration (Karolyi and Stulz, 2002). A relationship is higher than 0.2 of country stocks returns with the global indices indicate that's markets are partially integrated. Results explore that PSX is least integrated with the Global market explaining low dependency on the Global market. Results of the correlation also neglect the existence of multicollinearity phenomenon.

TABLE 4.2: Correlation Analysis for PSX

Variables	**1**	**2**	**3**	**4**	**5**	**6**
Stock Return	1					
Global Return	0.075***	1				
Local Market Return	0.088***	0.143***	1			
Emerging Market Return	0.073***	0.862***	0.142***	1		
Industry Return	0.317*	0.119***	0.131***	0.107***	1	
US Market Return	0.100***	0.636***	0.141***	0.567***	0.195***	1

**** P < .001, ** p < 0.05, * p < .01*

4.1.1.3 Estimates for Local CAPM for the PSX

Local CAPM estimates the relationship between the risk and return applying the Fama and Macbeth (1973) regression method. The results are acquired through taking the average of lambda's, standards errors, t-statistics and modified R-square reported in table 4.3.

Table 4.3: Estimates for Local CAPM for PSX

Variables	**1**	**2**	**3**	**4**
λ_i^L	0.0162**	0.0700***	0.0193***	0.0932***
	(0.007)	(0.010)	(0.007)	(0.016)
λ_i^2		-0.0616***		-0.0906***
		(0.009)		(0.018)
μ_i			-7.862***	5.557*
			(1.575)	(2.995)
Constant	-0.0983***	-0.0880***	-0.0665***	-0.106***
	(0.004)	(0.004)	(0.007)	(0.010)
Adj. R^2	0.039	0.337	0.210	0.357
RMSE	0.034	0.029	0.031	0.028

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

Four different models are estimated to measure the validity of Local CAPM. Model 1, reports an averages of stock returns and average λ's which indicates there is a significant positive relationship between the estimator of excess market premium (λ) and average stocks return. Likewise, in model 2, further λ^2 term is included to check the presence of non-linearity in the model. In result, it shows non-linear movement of risk and return (Black, 1972). According to the Local CAPM, market premium is the only factor explaining the stock returns. In the pursuance of this propositions, model 3 is tested further to test the adequacy of premium, residual of independent variable is being included in model 1. Results clearly indicate the significant role of residual term- excess market premium is not the only risk factor that explain the mean returns of PSX. Last but not least, joint hypothesis is tested in which λ, λ^2 and residual term is regressed against the mean stock returns. Results indicates that excess market premium is statistically significant explaining the mean stock returns with non-linear movement in final model.

The empirical findings of 4.3 clearly indicate pivotal role of market risk premium of Local CAPM for calculation of cost of equity in Pakistan. The main and critical condition of positive trade-off between market risk and average market returns is accepted. The residual risk do not play any significant role in explaining the market returns in empirical findings of joint hypothesis. Although significant non-linearity has been identified for the entire period for all models. These results are not consistent with the findings of Iqbal and Brooks (2007); Javid and Ahmad (2009) but these are coherent with Wu et al. (2017).

The predictive power of the model is calculated through Adj. R-square which is evolving in nature from model 1 to model 4. Model 4 exhibits highest explanatory power of market risk, lambda square and residual risk that is 35.7%. Mean root square of error is also calculated for all models and model 5 exhibits the lowest value than all other models. This exhibits that residual risk and non-linearity factor should be in the model with market risk for the determination of stock market returns.

The intercept term is negative and statistically significant which is contradictory to basic assumptions of asset pricing models. This negative intercept may be due to the consistent mispricing behavior of stocks in Pakistan Stock Exchange (Rashid and Hamid, 2015).

4.1.1.4 Estimates for Global CAPM for the PSX

In the second phase of analysis, Solinik (1974) and Stulz (1999)'s Global model has been estimated for the PSX over the observed period. For this purpose, excess global return has been calculated by taking Morgan Stanley Capital International' Index and US three months t-bill rate. In Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 returns. Than in second phase, cross sectional regression has been performed for beta and mean returns and lambda values has been achieved for each time period, which is averaged and reported in table 4.4.

Model 1 reports the results for means stock returns and excess global premium and indicates that there exists a significant and positive relationship between global premium risks and average stocks returns. It shows that investors can apply the Global CAPM in Pakistan Stock Market for the calculation of cost of equity.

Table 4.4: Estimates for Global CAPM for PSX

Variables	**1**	**2**	**3**	**4**
λ_i^G	0.00548**	0.00542*	0.00551**	0.00629
	(0.00248)	(0.00286)	(0.00254)	(0.0103)
λ_i^2		0.000179		-0.00176
		(0.00432)		(0.0225)
μ_i			0.126	1.000
			(2.189)	(11.42)
Constant	0.00118	0.00116	0.00103	0.000188
	(0.000984)	(0.00105)	(0.00267)	(0.0112)
Adj. R^2	0.040	0.040	0.041	0.041
RMSE	0.00882	0.00886	0.00886	0.00890

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

In model 2, lambda square term is added further to test the non-linearity in the relationship. Results reports there is lambda square term is insignificant so the assumption of linearity exists in Global Model. Further, residual term is added to check the adequacy of G-CAPM, still indicate the insignificant results. At the end, Joint hypothesis is estimated in model 4, all variables become insignificant. Root Mean Squared of Error reported that model 1 is a more appropriate model than other models. Although, R-squared 4% for Global CAPM model which is low than Local CAPM, which is consistent with Levy (1974) argument that monthly data R-square usually come within the range of 4 to 5 percent.

Global market risk is explaining average stock returns more appropriate for PSX than Local market risk. It is fulfilling all the assumption of capital market theory, there is no issue of non-linearity and inadequacy of residuals.

4.1.1.5 Estimates for Modified Global CAPM

Modified Global model has been used to estimate the slopes and intercept for Pakistan stock market returns and the results are reported in following table 4.5. Results clearly indicate that market premium calculated from this model is not explaining the variations of average return of stocks for all models.

TABLE 4.5: Estimates for Modified Global CAPM for PSX

Variables	**1**	**2**	**3**	**4**
$\lambda_i^{S\&P}$	0.00401	0.00857*	0.00395	0.00154
	(0.00249)	(0.00513)	(0.00249)	(0.0182)
$\lambda_i^{2S\&P}$		-0.00615		0.00321
		(0.00606)		(0.0240)
μ_i			-1.580*	-2.327
			(1.456)	(5.770)
Constant	-0.00306**	-0.00325**	-0.000996	0.0000778
	(0.00124)	(0.00125)	(0.00226)	(0.00834)
Adj. R^2	0.022	0.031	0.032	0.032
RMSE	0.00881	0.00881	0.00881	0.00884

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.1.1.6 Estimates for Downside CAPM

In the third phase of analysis in Pakistan Stock Market, downside market risk is estimated by using Estrada (2002) and is regressed with the average stock returns in order to drive out the risk and return model. Results are reported in table 4.6.

Five models have been estimated to exhibits the risk and return relationship. Results clearly indicate that downside risk is significantly explaining the mean returns for all the models with the explanatory power upto 35.7%.

The issue of non-linearity and residuals is significant in this model too, again showing the mispricing behavior of the stock market. Intercept term of the model should be insignificant but all models exhibit it is significant and negative which indicate that Pakistan Stock Market is inefficient The same issue has been reported by Fama and Macbeth (1973). Root Mean Square Error (RMSE) indicates that the model 5 produces more consistent results than other models. These results

Table 4.6: Estimates for Downside CAPM

Variables	**1**	**2**	**3**	**4**	**5**
λ_i^D	0.016**	0.070***	0.019***	0.093***	0.00324*
	(0.007)	(0.010)	(0.007)	(0.016)	(0.00183)
$\lambda_i^2 D$		-0.061***		-0.090***	
		(0.009)		(0.018)	
μ_i			-7.862***	5.557*	
			(1.575)	(2.995)	
λ_i^U					0.00734
					(0.00682)
Constant	-0.098***	-0.088***	-0.066***	-0.106***	-0.079***
	(0.004)	(0.004)	(0.007)	(0.010)	(0.013)
Adj. R^2	0.039	0.337	0.210	0.357	0.277
RMSE	0.00881	0.00881	0.00881	0.00884	0.00881

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

are consistent with results of Rashid and Hamid (2015). Results can be concluded that downside risk can be used to calculate the cost of equity in PSX.

4.1.1.7 Estimates for Hybrid CAPM

Results have been exhibited for global and emerging market risk factors that are used by the Hybrid model in table 4.7. Same four models have been estimated for global and emerging risk factors. Results indicate that global risk factor becomes insignificant as emerging market risk factor added into the model. The emerging risk factor is significantly explaining the mean returns of Pakistan stock Returns. This clearly explains that Pakistan Stock Market is partially integrated with the emerging markets. The root means square of error indicates that model 4 is more appropriate and its modified R-square is also high for this model.

The joint hypothesis clearly indicates that issue of non-linearity and inadequacy of residuals is not present there. Emerging risk factor is highly significant and having higher explaining power of 12.3%.

Results of hybrid model indicate that this model can be used for cost of equity as emerging market risk is significantly explaining the stock returns while global risk factor is significant at only p ¡ 10%.

TABLE 4.7: Estimates of Hybrid CAPM for PSX

Variables	**1**	**2**	**3**	**4**
λ_i^w	0.00521*	0.00494*	0.00420	0.00486*
	(0.00287)	(0.00276)	(0.00279)	(0.00284)
λ_i^{EMR}	0.00851**	0.00759**	0.00774**	0.00759**
	(0.00380)	(0.00366)	(0.00368)	(0.00368)
λ_i^{2w}		-0.00585***		-0.00534
		(0.00180)		(0.00442)
μ_i			-3.289***	-0.342
			(1.099)	(2.673)
Constant	0.00127	0.00265**	0.00600***	0.00302
	(0.000968)	(0.00102)	(0.00183)	(0.00307)
Adj. R^2	0.042	0.123	0.112	0.123
RMSE	0.00885	0.00851	0.00856	0.00855

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.1.8 Estimates of Extended Hybrid CAPM

Additional industry factor has been added in the original Hybrid CAPM model to capture the industry risk premium in the Pakistan Stock Market. For this purpose a multivariate regression model is estimated for the calculation of time invariant betas for all of these factors on the last 36 month window. Results of second pass regression are reported in table 4.8.

Results exhibit a significant and positive relationship between emerging market risk factor and industry risk factor with the mean returns of PSX firms, although global risk factor is statistically insignificant.

The modified R-square indicates that model 2 and 4 has 13.1%, explanatory power that is higher than any other model. These results clearly indicate that emerging risk premium and industry risk premium are an important risk factor to be considered by investors than global risk factors.

Results also indicate that inclusion of industry risk premium into the hybrid model has increased the explanatory power empirically. This indicate that market participants should consider the industrial risk factor while calculating their projects cost of equity.

Table 4.8: Estimates of Extended Hybrid CAPM for PSX

Variables	**1**	**2**	**3**	**4**
λ_i^w	0.00301	0.00387	0.00322	0.00385
	(0.00318)	(0.00308)	(0.00310)	(0.00312)
λ_i^{EMR}	0.00734**	0.00652**	0.00754**	0.00656**
	(0.00311)	(0.00198)	(0.00301)	(0.00305)
λ_i^{IND}	0.00324**	0.00306**	0.00286	0.00305**
	(0.00142)	(0.00155)	(0.00187)	(0.00151)
λ_i^{2w}		-0.00809***		-0.00779
		(0.00263)		(0.00543)
μ_i			-2.944***	-0.141
			(1.096)	(2.237)
Constant	-0.000158	0.00128	0.00479**	0.00146
	(0.00159)	(0.00161)	(0.00241)	(0.00333)
Adj. R^2	0.059	0.131	0.115	0.131
RMSE	0.00881	0.00850	0.00858	0.00850

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.1.1.9 Dynamics of Cost of Equity (Annualized)

Cost of equity has been calculated through different CAPM models which significantly explaining the risk and return dynamics in Pakistan Stock Market. The objective is to compare the cost of equity dynamics of Pakistan's equity market through multiple CAPM models. Multiple models have been applied to Local CAPM, World CAPM, Downside CAPM model, hybrid model, and Extended Hybrid model is applied.

Table 4.9: Cost of Equity Dynamics (Annualized) for PSX

Year	K(Local)	K(Global)	K(Downside)	K(Hybrid)	K(Ex-Hybrid)
2003	0.274	0.098	0.226	0.132	0.305
2004	0.203	0.038	0.187	0.055	0.219
2005	0.314	0.049	0.354	0.064	0.245
2006	0.153	0.098	0.162	0.089	0.142
2007	0.223	0.064	0.217	0.134	0.366
2008	-0.109	-0.231	-0.113	-0.245	-0.204
2009	0.104	0.071	0.104	0.128	-0.053
2010	0.144	0.025	0.141	0.036	-0.064
2011	0.053	-0.011	0.06	0.01	-0.075
2012	0.238	0.03	0.243	0.087	0.322
2013	0.245	0.041	0.243	0.063	0.191
2014	0.133	0.007	0.127	0.059	0.284
2015	0.062	0.017	0.06	0.068	0.136
2016	0.184	0.008	0.176	0.017	0.188
2017	0.135	0.048	0.134	0.018	0.202
Mean(K)	0.15707	0.02347	0.15473	0.04767	0.14693
Adj. R-Square	0.357	0.041	0.167	0.123	0.131
RMSE	0.0028	0.0089	0.00795	0.00855	0.0085

Table 4.9 indicate the annualized cost of equity estimates from different capital asset pricing model with their overall average behavior, predictive power and root mean square error as reported in their respective tables.

This table as well as figure 4.1 indicates the annualized behavior of cost of equity from those models where risk and return relationship is significant atleast over the one model. On average Local CAPM, downside CAPM, and extended CAPM reports 15% annualized cost of equity in the Pakistani Market which vary over the years. All Capital Asset pricing models fail to explain the cost of equity in 2008. That was the most disastrous year in the history of financial markets in Pakistan, Yasin Lakhani, a six-time president and chairman of Karachi Stock Exchange, says. In that fateful year, the Karachi stock market index of 100 shares had galloped to touch its all-time high level of 15,760 points on April 20, 2008. And then the stock prices collapsed with index plunging by almost 55 percent or by 5,600 points in four months. As panic was thick in the air, an entirely insane act was performed. On August 20, 2008, a floor was fixed at the level of 9144 points below which the index was not allowed to fall. All investors, including foreigners who wanted to seek an exit were trapped.

R-square and RMSE values clearly indicate that Local CAPM is still the best model to be employed in Pakistan Stock Market. One of the possible reason may be due to weak correlation of this market with global and US market, so isolation model perform better results than rest of all.

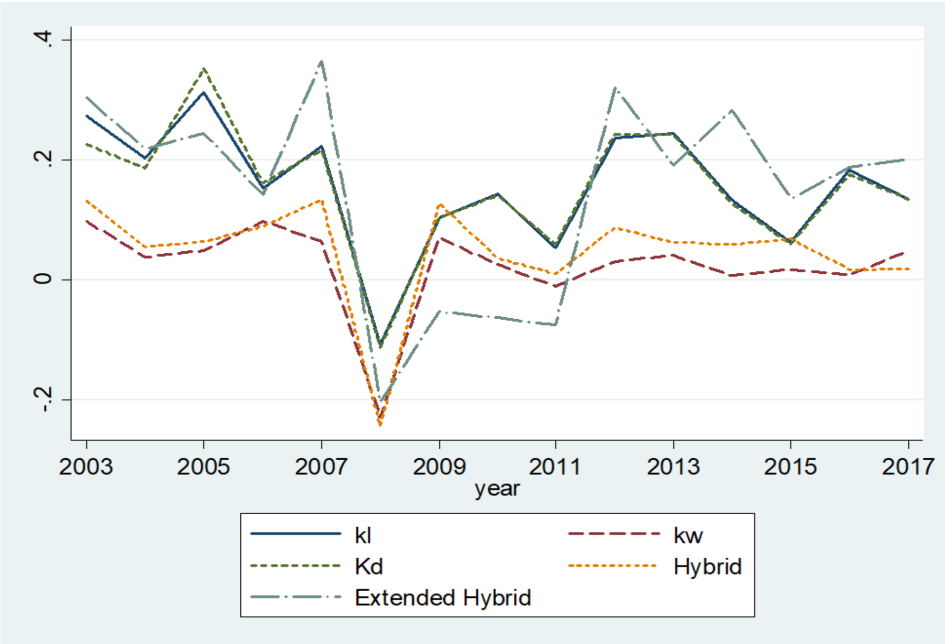

Figure 4.1: Dynamics of Cost of Equity for PSX

4.1.1.10 Summary of Analysis for Pakistan Stock Exchange

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range June 2000, to June 2017.

Results indicate that betas calculated through local risk premium, global risk premium, downside risk premium, emerging market premium and industry risk premium are significantly explaining the mean returns of stocks.

The dynamics of cost of equity over the different years, indicate that on average, a company whether local or global listed on PSX incur 15% equity cost over its investment.

4.1.2 Data Analysis for Bombay Stock Exchange

The Bombay Stock Exchange limited is established in 1875 as Asia's first and the Fastest Stock Exchange in the world. Over the past 141 years, BSE has facilitated the growth of the Indian corporate sector by providing it an efficient capital-raising platform. Popularly referred to as BSE, the bourse was established as "The Native Share and Stock Brokers' Association" in 1875. Today BSE provides an efficient and transparent market for trading in equity, currency, debt instruments, derivatives, mutual funds. It also makes a platform for trading in equities of small-and-medium enterprises (SME) [For more detail, refer to 3.3 in Chapter 3].

4.1.2.1 Descriptive Analysis for BSE

Descriptive analysis for the Bombay Stock Exchange has been reported in table 4.10. The mean of stock's returns indicate that on average one can earn .7% return on investing in stocks from BSE on monthly basis which can deviate by 21.3% in either higher and lower side. Maximum return that an investor can earn is 616.4% per month and maximum loss that may be incurred 310.6%. Stocks exhibit leptokurtic behavior (Kurt. = 35.564) overall and slightly positive skewness (Skew. = 1.954).

Overall market behavior indicates that one can earn 10% return on monthly basis from Bombay Stock Exchange which can deviate 6.7% for both sides. Maximum benefit that an investor earns from this market is 24.9% while maximum loss that one can suffer is 27.3% during a month. The shape of the data is showing almost normal where kurtosis and skewness are 4.92 and -.518 respectively.

On average, one can earn almost the same return from industry of 10% as of investing in the stock market index which can deviate 10.7% on both sides. Maximum benefits and loss which can incur during a month are almost 82%, while the shape of industry returns is leptokurtic with no skewness.

Table 4.10: Descriptive Analysis for BSE

Variables	**Means**	**Std.Dev**	**Min**	**Max**	**Skew.**	**Kurt.**
Stock Returns	.007	.213	-3.106	6.164	1.954	35.564
Market Returns	.01	.067	-.273	.249	-.518	4.924
Industry Returns	.01	.107	-.825	.819	.249	7.088

4.1.2.2 Correlation Analysis for BSE

The relationship of stock returns, market returns, industry returns, global index return and emerging market index return can be seen from table 4.11. Correlation matrix reports that stock returns are negatively correlated with the MSCI-Global and GSPC returns but this relationship is insignificant, and it is positively and significantly associated with the market returns and industry index returns. Stock returns are showing more association with the industrial index return as strength of this relationship is .303, which indicates that industry risk factor may be more important for explaining the means returns of a firm registered in Bombay Stock Exchange.

Table 4.11: Correlation Analyses for BSE

Variables	**1**	**2**	**3**	**4**	**5**	**6**
Stock Return	1					
Local Market Return	0.022***	1				
Global Market Return	-0.002	0.642***	1			
Emerging Market Return	0.006***	0.755***	0.862***	1		
Industry Return	0.303***	0.077***	0.025***	0.042***	1	
US Market Return	-0.002	0.585***	0.967***	0.785***	0.021***	1

**** P < .001, ** p < 0.05, * p < .01*

4.1.2.3 Estimates of Local CAPM

Fama-Macbeth cross sectional regression is performed to test each of the four models for the Bombay Stock Exchange. In the first stage, rolling regression is performed by using 36 months window on each month, and time variant beta has been estimated, which is used in the second stage of regression to test each sub-models.

Results of cross-section regression for the stock's returns over the systematic risk for different models over the observed period. The lambdas, SE, t-stat, and modified R^2 is than average out and reported in table 4.12

TABLE 4.12: Estimates of Local CAPM for BSE

Variables	**1**	**2**	**3**	**4**
λ_i^L	0.00481***	0.00454***	0.00495***	0.00815***
	(0.00139)	(0.00140)	(0.00139)	(0.00244)
λ_i^{2L}		0.00461		-0.0371
		(0.00321)		(0.0232)
μ_i			1.988*	15.61*
			(1.189)	(8.604)
Constant	0.00491***	0.00464***	0.00388***	-0.000966
	(0.000347)	(0.000395)	(0.000706)	(0.00311)
Adj. R^2	0.014	0.017	0.018	0.021
RMSE	0.00975	0.00974	0.00973	0.00973

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

Results for model 1 exhibits that there exists a positive and significant relationship (.00481) between the market risk premium and average stock returns, with 1.4% explanatory power and 0.00975 RMSE. This indicate that excess market return are the good predictor of cost of equity dynamics over the different years.

Second model is estimated by inclusion a non-linear squared lambda term with the original model to test the linearity assumptions and results are reported in column 2. Lambda square term is not statistically significantly different from zero that clearly indicate that linearity is a reasonable assumption for the Bombay Stock Exchange.

The third model is tested to check the adequacy of the market premium factor, which indicate that the market premium is the only factor that explains the average stocks returns. For this purpose, unstandardized residual are used as variable with the original model and results are reported in column 3. Results clearly report that the slope of residuals are not significantly different from zero which means that no other risk factor could be listed into the model.

Joint hypothesis is estimated in model 4, which reports that market risk premium is still the only significant variable that the average mean returns while other factors are not significant. These results clearly support the validity of capital asset pricing model in Bombay Stock Exchange, India.

The empirical findings clearly support the application of local CAPM for the calculation of cost of equity in the Bombay Stock Exchange, India, because this model is statistically producing the significant results and all the assumptions of CAPM are also fulfilling here. These results are consistent with Bajpai and Sharma (2015); Basu and Chawla (2010); Kumar and Siag (2017); Lazar and Yaseer (2012); Raja et al. (2017). These results are inconsistent with Hussain and Ul Islam (2017) study which reports non-significant results for the Bombay Stock Exchange.

The predictive power of the model is calculated through modified R-square which is in increasing trend from model 1 to model 4. Model 4 exhibits the highest explanatory power of the market risk-beta, beta square and residual risk that is 2.1%. Mean root square of error is also calculated for all models and model 4 exhibits the lowest value than all other models. Although predictive power of the CAPM model is lower but Levy (1974) report that for monthly data R-square usually lies within the range of 4 to 5%, and this value is close to this.

4.1.2.4 Estimates for Global CAPM

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global model has been estimated for the Pakistan Stock market over the observed period and results are reported in table 4.13. For this purpose, excess global return has been calculated by taking Morgan Stanley Capital International Index and US three months t-bill rate.

TABLE 4.13: Estimates of Global CAPM for BSE

Variables	**1**	**2**	**3**	**4**
λ_i^G	0.00141	0.00164	0.00147	0.000668
	(0.000900)	(0.00101)	(0.000908)	(0.00236)
λ_i^{2G}		0.000711		-0.00332
		(0.00142)		(0.00900)
μ_i			0.693	3.521
			(1.227)	(7.754)
Constant	0.00528***	0.00519***	0.00493***	0.00388
	(0.000353)	(0.000394)	(0.000721)	(0.00291)
Adj. R^2	0.003	0.003	0.003	0.004
RMSE	0.00980	0.00981	0.00981	0.00981

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

All models have been estimated and result exhibit insignificant relationship between the global risk premium and the average stock returns. This clearly indicates that Global CAPM is not applicable in the Bombay Stock Exchange, India and cannot be used further for the calculation of cost of equity. These results are consistent with Korkmaz et al. (2013). The insignificant results also indicate that Bombay Stock is not highly integrated with the global stock market and any changes appear in MSCI-Developed market may not transmit towards this market.

4.1.2.5 Estimates for Modified Global CAPM

On the lines of Sabal (2002), Modified Global CAPM is estimated for the Bombay Stock Exchange, India and results are reported in the table 4.14. Results show that there exist insignificant relationship between the market risk premium calculated using US index and average returns of Bombay Stock Exchange.

Estimates are reported for four models in column wise from 1 to 4. Model 1 reporting the relationship between the US risk premium and average stock return, second model is for linearity, 3 is for residuals and 4 is reported for the joint hypothesis.

The insignificant results is also expected as they have very low and insignificant relationship between each other i.e. r = -.002. This also show, that these firms are less integrated with the US market. These results are aligned with the results of Hou et al. (2011); Bruner et al. (2008) for the Global risk factor. The insignificant results also indicate that this market premium should not be used to calculate the cost of equity for this market.

TABLE 4.14: Estimates of Modified Global CAPM for BSE

Variables	**1**	**2**	**3**	**4**
$\lambda_i^{S\&P}$	0.000966	0.00105	0.00100	-0.00173
	(0.000841)	(0.000995)	(0.000847)	(0.00275)
$\lambda_i^{2S\&P}$		0.000214		-0.00805
		(0.00128)		(0.00771)
μ_i			0.431	8.182
			(1.250)	(7.528)
Constant	0.00529***	0.00526***	0.00507***	0.00210
	(0.000364)	(0.000398)	(0.000738)	(0.00293)
Adj. R^2	0.002	0.002	0.002	0.003
RMSE	0.00981	0.00981	0.00981	0.00981

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.2.6 Estimates for Downside CAPM

Downside and upside beta's are estimated by using 36 months prior recursive window calculated for Bombay Stock Market under the guidelines of Estrada (2002).

Five different models are reported in column wise. The average of lambda, standard errors and t-statistics are reported in table 4.15.

TABLE 4.15: Estimates of Downside CAPM for BSE

Variables	**1**	**2**	**3**	**4**	**5**
λ_i^D	0.00827***	0.00801***	0.00816***	0.0113***	0.00825***
	(0.00166)	(0.00170)	(0.00166)	(0.00249)	(0.00168)
λ_i^{2D}		0.00322		-0.0562*	
		(0.00466)		(0.0336)	
μ_i			1.120	15.49*	
			(1.202)	(8.664)	
λ_i^U					6.33e-05
					(0.00103)
Constant	0.00501***	0.00488***	0.00444***	-0.000643	0.00501***
	(0.000339)	(0.000387)	(0.000702)	(0.00312)	(0.000346)
Adj. R^2	0.029	0.030	0.030	0.034	0.029
RMSE	0.00967	0.00967	0.00967	0.00966	0.00967

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

For Downside CAPM, with four basic models, one extra model is tested for the downside as well as upside beta with average stock returns and the results are reported in above table. Results for all model clearly indicate that downside beta factor is statistically significantly explaining the average stock returns of Bombay Stock Exchange, India. These results are a clear indication that downside beta is an appropriate model for explaining the returns of this market. The explanatory power, R-Square, and root mean square of error indicates that model four is a more appropriate model for explaining the average stock returns.

4.1.2.7 Estimates for Hybrid and Lessard's Hierarchical CAPM

Following results have been estimated for checking the validity of global and emerging market risk factors that are used by the Lessard's Hierarchical and hybrid model in multiplicative and additive way. Same four hypotheses have been estimated on global and emerging risk factors. Results clearly indicate that all the four hypotheses are rejected, and there is no relationship between global and emerging risk factor.

These insignificant results indicate that emerging risk premium as well as world risk premium are not explaining the variations in average stock returns of Bombay Stock Exchange, India. These results also confirm that emerging markets are becoming less and less integrated than rest of the world (Bruner et al., 2008).

TABLE 4.16: Estimates of Hybrid and Lessards Hierarchical CAPM for BSE

Variables	**1**	**2**	**3**	**4**
λ_i^w	0.00120	0.000532	0.00112	-0.000179
	(0.000872)	(0.000938)	(0.000876)	(0.00105)
λ_i^{EMR}	0.00199	0.00195	0.00196	0.00199
	(0.00141)	(0.00141)	(0.00141)	(0.00141)
λ_i^{2w}		-0.000776*		-0.00192**
		(0.000404)		(0.000862)
μ_i			-1.192	3.833
			(1.199)	(2.556)
Constant	0.00522***	0.00552***	0.00594***	0.00364***
	(0.000374)	(0.000404)	(0.000812)	(0.00131)
Adj. R^2	0.003	0.007	0.004	0.010
RMSE	0.00981	0.00979	0.00981	0.00979

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.2.8 Estimates for Extended Hybrid CAPM

Further industry factor has been added to extend the original Lessard's and Hybrid CAPM model capture the industry risk premium in the Bombay Stock Market, India. For this purpose a multivariate regression model is estimated for the calculation of time invariant beta's for all of these factors on the last 36 month window. Results of second pass regression are reported in table 4.17.

TABLE 4.17: Estimates of Extended Hybrid CAPM for BSE

Variables	**1**	**2**	**3**	**4**
λ_i^w	0.00301	0.00387	0.00322	0.00385
	(0.00318)	(0.00308)	(0.00310)	(0.00312)
λ_i^{EMR}	0.00734**	0.00652**	0.00754**	0.00656**
	(0.00311)	(0.00198)	(0.00301)	(0.00305)
λ_i^{IND}	0.00324**	0.00306**	0.00286	0.00305**
	(0.00142)	(0.00155)	(0.00187)	(0.00151)
λ_i^{2w}		-0.00809***		-0.00779
		(0.00263)		(0.00543)
μ_i			-2.944***	-0.141
			(1.096)	(2.237)
Constant	-0.000158	0.00128	0.00479**	0.00146
	(0.00159)	(0.00161)	(0.00241)	(0.00333)
Adj. R^2	0.059	0.131	0.115	0.131
RMSE	0.00881	0.00850	0.00858	0.00850

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

These results provide an interesting phenomenon that when industry risk factor is added, all factors become highly significant. Results of hypothesis 1 are reported in column 1, which clearly indicate that global risk premium, emerging market risk factor and industry risk factor are statistically significantly and positively explaining the mean returns and same results can be seen in all other hypothesis although column 2 and 4 report that global risk factor is significant as 10%. While global risk factor is statistically insignificant. The mean root square of error indicates that model 2 and model 4 exhibits more model fit than others. Model 4, has 5%, explanatory power that is higher than any other above reported models.

These results indicated that still world risk premium is insignificant that can be interpret as Bombay Stock Exchange is less integrated with the world index, but emerging market risk premium and industry risk premium significantly explain the average stock returns of Bombay Stock Exchange which indicate that Bombay Stock Exchange is integrated with the emerging markets index.

4.1.2.9 Dynamics of Cost of Equity of Bombay Stock Exchange (Annualized)

Cost of equity has been derived with the help of those CAPM models which exhibits significant positive risk and return relationship for the Bombay Stock Exchange over the observed period. For this purpose, Local CAPM, Downside CAPM and Extended Hybrid model are utilized. The results of cost of equity in annualized form are provided in following table and figure. Table and figure both indicate that on average for India has 7% to 14% cost of equity over different years.

Table 4.18: Cost of Equity Dynamics for BSE

Year	K(Local)	K(Downside)	K(Extended Hybrid)
2003	0.197	0.044	0.048
2004	0.071	0.059	0.034
2005	0.157	0.072	0.048
2006	0.137	0.096	0.026
2007	0.091	0.088	0.027
2008	0.151	0.064	0.596
2009	0.106	0.126	0.338
2010	0.068	0.077	0.158
2011	0.021	0.031	0.201
2012	0.076	0.071	0.036
2013	0.09	0.089	0.206
2014	0.093	0.077	0.26
2015	0.068	0.074	0.044
2016	0.06	0.073	0.028
2017	0.029	0.083	0.113
Mean(K)	0.094	0.075	0.144
Adj.R^2	0.021	0.034	0.048
MSEA	0.0097	0.0097	0.0096

The hybrid model indicate much high cost of equity as 59% in year 2008 which indicate as abnormal, after revisit that year indicate in this year market drop on January 2008 from 21,000 index to 8000 on oct. 2008, which is the biggest fall in the history of India. This also indicate that industry risk premium has ability to capture such fall more effectively than any other model.

The value of R^2 and MSEA indicate that hybrid model is a better model for calculating the cost of equity in Bombay Stock Exchange, India.

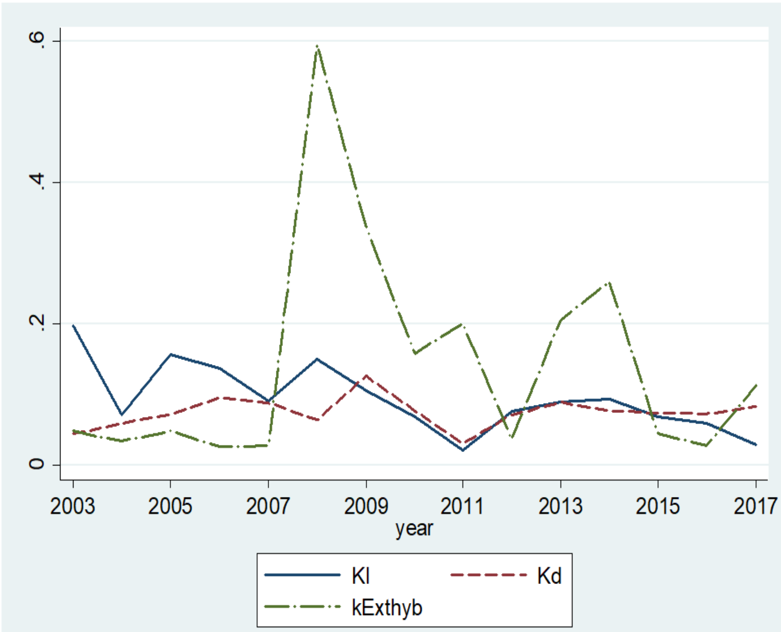

FIGURE 4.2: Dynamics of Cost of Equity for Indian Firms

This figure indicates the annualized behavior of cost of equity from those models where risk and return relationship is significant at-least over the one risk factor. Figure 4.2 indicate the same situation of rise of cost of equity in all models in year 2008.

4.1.2.10 Summary for Bombay Stock Exchange

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range June 2000, to June 2017.

Results indicate that beta calculated through local risk premium, downside risk premium, emerging market premium and industry risk premium are significantly explaining the mean returns of stocks in CAPM frameworks.

The dynamics of cost of equity over the different years, indicate that on average cost of equity vary from 9% to 15% over different years over different model.

4.1.3 Data Analysis for Shanghai Stock Exchange (SSE)

4.1.3.1 Descriptive Analysis for SSE

Descriptive analysis for Shanghai Stock Exchange has been presented in table 4.19. The mean of stocks returns indicate that on average one can earn .5% return on monthly basis on stocks which can deviate by 15.0% on either side, maximum return that as investors can earn is 238.6% monthly and maximum loss that may be incurred 131.6% on the monthly basis. Stocks exhibit leptokurtic behavior overall and zero skewness.

Overall market behavior indicates that one can earn .2% return on monthly basis from Shanghai Stock exchange which can deviate 9% for both tails. Maximum benefit that an investor earns from this market is 24.3% while maximum loss that one can suffer is 43.2% during a month. The shape of the data is showing almost normal where kurtosis and skewness are 6.475 and -1.064 respectively.

On average, one can earn almost the same return from industry of .5% as of investing in the stock market index which can deviate 11.3% on both sides. Maximum benefits can incur during a month is almost 55.2%, and loss which can occur 46.5% while the shape of industry returns is leptokurtic (4.637) with no skewness.

Table 4.19: Descriptive Statistics for SSE

Variables	Mean	Std.Dev.	Min	Max	Skew.	Kurt.
Stock_Return	0.005	0.15	-1.316	2.386	0.033	7.337
Market_Return	0.002	0.09	-0.432	0.243	-1.064	6.475
Industry_Return	0.005	0.113	-0.465	0.552	-0.477	4.637

4.1.3.2 Correlation Analysis for SSE

The relationship of stock returns, market returns, industry returns, global index return and emerging market index return can show in table 4.3.2. Correlation matrix reports that stock returns are positively correlated with all the risk factors with statistical significant at 0.01. Stock returns and industry return are highly correlated with each other with the strength of .734, while all other factors are correlated with .1 or lower strength.

Table 4.20: Correlation Analyses for SSE

Variables	1	2	3	4	5	6
Stock Return	1					
Local Market Return	0.073***	1				
Global Market Return	0.103***	0.526***	1			
Emerging Market Return	0.086***	0.595***	0.896***	1		
Industry Return	0.734***	0.087***	0.119***	0.100***	1	
US Market Return	0.103***	0.442***	0.760***	0.754***	0.127***	1

**** P < .001, ** p < 0.05, * p < .01*

4.1.3.3 Estimates of Local CAPM for SSE

Following are the results cross-section regression for the average stocks return over the systematic risk for different models over the observed period. Results indicate that market risk premium is not significantly explaining the average stock returns in any of the models that mean that Local CAPM model is not applicable for the Shanghai Stock Exchange.

These results indicate that average stock returns of SSE cannot be predicted by the local market premium. In other words, this market is highly efficient that local factors cannot explain their returns. These results are consistent with the study of Wong et al. (2006) as that study also report negative relationship between cross section relationship between average stock returns and beta.

TABLE 4.21: Estimates of Local CAPM for SSE

Variables	**1**	**2**	**3**	**4**
λ_i^L	-0.0018	-0.00291*	-0.0015	-0.0032
	(0.0016)	(0.0016)	(0.0016)	(0.0025)
λ_i^{2L}		0.0326***		0.0397
		(0.008)		(0.0444)
μ_i			5.056***	-1.153
			(1.273)	(7.057)
Constant	0.00622***	0.00573***	0.00472***	0.00596***
	(0.0002)	(0.0002)	(0.0004)	(0.0015)
Adj. R^2	0.002	0.025	0.024	0.025
RMSE	0.00513	0.00507	0.00508	0.00508

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.3.4 Estimates of Global CAPM for SSE

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global model has been estimated for the SSE over the observed period and results are reported in table 4.22. Excess global return has been calculated by taking Morgan Stanley Capital International Index and US three months t-bill rate. In Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 values. Than in second phase, cross sectional regression has been performed for beta and mean returns and results are reported in table 4.22.

Results for all models indicate that beta calculated through global risk premium unable to explain the variations of average stocks returns of SSE. This again verify the efficiency of this market. This clearly indicates that Global CAPM is not applicable in Shanghai Stock Exchange, China. These results are consistent with the results of Hou et al. (2011).

Table 4.22: Estimates of Global CAPM for SSE

Variables	**1**	**2**	**3**	**4**
λ_i^G	0.000711	-0.00136	0.00074	-0.00496
	(0.0008)	(0.0011)	(0.0008)	(0.0039)
λ_i^{2G}		0.00710***		0.0192
		(0.0023)		(0.0128)
μ_i			3.693***	-6.91
			(1.2770)	(7.1460)
Constant	0.00607***	0.00583***	0.00497***	0.00748***
	(0.0002)	(0.0002)	(0.0004)	(0.0017)
Adj. R^2	0.001	0.015	0.013	0.016
RMSE	0.00513	0.0051	0.0051	0.0051

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.3.5 Estimates of Modified Global CAPM for SSE

On the lines of Sabal (2002), Modified Global CAPM is estimated for SSE and results are reported in the table 4.23. All the four models are estimated to check the risk and return relationship.

Results for global risk premium are significant for model 1 and model 3 at 0.05, but as a squared term is added in model 2 and 4, results remains significant but only at 0.1. The joint hypothesis (Model 4) indicates that beta drives from the rolling regression on each month from modified global risk premium is unable to explain the variations in the average stocks returns of SSE, which conclude the above results of market efficiency that none of factor can predict the stock returns as they move randomly.

Cost of equity from the perspective fo international investor can be calculated by using the modified CAPM but using only third model, although power of the model is not sufficient.

TABLE 4.23: Estimates of Modified Global CAPM for SSE

Variables	**1**	**2**	**3**	**4**
$\lambda_i^{S\&P}$	0.00186**	0.00176*	0.00199**	0.0013
	(0.0009)	(0.0009)	(0.0009)	(0.0014)
$\lambda_i^{2S\&P}$		0.00351		0.0106
		(0.0026)		(0.0160)
μ_i			1.551	-3.392
			(1.2330)	(7.5760)
Constant	0.00609***	0.00594***	0.00563***	0.00663***
	(0.0002)	(0.0002)	(0.0004)	(0.0016)
Adj. R^2	0.006	0.008	0.008	0.009
RMSE	0.00512	0.00511	0.00512	0.00512

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.1.3.6 Estimates of Downside CAPM for SSE

In the fourth phase of analysis for Bombay Stock Market, downside market risk is estimated by using Estrada (2002). In the second phase, this beta is cross sectional regressed for each time period and λ values has been calculated which is eventually average out and reported in the table 4.24.

For this CAPM version of model, an extra model 5 has been also estimated for both downside and upside beta to see the up and down effect of the market on the average stock's returns.

Results for all models indicate that downside beta factor is not statistically significantly explaining the average stock returns of Shanghai Stock Exchange, China. These results are consistent with the findings of Harvey (1995).

Table 4.24: Estimates of Downside CAPM for SSE

Variables	**1**	**2**	**3**	**4**	**5**
λ_i^D	-1.64E-05	-9.75E-05	-1.64E-05	-0.000211	-8.19E-05
	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)
λ_i^{2D}		0.0221**		0.0531	
		(0.0104)		(0.0474)	
μ_i			2.551*	-4.033	
			(1.3220)	(6.0180)	
λ_i^U					0.000452
					(0.0014)
Constant	0.00617***	0.00589***	0.00541***	0.00670***	0.00616***
	(0.0002)	(0.0002)	(0.0004)	(0.0012)	(0.0002)
Adj. R^2	0	0.006	0.005	0.007	0
RMSE	0.00513	0.00512	0.00512	0.00512	0.00514

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.3.7 Estimates of Hybrid and Lessard's Hierarchical CAPM for SSE

Following results are estimated for checking the validity of global and emerging market risk factors that are used by the Lessard's Hierarchical and hybrid model in multiplicative and additive way.

Same four models have been estimated on global and emerging risk factors. Again the results of the model is not explaining the risk and return relationship between the global as well as emerging risk factors with the average stock's returns.

This also indicate that the investor of Shanghai stock market cannot relay on these models for the calculation of cost of equity. Results suggested to explore other risk factors that may explain the variations in stock market returns.

Table 4.25: Estimates of Hybrid and Lessards Hierarchical CAPM for SSE

Variables	**1**	**2**	**3**	**4**
λ_i^w	0.000327	-0.0012	0.000386	0.00283*
	(0.0008)	(0.0010)	(0.0008)	(0.0016)
λ_i^{EMR}	0.000878	0.000899	0.000913	0.000912
	(0.0013)	(0.0013)	(0.0013)	(0.0012)
λ_i^{2w}		0.00138**		-0.00216*
		(0.0006)		(0.0012)
μ_i			4.468***	8.457***
			(1.2140)	(2.5450)
Constant	0.00619***	0.00631***	0.00459***	0.00297***
	(0.0003)	(0.0003)	(0.0005)	(0.0011)
Adj. R^2	0.001	0.009	0.02	0.024
RMSE	0.00513	0.00512	0.00509	0.00508

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.3.8 Estimates for Extended Hybrid CAPM

Further industry factor has been added to extend the original Lessard's and Hybrid CAPM model capture the industry risk premium in the Shanghai Stock Exchange, China. For this purpose a multivariate regression model is estimated for the calculation of time invariant beta's for all of these factors on the last 36 month window. Results of second pass regression are reported in table 4.26.

These results indicated that still world risk premium, emerging risk premium, and industry risk premium is insignificant. Industrial risk factor also produces non-significant results in a multivariate framework. It can be said stock returns of Shanghai Stock Exchange are random in nature and could not be predicted from any factor.

Table 4.26: Estimates of Extended Hybrid CAPM for BSE

Variables	**1**	**2**	**3**	**4**
λ_i^w	0.00116	0.000919	0.000962	0.00112
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
λ_i^{EMR}	0.00194	0.00186	0.00166	0.0016
	(0.0013)	(0.0013)	(0.0013)	(0.0013)
λ_i^{IND}	-0.00177	-0.00181	-0.00143	-0.00123
	(0.0013)	(0.0013)	(0.0013)	(0.0013)
λ_i^{2w}		0.00142**		-0.00147
		(0.0006)		(0.0011)
μ_i			4.660***	6.914***
			(1.2040)	(2.0080)
Constant	0.00786***	0.00763***	0.00568***	0.00486***
	(0.0013)	(0.0013)	(0.0014)	(0.0015)
Adj. R^2	0.006	0.013	0.027	0.029
RMSE	0.00513	0.00511	0.00508	0.00507

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.1.3.9 Estimates for Industrial Return

An extra step has been performed for the Shanghai Stock Exchange, China for testing industrial factor in bivariate regression due to non-significant results in all other models. The joint hypothesis indicate that beta drive from the industrial returns is significantly explaining the average returns of stocks in the presence of squared and residual term.

The significant of the result may be concluded that although industrial index is not a perfect portfolio index as it is leaving the basic definition of market portfolio, but still results suggest to work out other risk factors which may be highly correlated to this index and can be used under the definition of market portfolio for this market.

Table 4.27: Estimates of Industrial CAPM for SSE

Variables	**1**	**2**	**3**	**4**
λ_i^{IND}	-0.0018	0.0265**	-0.00128	0.154***
	(0.0013)	(0.0115)	(0.0013)	(0.0569)
λ_i^{2IND}		-0.0129**		-0.0798***
		(0.0060)		(0.0292)
μ_i			3.617***	20.79***
			(1.3040)	(6.4110)
Constant	0.00794***	0.0195***	0.00635***	-0.0729**
	(0.0013)	(0.0055)	(0.0014)	(0.0290)
Adj. R^2	0.003	0.009	0.013	0.024
RMSE	0.00513	0.00511	0.0051	0.00508

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.3.10 Dynamics of Cost of Equity of Shanghai Stock Exchange (Annualized)

Cost of equity has been calculated with the help of modified global model and Industry model which exhibits significant positive risk and return relationship for the SSE over the observed period and results are reported in table 4.28.

Cost of equity indicates that year 2008, 2011, and 2017 report negative costs of equity, which mean that still these models fail to capture the cost of equity in these years. The main reason is that in the year 2008, SSE market shows an annual loss of 65% in just one year, from 4380 to 1820 points at the end of December, 2008. Same down trend can be traced in the year 2011 and 2017. In other words, these models failed to perform during bubbles.

4.1.3.11 Summary for Shanghai Stock Exchange

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range June 2000, to June 2017.

Table 4.28: Dynamics of Cost of Equity for SSE firms

Year	Kmg	kind
2006	-0.05315	0.076175
2007	0.081654	0.094032
2008	-0.15504	-0.56744
2009	0.170601	0.08278
2010	0.103702	0.074974
2011	-0.00882	-0.17102
2012	0.045752	-0.28441
2013	-0.01101	0.31334
2014	-0.01879	0.330808
2015	-0.02245	0.38109
2016	0.007401	-0.0337
2017	-0.20883	-0.31881
Mean(K)	-0.00575	-0.00185
Adj. R^2	0.006	0.024
RMSE	0.00512	0.00508

Figure 4.3: Dynamics of Cost of Equity for SSE firms

Results indicate that beta calculated through all other risk factor except industry risk factor, show insignificant results. Beta calculated with the help of industry risk premium, explained the variations of average stock returns.

Still the cost of equity calculated with this factor, provide unusual results as most of year value is negative. This study suggests to other than the CAPM model to calculate the cost of equity.

4.1.4 Data Analysis for Brazil Stock Exchange (BOVESPA)

4.1.4.1 Descriptive Analysis for BOVESPA

Descriptive analysis for Brazilian Stock Market (BOVESPA) has been reported in table 4.29. The mean of stocks returns indicate that on average one can earn .7% return on monthly basis on stocks which can deviate by 16.3% in either higher and lower tail, maximum return that as investors can earn is 458% monthly and maximum loss that may be incurred 263.9% on the monthly basis. Stocks exhibit leptokurtic behavior (Kurt. = 72.75) with partial skewness (Skew. = 2.59). Overall market behavior indicates that one can earn 1% return on monthly basis from Brazil Stock exchange which can deviate 6.8% for both tails. Maximum benefit that an investor earns from this market is 16.5% while maximum loss that one can suffer is 28.5% during a month. The shape of the data is showing almost normal where kurtosis and skewness are 4.23 and -.477 respectively.

On average, one can earn almost the same return from industry of .3% as of investing in the stock market index which can deviate 10% on both sides. Maximum benefits can incur during a month is almost 138.1%, and loss which can occur 212.6% while the shape of industry returns is highly leptokurtic (89.41) with negative partial skewness (-3.071).

Table 4.29: Descriptive Analysis for BOVESPA

Variables	Means	Std.Dev	Min	Max	Skew.	Kurt.
Stock_Return	0.007	0.163	-2.639	4.58	2.597	72.75
Market_Return	0.01	0.068	-0.285	0.165	-0.477	4.234
Industry_Return	0.003	0.1	-2.126	1.381	-3.071	89.417

4.1.4.2 Correlation Analysis for BOVESPA

The relationship of stock returns, market returns, industry returns, the global index return, emerging market index return and US stock market index return can be seen from table 4.30. Correlation matrix reports that stock returns are positively correlated with all the risk factors with statistically significant at 0.05. Stock returns and industry return are highly correlated with each other with the strength of .286, while all other factors are correlated with .1 or lower strength.

Table 4.30: Correlation Analyses for BOVESPA

Variables	1	2	3	4	5	6
Stock Return	1					
Local Market Return	0.032***	1				
Industry Market Return	0.286***	0.035***	1			
Emerging Market Return	0.051***	0.816***	0.065***	1		
Global Index Return	0.036***	0.707***	0.051***	0.869***	1	
US Market Return	0.025***	0.639***	0.040***	0.784***	0.969***	1

**** P < .001, ** p < 0.05, * p < .01*

4.1.4.3 Estimates of Local CAPM for BOVESPA

Following are the results of cross-section regression for the Brazilian Stock market over the observed period. All the four hypotheses are tested and the results indicate that there is no risk and return relationship.

These results indicate that average stock returns of Brazilian Stock Market can be predicted by the local market premium. In other words, this market is highly efficient that local factors cannot explain their returns. These results are consistent with the study of Garcia and Bonomo (2001).

4.1.4.4 Estimates of Global CAPM for BOVESPA

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global model has been estimated for the Brazilian Stock Market over the observed period and results are reported in table 4.32. Excess global return has been calculated by taking Morgan Stanley Capital International Index and US three months t-bill rate. In

Table 4.31: Estimates of Local CAPM for BOVESPA

Variables	1	2	3	4
λ_i^L	-0.00536	-0.00383	-0.00547	-0.00114
	(0.00515)	(0.00529)	(0.00514)	(0.0126)
λ_i^{2L}		-0.0191		-0.0503
		(0.0156)		(0.133)
μ_i			-1.441	2.431
			(1.214)	(10.35)
Constant	-0.00590***	-0.00526***	-0.00378*	-0.00779
	(0.000982)	(0.00111)	(0.00203)	(0.0108)
Adj. R^2	0.008	0.018	0.018	0.019
RMSE	0.0115	0.0114	0.0114	0.0115

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 values. Than in second phase, cross sectional regression has been performed for beta and mean returns and results are reported in table 4.32.

Table 4.32: Estimates of Global CAPM for BOVESPA

Variables	1	2	3	4
λ_i^G	-0.00368	-0.00373	-0.00369	-0.00432
	(0.00284)	(0.00291)	(0.00288)	(0.00320)
λ_i^{2G}		-0.000354		-0.0171
		(0.00445)		(0.0374)
μ_i			-0.0302	4.543
			(1.201)	(10.09)
Constant	-0.00606***	-0.00602***	-0.00601***	-0.0107
	(0.00096)	(0.00109)	(0.00200)	(0.0105)
Adj. R^2	0.012	0.012	0.012	0.013
RMSE	0.0114	0.0115	0.0115	0.0115

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

All models has been tested and the results have been reported in table 4.2.2. Global risk factor provided insignificant results for all models. This clearly indicates that Global CAPM is not applicable in Brazil Stock Exchange. These results are the same like Bruner and Chan (2002) and Pereiro (2002) report in their studies for Brazil.

4.1.4.5 Estimates of Modified Global CAPM for BOVESPA

On the lines of Sabal (2002), Modified Global CAPM is estimated for SSE and results are reported in the table 4.33. Results indicate that there is a negative relationship between beta drive from US risk premium and average stock returns of Brazilian Stock Market for model 1 at significant less than 0.05. But as squared term is added into the model, it become insignificant.

TABLE 4.33: Estimates of Modified Global CAPM for BOVESPA

Variables	**1**	**2**	**3**	**4**
$\lambda_i^{S\&P}$	-0.00480**	-0.00468*	-0.00752*	-0.00472*
	(0.00241)	(0.00251)	(0.00427)	(0.00244)
$\lambda_i^{2S\&P}$		0.000554		-0.0246
		(0.00305)		(0.0308)
μ_i			9.629	0.304
			(11.72)	(1.160)
Constant	-0.00621***	-0.00629***	-0.00664***	-0.0162
	(0.000953)	(0.00106)	(0.00191)	(0.0121)
Adj. R^2	0.028	0.028	0.028	0.033
RMSE	0.0113	0.0114	0.0114	0.0114

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.4.6 Estimates of Downside CAPM for BOVESPA

In the fourth phase of analysis for the Brazilian Stock Market, downside market risk is estimated by using Estrada (2002) and is regressed with the average stock returns in order to drive out the risk and return model.

For Downside CAPM, with four basic hypotheses, one extra model is tested for the downside as well as upside beta with average stock returns and the results are reported in above table. The results of the above table indicate that except model 4 which is testing the joint model, all other model are failed to explain the

Table 4.34: Estimates of Downside CAPM for BOVESPA

Variables	**1**	**2**	**3**	**4**	**5**
λ_i^D	-0.00517	0.00276	-0.00281	0.0341***	-0.00510
	(0.00526)	(0.00553)	(0.00516)	(0.0124)	(0.00529)
λ_i^{2D}		-0.0516***		-0.360***	
		(0.0146)		(0.110)	
μ_i			-3.748***	25.30***	
			(1.200)	(8.972)	
λ_i^U					-0.000933
					(0.00383)
Constant	-0.00587***	-0.00431***	-0.000656	-0.0302***	-0.00589***
	(0.000991)	(0.00105)	(0.00193)	(0.00924)	(0.000998)
Adj. R^2	0.007	0.090	0.073	0.140	0.007
RMSE	0.0115	0.0111	0.0112	0.0108	0.0116

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

basic risk and return relationship. The joint hypothesis reports a positive and significant relationship between risk and return with the slope of 0.0341 but non-linearity and residuals are also significant. This model has explanatory power of 14%. The intercept of the model is negative and significant, which clearly indicate the issue of mis-pricing behavior in the Brazilian stock market.

4.1.4.7 Estimates of Hybrid CAPM and Lessards Hierarchical CAPM for BOVESPA

Following results have been estimated for checking the validity of global and emerging market risk factors that are used by the Lessards Hierarchical and Hybrid model in multiplicative and additive way. Same four hypothesis have been estimated on global and emerging risk factors. Results clearly indicate that all the four hypotheses are rejected for both risk factors.

These results suggest that both beta's that is calculated from the global risk factor and emerging risk factor cannot explain the average returns of Brazilian's stock. This may mean that this market is either efficient, but significance of intercept indicate that there are other risk factors which may explain these returns.

TABLE 4.35: Estimates of Hybrid and Lessards Hierarchical CAPM for BOVESPA

Variables	**1**	**2**	**3**	**4**
λ_i^w	-0.00322	-0.00510*	-0.00405	-0.00433
	(0.00272)	(0.00284)	(0.00271)	(0.00294)
λ_i^{EMR}	-0.00171	-0.00132	-0.00133	-0.00130
	(0.00473)	(0.00468)	(0.00466)	(0.00468)
λ_i^{2w}		-0.00225**		-0.000524
		(0.00110)		(0.00205)
μ_i			-2.591**	-2.132
			(1.143)	(2.128)
Constant	-0.00633***	-0.00554***	-0.00210	-0.00267
	(0.000994)	(0.00106)	(0.00211)	(0.00306)
Adj. R^2	0.021	0.049	0.056	0.056
RMSE	0.0114	0.0113	0.0113	0.0113

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

Statistically speaking, lower correlation of these risk factor with stock returns is the main reason of such insignificant results, which also indicates that Brazilian market is isolated form global and emerging market.

4.1.4.8 Estimates of Extended Hybrid CAPM for BVESPA

Further industry factor has been added to extend the original Lessard's and Hybrid CAPM model capture the industry risk premium in the Brazilian Stock Exchange. For this purpose a multivariate regression model is estimated for the calculation of time invariant beta's for all of these factors on the last 36 month window. Results of second pass regression are reported in table 4.36.

Industrial risk factor is significantly explaining the mean returns of firms in a multivariate framework. But the other both variables are still insignificant. The intercept term is significant and negative that indicates the mispricing consistent behavior in this market.

Table 4.36: Estimates of Extended Hybrid CAPM for BVESPA

Variables	**1**	**2**	**3**	**4**
λ_i^w	-0.00222	-0.00270	-0.00201	-0.00368
	(0.00287)	(0.00301)	(0.00289)	(0.00304)
λ_i^{EMR}	0.00114	0.00123	0.000989	0.00107
	(0.00519)	(0.00521)	(0.00520)	(0.00517)
λ_i^{IND}	0.00215**	0.00204*	0.00271**	0.00343***
	(0.00103)	(0.00105)	(0.00124)	(0.00131)
λ_i^{2w}		-0.000576		-0.00252
		(0.00106)		(0.00152)
μ_i			0.866	2.727*
			(1.075)	(1.552)
Constant	-0.00442***	-0.00432***	-0.00547***	-0.00729***
	(0.00131)	(0.00133)	(0.00185)	(0.00214)
Adj. R^2	0.048	0.050	0.053	0.071
RMSE	0.0113	0.0113	0.0113	0.0112

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.1.4.9 Dynamics of Cost of Equity of Brazilian Stock Exchange (Annualized)

Cost of equity has been calculated with the help of downside CAPM model and extended hybrid model which exhibits significant positive risk and return relationship for the Brazilian Stock Market over the observed period and results are reported in table 4.37.

Table 4.37 and figure 4.4 both indicate that, on average firm cost of equity for Brazilian firms is almost move between 11% to 12%. Year 2011 show a dip in cost and report lowest value as 3.46% and 2.28%. It is that time when every stock market in Asia show a slow growth than respective other years.

4.1.4.10 Summary for Brazilian Stock Exchange (BOVESPA)

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed

Table 4.37: Dynamics of Cost of Equity for Brazilian Firms

Year	**Kd**	**Kexthyb**
2005	0.1513	0.1563
2006	0.1378	0.1372
2007	0.0957	0.0819
2008	0.0582	0.1173
2009	0.2178	0.2184
2010	0.0951	0.0955
2011	0.0346	0.0228
2012	0.0790	0.0827
2013	0.0864	0.0969
2014	0.1450	0.1328
2015	0.1589	0.1431
2016	0.1415	0.1590
2017	0.1116	0.1101
Mean(K)	0.1164	0.1196
Adj. R^2	0.1400	0.0710
RMSE	0.0108	0.0112

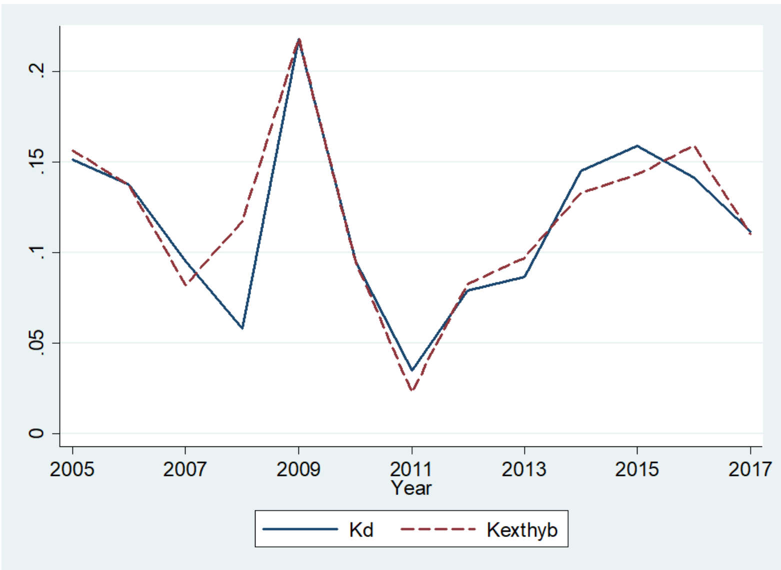

Figure 4.4: Dynamics of Cost of Equity for Brazilian Firms

against average returns to check the validity of that risk factor over the range of data as shown in chapter 3 section 3.1.

Results indicate that beta calculated through all other risk factor except downside risk factor and industry risk factor, show insignificant results. Beta calculated with the help of downside risk premium and industry risk premium, explained the variations of average stock returns with modified R^2 as 14% and 7.10%, which also indicate that downside model is a better performer than the other. Cost of equity for Brazilian firms move between 11% to 12%.

4.1.5 Data Analysis for Moscow Stock Exchange, Russia (MICEX)

4.1.5.1 Descriptive Analysis for Moscow Stock Exchange

Descriptive analysis for Moscow Stock Exchange, Russia has been presented in table 4.3.1. The mean of stocks returns indicate that on average one can incur a loss of .1% on a monthly basis which can deviate by 15.9% in either higher and lower tail, maximum return that as investors can earn is 541.6% monthly and maximum loss that may be incurred 521.8% on the monthly basis. Stocks exhibit highly leptokurtic behavior (333.525) overall and positive skewness (3.219).

Overall stock market behavior indicates that one can earn .4% return on monthly basis from Moscow Stock exchange which can deviate 5.1% for both tails. Maximum benefit that an investor earns from investing in the market is 16.7% while maximum loss that one can suffer is 9% during a month.

On average, one can earn almost the same return from industry of .1% as of investing in industry index which can deviate 8.5% on both sides. Maximum benefits can incur during a month is almost 112.8%, and loss which can occur 115.7% while the shape of industry returns is leptokurtic (22.315) with almost no skewness.

Table 4.38: Descriptive Analysis for Moscow Stock Exchange

Variables	Means	Std.Dev	Min	Max	Skew.	Kurt.
Stock_Return	-.001	.159	-5.218	5.416	3.219	333.525
Market_Return	.004	.051	-.123	.167	-.09	3.377
Industry_Return	.001	.085	-1.157	1.128	.774	22.315

4.1.5.2 Correlation Analysis for Moscow Stock Exchange

The relationship of stock returns, market returns, industry returns, global index return and emerging market index return can display on table 4.39. Correlation matrix reports that stock returns are significantly positively correlated with all the risk factors with statistically significant at 0.05. Industry return is more related with stock returns than any of the other risk factor with a strength of .166. MSCI-Global Stock return and US market return are highly correlated but as both risk factors are used separately, so the issue of multicollinearity does not take place.

Table 4.39: Correlation Analyses for Moscow Stock Exchange

Variables	1	2	3	4	5	6
Stock Return	1					
Local Market Return	0.126***	1				
Industry Market Return	0.166***	0.154***	1			
Global Market Return	0.019***	0.118***	0.021***	1		
Emerging Index Return	0.016***	0.085***	0.014***	0.869***	1	
US Market Return	0.021***	0.136***	0.022***	0.784***	0.969***	1

**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.5.3 Estimates of Local CAPM for Moscow Stock Exchange

Following are the results of cross-section regression for the average stocks return over the systematic risk for different models over the observed period. Four hypotheses are tested for Local CAPM from 1 to 4 as showed in table.

Results report that there is no significant relationship between beta and average stock returns of the Moscow Stock Exchange. These results are not consistent with Sergery (2015) who reported significant relationship with systematic risk and average stock returns.

Table 4.40: Estimates of Local CAPM for Moscow Stock Exchange

Variables	**1**	**2**	**3**	**4**
λ_i^L	-0.00131	-0.00115	-0.00132	0.00744
	(0.00155)	(0.00224)	(0.00156)	(0.00915)
λ_i^{2L}		-0.000166		-0.0104
		(0.00169)		(0.0107)
μ_i			0.0653	7.199
			(1.172)	(7.434)
Constant	-0.00699***	-0.00698***	-0.00707***	-0.0147*
	(0.000990)	(0.000997)	(0.00168)	(0.00806)
Adj. R^2	0.002	0.002	0.002	0.005
RMSE	0.0145	0.0145	0.0145	0.0145

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.1.5.4 Estimates of Global CAPM for Moscow Stock Exchange

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global model has been estimated for the Brazilian Stock Market over the observed period and results are reported in table 4.41. Excess global return has been calculated by taking Morgan Stanley Capital International Index and US three months t-bill rate. In Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 values. Than in second phase, cross sectional regression has been performed for beta and mean returns and results are reported in table 4.41.

All hypothesis has been tested and the results have been reported in table 4.41. Global risk factor provided significant results for all models. Although, model 2 and 3 is reported the issue of non-linearity and inadequacy of global premium, but these become insignificant in model 4 where joint hypothesis tested. These results are a clear indication that Global CAPM is a more suitable model for the valuation of the cost of equity for stocks registered on the Moscow Stock Exchange. The intercept of the model is significant and negative that indicate that mispricing phenomena are consistent phenomena in this market. No other study can be

Table 4.41: Estimates of Global CAPM for MICEX

Variables	**1**	**2**	**3**	**4**
λ_i^G	0.00312**	0.00514***	0.00454***	0.00415**
	(0.00133)	(0.00151)	(0.00140)	(0.00170)
λ_i^{2G}		-0.00108***		0.000558
		(0.000395)		(0.00136)
μ_i			-2.946***	-4.278
			(0.984)	(3.385)
Constant	-0.00726***	-0.00672***	-0.00398***	-0.00277
	(0.000811)	(0.000826)	(0.00136)	(0.00323)
Adj. R^2	0.017	0.040	0.044	0.045
RMSE	0.0144	0.0142	0.0142	0.0142

Standard errors in parentheses
*** $P < .001$, ** $p < 0.05$, * $p < .01$*

found in this model for the Moscow Stock Exchange, Russia on Global Risk so that results cannot be comparable.

4.1.5.5 Estimates of Modified Global CAPM for Moscow Stock Exchange

Modified Global CAPM is estimated for the Moscow Stock Exchange, Russia and results are reported in the table in 4.42. Results indicate a significant and positive relationship exists between US index return and average stock return.

Results also report that this significant relationship is non-linear and no other risk factor explains the variations in average stock returns. Average adjusted R square show the model predictability which is 5% approximately which is weak. Root mean square error indicates that model 2 and 3 is more suitable models to calculate the cost of equity from the said CAPM model.

TABLE 4.42: Estimates of Modified Global CAPM for MICEX

Variables	**1**	**2**	**3**	**4**
$\lambda_i^{S\&P}$	0.00339***	0.00497***	0.00447***	0.00471***
	(0.00119)	(0.00129)	(0.00123)	(0.00145)
$\lambda_i^{2S\&P}$		-0.00109***		-0.000476
		(0.000375)		(0.00157)
μ_i			-2.863***	-1.657
			(0.978)	(4.104)
Constant	-0.00718***	-0.00653***	-0.00399***	-0.00505
	(0.000809)	(0.000830)	(0.00135)	(0.00376)
Adj. R^2	0.025	0.051	0.051	0.051
RMSE	0.0143	0.0141	0.0141	0.0142

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.1.5.6 Estimates of Downside CAPM for Moscow Stock Exchange

In the fourth phase of analysis for the Moscow Stock Exchange, Russia, downside market risk is estimated by using Estrada (2002) and is regressed with the average stock returns in order to drive out the risk and return model.

TABLE 4.43: Estimates of Downside CAPM for MICEX

Variables	**1**	**2**	**3**	**4**	**5**
λ_i^D	0.00269*	0.00511*	0.00104	0.00449	0.00324*
	(0.00160)	(0.00307)	(0.00165)	(0.00775)	(0.00183)
λ_i^{2D}		-0.00610***	0.00332		
		(0.00206)		(0.00728)	
μ_i			-4.599***	-6.808	
			(1.424)	(5.051)	
λ_i^U					0.00121
					(0.00196)
Constant	-0.00621***	-0.00656***	-0.000570	0.00233	-0.00629***
	(0.00116)	(0.00115)	(0.00209)	(0.00670)	(0.00117)
Adj. R^2	0.010	0.040	0.045	0.046	0.011
RMSE	0.0152	0.0150	0.0150	0.0150	0.0152

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

Results for all model clearly indicate that downside beta factor is not statistically significantly explaining the average stock returns of Moscow Stock Exchange, Russia at 5% confidence interval. This indicates that downside beta model is not applicable to the valuation of the cost of equity for Stocks listed on the Moscow Stock Exchange.

4.1.5.7 Estimates of Hybrid CAPM and Lessards Hierarchical CAPM for MICEX

Following results have been estimated for checking the validity of global and emerging market risk factors that are used by the Lessards Hierarchical and Hybrid model in multiplicative and additive way. Same four hypotheses have been estimated on global and emerging risk factors.

Results indicate that global factor is statistically significantly explaining the returns in all model but emerging market risk factor is not significantly explaining the average market premium. This clearly indicates that global risk is a more important variable in explaining the average stock returns of this market although the addition of the emerging market risk factor increases the explanatory power of the model.

4.1.5.8 Estimates of Extended Hybrid CAPM for MICEX

Further industry factor has been added to extend the original Lessard's and Hybrid CAPM model capture the industry risk premium in the Moscow Stock Market, Russia. For this purpose a multivariate regression model is estimated for the calculation of time invariant beta's for all of these factors on the last 36 month window. Results of second pass regression are reported in table 4.45.

These results report that still only global market factor is statistically positively explaining the average mean returns but non-linearity issue still exists. These results indicate that returns to firms registered with the Moscow Stock Market, Russia, can be explained with the help of Global Market factor.

Table 4.44: Estimates of Hybrid and Lessards Hierarchical CAPM for MICEX

Variables	**1**	**2**	**3**	**4**
λ_i^w	0.00237*	0.00430***	0.00339**	0.00484***
	(0.00130)	(0.00145)	(0.00137)	(0.00153)
λ_i^{EMR}	-0.00224	-0.000515	-0.000995	-0.000491
	(0.00209)	(0.00215)	(0.00215)	(0.00215)
λ_i^{2w}		-0.000547***		-0.00110**
		(0.000189)		(0.000518)
μ_i			-1.982**	2.745
			(0.877)	(2.391)
Constant	-0.00758***	-0.00691***	-0.00505***	-0.00973***
	(0.000797)	(0.000821)	(0.00137)	(0.00259)
Adj. R^2	0.064	0.088	0.079	0.092
RMSE	0.0140	0.0139	0.0140	0.0139

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

Table 4.45: Estimates of Extended Hybrid CAPM for MICEX

Variables	**1**	**2**	**3**	**4**
λ_i^w	0.00209	0.00458***	0.00260*	0.00514***
	(0.00135)	(0.00156)	(0.00143)	(0.00158)
λ_i^{EMR}	-0.00275	-0.000381	-0.00209	-0.000317
	(0.00219)	(0.00230)	(0.00227)	(0.00229)
λ_i^{IND}	-0.000327	-0.000282	-0.000300	-0.000321
	(0.000216)	(0.000214)	(0.000217)	(0.000214)
λ_i^{2w}		-0.000632***		-0.00113***
		(0.000206)		(0.000325)
μ_i			-0.858	2.343*
			(0.767)	(1.192)
Constant	-0.00732***	-0.00656***	-0.00614***	-0.00920***
	(0.000795)	(0.000823)	(0.00132)	(0.00157)
Adj. R^2	0.073	0.100	0.077	0.111
RMSE	0.0140	0.0138	0.0140	0.0137

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.1.5.9 Dynamics of Cost of Equity of Moscow Stock Exchange (Annualized)

The dynamics of the cost of equity have been calculated for Global and Modified Global model as these model represents the significant risk and return relationship in this stock exchange. On average, these models represent that those firms have almost 3% to 7% cost of equity. Last two quarters of year 2015 report the highest cost of equity.

The basic reason for such high cost of equity is the fall of the index in the middle of August by 724 points which are stabilized for just a month, and another fall followed in followed in November, 2015 - December, 2015. This season has the highest volatility of 4.5 and the lowest yield was -.66 in the stock market (Tregub et al., 2015).

TABLE 4.46: Dynamics of Cost of Equity for Moscow Firms

Year	Kw	KMW
2013	0.0188	0.0254
2014	0.0320	0.0413
2015	0.0564	0.0650
2016	0.0208	0.0223
2017	0.0152	0.0143
Mean(K)	0.0287	0.0337
Adj. R^2	0.045	0.051
RMSE	0.0142	0.0142

4.1.5.10 Summary for Moscow Stock Exchange (MICEX)

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range of data as shown in chapter 3 section 3.1.

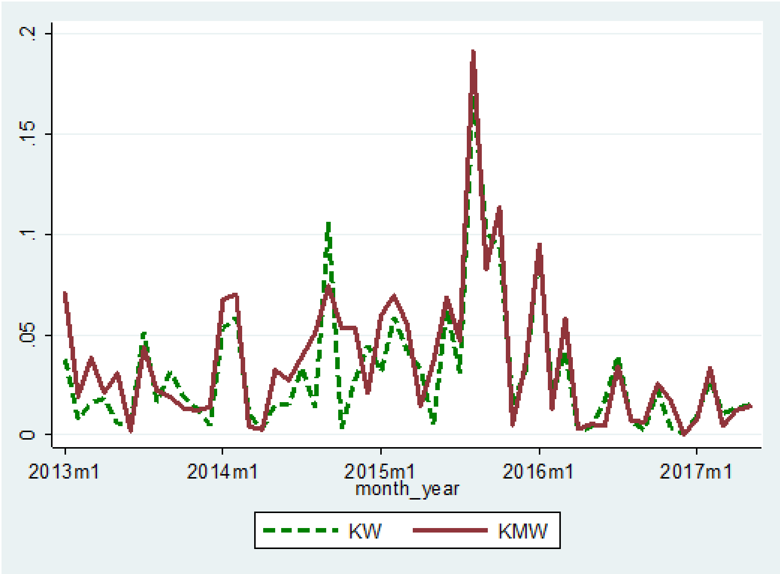

Figure 4.5: Dynamics of Cost of Equity over Months for Moscow Firms

Results of all tables indicate that beta calculated through all other risk factor except global risk premium and modified global risk premium, show insignificant results. Figure 4.5 reports the cost of equity monthly basis to see the variations over the month for detail insight, November, 2015 to December, 2015 show high volatility.

4.1.6 Data Analysis for Johannesburg Stock Exchange (JSE)

4.1.6.1 Descriptive Analysis for JSE

Descriptive analysis for Johannesburg Stock Exchange, South Africa has been presented in table 4.47. The mean of stocks returns indicate that on average one can earn 0.6% return on monthly basis on stocks which can deviate by 15.1% in either higher and lower tail, maximum return that as investors can earn is 625.3% monthly and maximum loss that may be incurred 631% on the monthly basis. Stocks exhibit leptokurtic behavior overall and zero skewness.

Overall market behavior indicates that one can earn 0.9% return on monthly basis from Johannesburg Stock exchange which can deviate 4.6% on both sides.

Maximum benefit that an investor earns from investing in the market is 13.1% while maximum loss that one can suffer is 15% during a month.

On average, one can earn almost the same return from industry of 0.9% as of investing in industry index which can deviate 6.6% on both sides. Maximum benefits can incur during a month is almost 67.6%, and loss which can occur 63.3% while the shape of industry returns is lymphocytic (11.041) with little skewness.

TABLE 4.47: Descriptive Analysis for JSE

Variables	Means	Std.Dev	Min	Max	Skew.	Kurt.
Stock_Return	.006	.151	-6.31	6.253	.865	246.6
Market_Return	.009	.046	-.15	.131	-.355	4.075
Industry_Return	.009	.066	-.633	.676	-.033	11.041

4.1.6.2 Correlation Analysis for JSE

The relationship of stock returns, market returns, industry returns, global index return and emerging market index return can show in table 4.57. Correlation matrix reports that stock returns are positively correlated with all the risk factors with statistically significant at 0.05. Industry return is more related with stock returns than any of the other risk factor with a strength of .313. MSCI-Global Stock return and US market return are highly correlated but as both risk factors are used separately, so the issue of multicollinearity does not exist.

TABLE 4.48: Correlation Analyses for JSE

Variables	1	2	3	4	5	6
Stock Return	1					
Local Market Return	0.162***	1				
Industry Market Return	0.313***	0.458***	1			
Global Market Return	0.043***	0.107***	0.091***	1		
Emerging Index Return	0.041***	0.107***	0.078***	0.869***	1	
US Market Return	0.037***	0.078***	0.081***	0.969***	0.784***	1

**** P < .001, ** p < 0.05, * p < .01*

4.1.6.3 Estimates of Local CAPM for JSE

Following are the results of cross-section regression for the average stocks return over the systematic risk for different models over the observed period. Four hypotheses are tested for Local CAPM from 1 to 4 as showed in table 4.49.

There is positive and significant effect of market risk factor for the determination of average stock returns of firms registered at the Johannesburg Stock Exchange. South Africa is tested in hypothesis 1. The results clearly indicate a positive and significant relationship between risk and return, which validate the basic hypothesis. But as hypothesis 2 is tested beta become insignificant which indicate that non-linearity is the major issue between these relationships. Hypothesis 3, also indicate the inadequacy of market premium factor but the basic relationship becomes significant again, which become insignificant in joint hypothesis 4. Joint hypothesis indicates that average return cannot be predicted through market premium only. There is need to identify more risk factors to explain the average return of stocks. These results are consistent with the Ward and Muller (2012, 2015) and Alagidede et al. (2017).

Table 4.49: Estimates of Local CAPM for JSE

Variables	**1**	**2**	**3**	**4**
λ_i^L	0.00384**	0.00143	0.00393**	0.0319
	(0.00181)	(0.00272)	(0.00179)	(0.0213)
λ_i^{2L}		-0.00541**		-0.0362*
		(0.00210)		(0.0214)
μ_i			-2.710**	16.45
			(1.118)	(11.40)
Constant	-0.000265	-0.000578	0.00283	-0.0211
	(0.00120)	(0.00119)	(0.00174)	(0.0143)
Adj. R^2	0.021	0.052	0.048	0.061
RMSE	0.0111	0.0110	0.0110	0.0110

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.1.6.4 Estimates of Global CAPM for JSE

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global or International model has been estimated for the Johannesburg Stock Exchange, South Africa over the observed period and results are reported in table 4.50. For this purpose, excess global return has been calculated by taking Morgan Stanley Capital International' Index and US three months t-bill rate. In Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 values. Than in second phase, cross sectional regression has been performed taking beta as independent variable and mean returns as dependent variable and results are reported in table 4.50.

TABLE 4.50: Estimates of Global CAPM for JSE

Variables	**1**	**2**	**3**	**4**
λ_i^G	-0.00422	0.00148	-0.00370	0.0346
	(0.00281)	(0.00313)	(0.00274)	(0.0270)
λ_i^{2G}		-0.0151***		-0.112
		(0.00407)		(0.0787)
μ_i			-3.832***	25.11
			(1.051)	(20.32)
Constant	-0.00157*	-0.000948	0.00250*	-0.0236
	(0.000886)	(0.000876)	(0.00141)	(0.0184)
Adj. R^2	0.011	0.073	0.070	0.079
RMSE	0.0112	0.0109	0.0109	0.0108

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

All hypothesis has been tested and the results have been reported in table 4.50. Global risk factor provided insignificant results for all models. This clearly indicates that Global CAPM is not applicable in Johannesburg Stock Exchange, South Africa.

These results are consistant with the conclusion of Alagidede et al. (2017), who report that global risk factor exhibits a weak influnence of the JSE market.

4.1.6.5 Estimates of Modified Global CAPM for JSE

On the lines of Sabal (2002), Modified Global CAPM is estimated for the Johannesburg Stock Exchange, South Africa and results are reported in the table 4.47. First three hypothesis are rejected but the joint hypothesis is accepted as US-Market risk premium is significantly explaining the average stock returns of Johannesburg Stock Exchange, South Africa, although there is persistent issue of non-linearity and inadequacy of market premium.

TABLE 4.51: Estimates of Modified Global CAPM for JSE

Variables	1	2	3	4
$\lambda_i^{S\&P}$	-0.000704	0.00120	0.00102	0.0568**
	(0.00255)	(0.00254)	(0.00248)	(0.0270)
$\lambda_i^{2S\&P}$		-0.0102***		0.256**
		(0.00292)		(0.123)
μ_i			-3.557***	-91.70**
			(1.006)	(42.51)
Constant	-0.00214**	-0.00127	0.00172	0.0755**
	(0.000835)	(0.000851)	(0.00136)	(0.0356)
Adj. R^2	0.000	0.056	0.057	0.077
RMSE	0.0112	0.0110	0.0110	0.0109

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.1.6.6 Estimates of Downside CAPM for JSE

In the fourth phase of analysis for Johannesburg Stock Exchange, South Africa, downside market risk is estimated by using Estrada (2002) and is regressed with the average stock returns in order to drive out the risk and return model.

Results for all model clearly indicate that downside beta factor is not statistically significantly explaining the average stock returns of Moscow Stock Exchange, Russia at 5% confidence interval. This indicates that downside beta model is not applicable to the valuation of the cost of equity for Stocks listed on the Moscow Stock Exchange. The results of this study are consistent with the Okyere-Boakye and O'Malley (2016) which report the significance of this risk factor at 10% as found in this study.

TABLE 4.52: Estimates of Downside CAPM for JSE

Variables	**1**	**2**	**3**	**4**	**5**
λ_i^D	-0.00266	0.00300	-0.00127	-0.0125	-0.00139
	(0.00161)	(0.00216)	(0.00159)	(0.00801)	(0.00176)
λ_i^{2D}		-0.00355***		0.00917	
		(0.000936)		(0.00639)	
μ_i			-4.089***	-13.88**	
			(1.005)	(6.897)	
λ_i^U					0.00360*
					(0.00210)
Constant	-0.000858	-0.00199*	0.00275*	0.0143*	-0.000259
	(0.00112)	(0.00113)	(0.00140)	(0.00817)	(0.00117)
Adj. R^2	0.013	0.078	0.086	0.095	0.027
RMSE	0.0112	0.0109	0.0108	0.0108	0.0112

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.1.6.7 Estimates of Hybrid CAPM and Lessards Hierarchical CAPM for JSE

Following results have been estimated for checking the validity of global and emerging market risk factors that are used by the Lessards Hierarchical and Hybrid model in multiplicative and additive way. Same four hypotheses have been estimated on global and emerging risk factors.

Results indicates that global factor is not statistically significantly explaining the returns in all model but emerging market risk factor is positively and significantly explaining the average market premium with 13.8% explanatory power.

4.1.6.8 Estimates of Extended Hybrid CAPM for JSE

Further industry factor has been added to extend the original Lessards and Hybrid CAPM model capture the industry risk premium in the Johannsson Stock Market, South Africa. For this purpose a multivariate regression model is estimated for the calculation of time invariant betas for all of these factors on last 36 month window. Results of second pass regression are reported in table 4.3.6.

Table 4.53: Estimates of Hybrid and Lessards Hierarchical CAPM for JSE

Variables	**1**	**2**	**3**	**4**
λ_i^w	-0.00375	-0.00371	-0.00251	-0.00431
	(0.00274)	(0.00286)	(0.00279)	(0.00277)
λ_i^{EMR}	0.0122***	0.0121***	0.00975**	0.00773*
	(0.00399)	(0.00407)	(0.00414)	(0.00408)
λ_i^{2w}		-5.92e-05		0.00725***
		(0.00111)		(0.00211)
μ_i			-1.949**	-7.444***
			(0.964)	(1.858)
Constant	-0.00181**	-0.00180*	0.000479	0.00543***
	(0.000884)	(0.000915)	(0.00143)	(0.00201)
Adj. R^2	0.070	0.070	0.088	0.138
RMSE	0.0109	0.0109	0.0108	0.0105

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

Table 4.54: Estimates of Extended Hybrid CAPM for JSE

Variables	**1**	**2**	**3**	**4**
λ_i^w	-0.00466	-0.00516*	-0.00351	-0.00428
	(0.00288)	(0.00301)	(0.00300)	(0.00294)
λ_i^{EMR}	0.0109***	0.0114***	0.00920**	0.00844**
	(0.00405)	(0.00415)	(0.00423)	(0.00415)
λ_i^{IND}	0.00186	0.00208	0.00166	0.00303*
	(0.00163)	(0.00168)	(0.00164)	(0.00166)
λ_i^{2w}		0.000753		0.00674***
		(0.00127)		(0.00217)
μ_i			-1.208	-5.042***
			(0.874)	(1.503)
Constant	-0.00322**	-0.00352**	-0.00140	0.00168
	(0.00147)	(0.00156)	(0.00197)	(0.00217)
Adj. R^2	0.047	0.049	0.056	0.099
RMSE	0.0110	0.0111	0.0110	0.0108

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

These results report that still only emerging market factor is statistically positively explaining the average mean returns but non-linearity and inadequacy of factor also exists. These results indicate that returns of firms registered with the Johannsson Stock Market, South Africa, can be explained with the help of emerging market factor.

4.1.6.9 Dynamics of Cost of Equity of JSE (Annualized)

The dynamics of the cost of equity have been calculated for Local, Modified Global and extended hybrid model, as these model represents the significant risk and return relationship in this stock exchange. On average, cost of equity calculated from local and extended hybrid model indicate that cost of equity is 12% to 13% for JSE firms. While global CAPM report much lower cost of equity than these. The basic reason is that global model is unable to capture the characteristics of emerging economies (Harvey, 1995).

TABLE 4.55: Dynamics of Cost of Equity for JSE Firms

Year	**K(L)**	**K(MG)**	**K(Exthybr)**
2005	0.258	0.066	0.280
2006	0.255	0.097	0.229
2007	0.194	0.014	0.132
2008	0.197	0.113	0.351
2009	0.184	0.043	0.157
2010	0.100	0.032	0.117
2011	0.063	0.012	0.025
2012	0.101	0.095	0.053
2013	0.087	0.024	0.057
2014	0.070	0.023	0.060
2015	0.045	0.031	0.112
2016	0.016	0.034	0.036
2017	0.135	0.064	0.026
Mean(K)	0.131	0.050	0.126
Adj. R^2	0.048	0.077	0.111
RMSE	0.011	0.011	0.014

The figure 4.6 indicate a sharp decrease in the cost of equity in all models from 2006 that remain continue till 2007, and then it all reverse back, then fall again

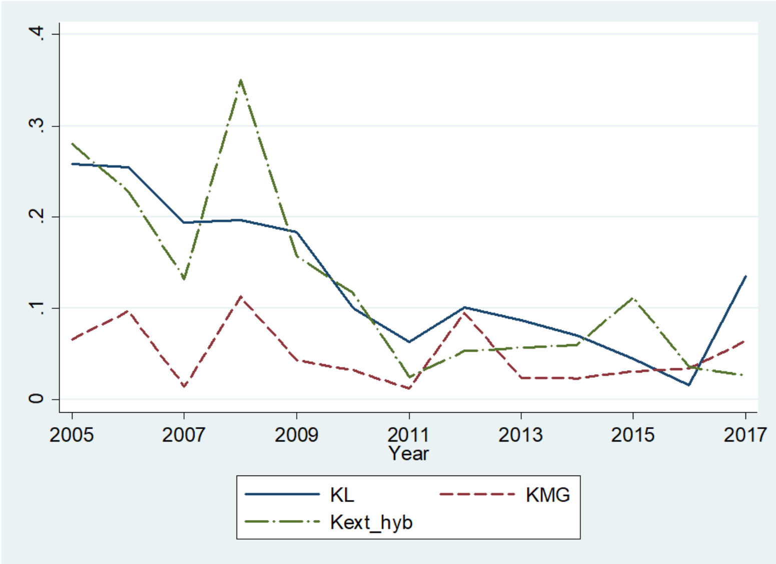

FIGURE 4.6: Dynamics of Cost of Equity over Months for JSE Firms

in year 2008, which recover slightly in low speed. This also provide insight that when market fall in 2008, cost of equity increase which is according to the theory of investment.

4.1.6.10 Summary for Johannesburg Stock Exchange (JSE)

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range of data as shown in chapter 3 section 3.1.

Results of all tables indicate that beta calculated through all other risk factor except local, modified global risk premium and emerging risk factor, show insignificant results. Figure 4.6 show that cost fo equity move with the rise and fall of market. During rise, the cost of equity fall and viz-a-viz rise as market fall and its hard to acquire financing from market.

4.2 Empirical Evidence from Developed Stock Markets

Empirical evidence for a different version of capital asset pricing models is provided for each market one by one. To provide analytical view on the variables, descriptive analysis and correlation analysis are provided in the first stage that follows the results of Fama-Macbeth regression and ends on the dynamics of the cost of equity.

4.2.1 Data Analysis for Toronto Stock Exchange (TSE), Canada

4.2.1.1 Descriptive Analysis for TSE

Descriptive analysis for Toronto Stock Exchange has been presented in table 4.56. The mean of stocks returns indicate that on average one can earn .3% return on monthly basis on stocks which can deviate by 14.2% on both higher and lower tail, maximum return that as investors can earn is 183.5% monthly and maximum loss that may be incurred 310.7% on the monthly basis. Stocks exhibit leptokurtic behavior overall and slightly skewness.

Overall market behavior indicates that one can earn .2% return on monthly basis from Toronto Stock exchange which can deviate 4% for both tails. Maximum benefit that an investor earns from this market is 10.6% while maximum loss that one can suffer is 18.6% during a month. The shape of the data is showing slight leptokurtic (6.146) and skewness (-1.212).

On average, one can earn some higher return from investing in industry indexes for almost.4% which can deviate 6.9% on both sides. Maximum benefits and loss which can incur during a month are 44.2% and 39.8% respectively, while the shape of industry returns is slightly leptokurtic (7.703) with almost no skewness (-.692).

Table 4.56: Descriptive Analysis for TSE

Variables	Means	Std.Dev	Min	Max	Skew.	Kurt.
Stock_Return	.003	.142	-3.107	1.835	-.087	22.488
Market_Return	.002	.04	-.186	.106	-1.212	6.146
Industry_Return	.004	.069	-.398	.442	-.692	7.703

4.2.1.2 Correlation Analysis for TSE

The relationship of stock returns, market returns, industry returns and global index return can show in table 4.52. Correlation matrix reports that there exists a positive relationship between stock returns and market return, industry return and MSCI-Global return. The strength of this relationship is 0.083, .441 and 0.056 which is statistically significantly different from zero. This positive and significant behavior will help to apply cross sectional regression on these risk factors.

Table 4.57: Correlation Analyses for TSE

Variables	1	2	3	4
Stock Return	1			
Local Market Return	0.083***	1		
Industry Market Return	0.441***	0.149***	1	
Global Market Return	0.056***	0.826***	0.092***	1

**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.1.3 Estimates of Local CAPM for TSE

Following are the results cross-section regression for the average stocks return over the systematic risk for different models over the observed period.

Results of Fama-Macbeth cross sectional report insignificant relationship between systematic risk and average stock returns for all the hypothesis. Results can be interpreted as non-applicability of traditional CAPM in Toronto Stock Market, Canada.

TABLE 4.58: Estimates of Local CAPM for TSE

Variables	1	2	3	4
λ_i^L	-0.00408*	-0.00179	-0.00336	-0.0169
	(0.00212)	(0.00369)	(0.00223)	(0.0117)
λ_i^{2L}		-0.00305		0.0234
		(0.00403)		(0.0199)
μ_i			-1.294	-8.536
			(1.274)	(6.296)
Constant	0.00270***	0.00259***	0.00376***	0.0105*
	(0.000802)	(0.000815)	(0.00132)	(0.00590)
Adj. R^2	0.020	0.023	0.025	0.033
RMSE	0.00850	0.00851	0.00850	0.00849

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.1.4 Estimates of Global CAPM for TSE

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global or International model has been estimated for the Toronto Stock Exchange, Canada over the observed period and results are reported in table 4.59. For this purpose, excess global return has been calculated by taking Morgan Stanley Capital International' Index and US three months t-bill rate. In Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 values. Than in second phase, cross sectional regression has been performed taking beta as independent variable and mean returns as dependent variable and results are reported in table 4.59.

All hypothesis has been tested for Global CAPM and results has been reported in table 4.59. Except model 2, all the other hypothesis has been rejected as a result report insignificant relationship between global beta and average stock returns. Model 2 reported significant and positive relationship between global risk premium and average stock returns aligned with the significant non-linearity in this relationship. But as the residual term is added into the model, beta become insignificant again in the next two models. This indicates that the significance of

Table 4.59: Estimates of Global CAPM for TSE

Variables	1	2	3	4
λ_i^G	0.00158	0.00625**	0.00328	-0.000854
	(0.00261)	(0.00297)	(0.00261)	(0.00793)
λ_i^{2G}		-0.0140***		0.0191
		(0.00457)		(0.0346)
μ_i			-3.456***	-7.959
			(1.088)	(8.240)
Constant	0.00163**	0.00220***	0.00462***	0.00775
	(0.000656)	(0.000668)	(0.00114)	(0.00579)
Adj. R^2	0.002	0.051	0.055	0.056
RMSE	0.00857	0.00838	0.00837	0.00838

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

risk and return relationship in model 2 may be due to non-linearity and inadequacy of the beta factor.

4.2.1.5 Estimates of Modified Global CAPM

Modified Global model has been used to estimate the slopes and intercept for Canada stock market returns and the results are reported in following table 4.60. Results indicate that model 4 is significantly explaining the risk and return behavior.

These results indicate that average stock returns can be predicted by the US stock market premium. This also show that investment rate for the Canadian companies can be calculated though modified CAPM model.

4.2.1.6 Estimates of Downside CAPM for TSE

In the next phase downside CAPM is validated to see whether semi-variance's beta explain the returns of the Toronto Stock Market. For this purpose, downside market risk is estimated by using Estrada (2002) and is regressed with the average stock returns in order to drive out the risk and return model, and results are reported in table 4.61.

Table 4.60: Modified Global CAPM for TSE

Variables	**1**	**2**	**3**	**4**
$\lambda_i^{A.G}$	-0.00302	-0.00169	-0.00307	0.0801**
	(0.0022)	(0.0027)	(0.0022)	(0.0399)
λ^2		-0.00305		-0.183**
		(0.0033)		(0.0875)
μ_i			-0.891	57.40**
			(1.0590)	(27.9000)
Constant	0.00244***	0.00253***	0.00326**	-0.0449*
	(0.0008)	(0.0008)	(0.0013)	(0.0231)
$Adj.R^2$	0.01	0.015	0.014	0.037
RMSE	0.00854	0.00854	0.00855	0.00847

Standard errors in parentheses
*P < .001***, p < 0.05**, p < .01**

Table 4.61: Estimates of Downside CAPM for TSE

Variables	**1**	**2**	**3**	**4**	**5**
λ_i^D	0.00414**	0.00120	0.00271	0.0210**	0.00373*
	(0.00198)	(0.00420)	(0.00221)	(0.00949)	(0.00205)
λ_i^{2D}		-0.00336		0.0280**	
		(0.00422)		(0.0142)	
μ_i			-2.163	-11.75**	
			(1.503)	(5.071)	
λ_i^U					-0.00161
					(0.00210)
Constant	0.00285***	0.00263***	0.00458***	0.0141***	0.00293***
	(0.000821)	(0.000864)	(0.00146)	(0.00501)	(0.000829)
Adj. R^2	0.023	0.027	0.035	0.055	0.027
RMSE	0.00848	0.00849	0.00846	0.00839	0.00849

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

For Downside CAPM, a extra fifth hypothesis is tested to see the impact of the downside as well as upside beta over the average behavior of stock returns. Results report that model 1 and model 4 are statistically significantly explaining the variations in the average stock returns while all other model reports the insignificant behavior. Joint hypothesis that is tested in model 4 reports that non-linearity and inadequacy of residual terms still significant. Model 5 reports that upside beta is not contributing any extra return.

4.2.1.7 Estimates Extended Global CAPM with Industry Factor for TSE

Global model has been extended by the inclusion of industrial risk factor, and results of Fama-Macbeth regression has been reported in table 4.62. Results indicate that only the industry risk premium is significantly explaining the average returns this market, which is significant throughout all models. These results indicate that industry factor is a good contributor for explaining the variations of average stock variations in Toronto Stock Exchange, Canada.

TABLE 4.62: Estimates of Extended Global CAPM for TSE

Variables	**1**	**2**	**3**	**4**
λ_i^w	-0.000210	0.00150	0.000484	-0.000434
	(0.00252)	(0.00261)	(0.00249)	(0.00285)
λ_i^{IND}	0.00713***	0.00608***	0.00575***	0.00575***
	(0.00141)	(0.00147)	(0.00148)	(0.00148)
λ_i^{2w}		-0.0101**		0.00777
		(0.00460)		(0.0116)
μ_i			-2.854***	-4.519*
			(1.065)	(2.713)
Constant	0.00850***	0.00803***	0.0101***	0.0114***
	(0.00147)	(0.00147)	(0.00156)	(0.00248)
Adj. R^2	0.126	0.148	0.159	0.161
RMSE	0.00805	0.00796	0.00791	0.00793

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

The average beta, calculated from the firms and industrial returns over each month rolling window, is explaining the variations of average stocks returns over the range of data. These results suggest to use of industry risk premium for the valuation of of TSE.

4.2.1.8 Estimates of Industry CAPM for TSE

In the final step, study regressed the industry risk premium for explaining the average stocks returns as an individual risk factor, and results is reported for all model in table 4.63.

Beta of industry is significantly explaining the average stock returns in model 1 and model 3 indicates non-linearity term is not added. But as non-linearity term is added into the model 2 and 4, results becomes insignificant although non-linearity term as itself is not significant. Root mean square of error and R-square indicate that model 3 is the most appropriate model for the value of cost of equity in this market.

TABLE 4.63: Estimates of Industrial CAPM for TSE

Variables	**1**	**2**	**3**	**4**
λ_i^{IND}	0.00709***	0.00204	0.00655***	0.00932
	(0.00141)	(0.00407)	(0.00146)	(0.0248)
λ_i^{2IND}		-0.00227		0.00139
		(0.00172)		(0.0124)
μ_i			-1.642	-2.616
			(1.215)	(8.778)
Constant	0.00845***	0.00610***	0.00939***	0.0114
	(0.00146)	(0.00230)	(0.00162)	(0.0179)
Adj. R^2	0.122	0.131	0.131	0.131
RMSE	0.00804	0.00803	0.00802	0.00805

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.1.9 Dynamics of Cost of Equity of TSE (Annualized)

Cost of equity has been calculated with only those CAPM models where beta is statistically significantly explaining the variations of average stocks returns as reported above. Cost of equity has been estimated and reported for only Global CAPM model 2, Downside CAPM model 4 and Industry CAPM model 3.

Results suggest that these versions of Capital Asset Pricing Models are producing inconsistent results for the cost of equity over different years 2008, 2011 and 2015.

TABLE 4.64: Dynamics of Cost of Equity for JSE Firms

Year	K(Global)	K(Downside)	K(Industry)
2003	0.244	0.362	0.288
2004	0.088	0.275	0.200
2005	0.007	0.361	0.208
2006	-0.020	0.485	0.156
2007	-0.016	0.553	-0.040
2008	-0.820	-0.725	-0.435
2009	0.150	0.216	0.414
2010	0.057	0.105	0.237
2011	-0.476	-0.656	-0.061
2012	0.226	0.209	0.021
2013	0.199	0.045	0.175
2014	0.180	0.063	0.013
2015	-0.100	-0.051	-0.153
2016	0.346	0.013	0.185
2017	0.165	0.145	0.028
Mean(K)	0.060	0.124	0.099
R-2	0.051	0.055	0.131
RMSE	0.00838	0.00839	0.00802

FIGURE 4.7: Dynamics of Cost of Equity over Months for TSE Firms

These are the years when overall TSE fall down. In only year 2008, TSE index come down to 35% than last year. On average, downside CAPM factor producing higher cost of equity than any others. Global model produce lowest cost of equity while downside CAPM production cost of equity in between the other two models. Root mean square of error reports that industrial model produce lowest value that describes the best model than others. The r-square value for Industrial Model is also highest at 13.1% than any of the other models. The research work of Zorn (2007) over the calculation of cost of equity for Canadian reports that cost of equity is almost 11%, which is close to the average cost suggested by this study.

4.2.1.10 Summary for Toronto Stock Exchange (TSE)

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range of data as shown in chapter 3 section 3.1.

Results of all tables indicate that beta calculated through global, downside, and industry risk premium show significant results. Figure 4.7 show that cost fo equity move with the rise and fall of market during year 2008, 2011 and 2015. During rise, the cost of equity fall and viz-a-viz rise as market fall and its hard to acquire financing from market. Another important conclusion that can drive is that during fall of market, the CAPM model is not able to capture the cost of equity phenomena.

4.2.2 Data Analysis for Paris Stock Exchange / NYSE Euronext (NYX)

4.2.2.1 Descriptive Analysis for NYX

Descriptive analysis for French Stock Exchange has been presented in table 4.3.1. The mean of stocks returns indicate that on average one can earn .2% return on monthly basis on stocks which can deviate by 13.4% on either higher and lower tail, maximum return that as investors can earn is 445.4% monthly and maximum loss that may be incurred 466.7% on the monthly basis. Stocks exhibit highly leptokurtic behavior (119.424) overall and almost no skewness (.529).

Overall Paris stock market exhibits negative average return of 0.1% on a monthly basis which can deviate 5.2% for both tails. Maximum benefit that an investor earns from this market is 12.6% while maximum loss that one can suffer is 19.2% during a month. The shape of the data is showing slight leptokurtic (3.784) and almost no skewness (-.63).

On average, one can earn some higher return from investing in industry indexes for almost.4% which can deviate 6.6% on both sides. Maximum benefits and loss which can incur during a month are 74.9% and 56.6% respectively, while the shape of industry returns is slightly leptokurtic (14.301) with almost no skewness (-.692).

Table 4.65: Descriptive Analysis for NYX

Variables	**Means**	**Std.Dev**	**Min**	**Max**	**Skew.**	**Kurt.**
Stock_Return	.002	.134	-4.667	4.454	.529	119.424
Market_Return	-.001	.052	-.192	.126	-.63	3.784
Industry_Return	.004	.066	-.566	.749	-.257	14.301

4.2.2.2 Correlation Analysis for NYX

The relationship of stock returns, market returns, industry returns and global index return can show in table 4.3.2. Correlation matrix reports that there exists a positive relationship between stock returns and market return, industry return and MSCI-Global return. The strength of this relationship is 0.021, .335 and 0.051 which are statistically significantly different from zero. This positive and significant behavior will help to apply cross sectional regression on these risk factors.

TABLE 4.66: Correlation Analyses for NYX

Variables	1	2	3	4
Stock Return	1			
Local Market Return	0.021***	1		
Industry Market Return	0.335***	0.025***	1	
Global Market Return	0.051***	0.865***	0.072***	1

**** P < .001, ** p < 0.05, * p < .01*

4.2.2.3 Estimates of Local CAPM for NYX

Following are the results cross-section regression for the average stocks return over the systematic risk for different models over the observed period.

Results of Fama-Macbeth cross sectional report insignificant relationship between systematic risk and average stock returns for all the hypothesis. Results can be interpreted as non-applicability of traditional CAPM in French Stock Market, France. These results are consistent with the Xiao (2016) study which reports non-significant results in cross sectional for the French Stock Market.

Table 4.67: Estimates of Local CAPM for NYX

Variables	**1**	**2**	**3**	**4**
λ_i^L	0.00327	0.00314	0.00344	0.00151
	(0.00280)	(0.00327)	(0.00304)	(0.00374)
λ_i^{2L}		-0.000316		-0.0136
		(0.00382)		(0.0154)
μ_i			0.154	3.944
			(1.097)	(4.425)
Constant	0.00280***	0.00282***	0.00265**	-2.42e-05
	(0.000644)	(0.000693)	(0.00122)	(0.00326)
Adj. R^2	0.007	0.007	0.007	0.012
RMSE	0.00873	0.00875	0.00875	0.00875

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.2.4 Estimates of Global CAPM for NYX

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global or International model has been estimated for the Paris Stock Exchange, France over the observed period and results are reported in table 4.68.

For this purpose, excess global return has been calculated by taking Morgan Stanley Capital International' Index and US three months t-bill rate. In Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 values. Than in second phase, cross sectional regression has been performed taking beta as independent variable and mean returns as dependent variable and results are reported in table 4.68.

All hypothesis have been tested for Global CAPM and results have been reported in table 4.68. Results report that there is no significant relationship between global beta and stock return in cross sectional setting.

Table 4.68: Estimates of Global CAPM for NYX

Variables	**1**	**2**	**3**	**4**
λ_i^G	-2.38e-06	-0.00102	-0.000775	0.000512
	(0.00266)	(0.00279)	(0.00283)	(0.00285)
λ_i^{2G}		-0.00499		-0.0528**
		(0.00410)		(0.0224)
μ_i			-0.915	13.39**
			(1.133)	(6.181)
Constant	0.00289***	0.00328***	0.00380***	-0.00627
	(0.000668)	(0.000739)	(0.00131)	(0.00447)
Adj. R^2	0.000	0.008	0.004	0.033
RMSE	0.00876	0.00875	0.00877	0.00866

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.2.2.5 Estimates of Modified Global CAPM for NYX

Modified Global model has been used to estimate the slopes and intercept for Paris stock market returns and the results are reported in following table 4.69.

Table 4.69: Modified Global CAPM for NYX

Variables	**1**	**2**	**3**	**4**
$\lambda_i^{A.G}$	-0.0017	-0.0016	-0.0033	-0.0136***
	(0.0021)	(0.0021)	(0.0022)	(0.0052)
λ^2		-0.00481*		0.0356**
		(0.0028)		(0.0164)
μ_i			-2.509**	-17.47**
			-1.175	-6.979
Constant	0.00325***	0.00390***	0.00595***	0.0172***
	(0.0008)	(0.0009)	(0.0015)	(0.0054)
Adj.R^2	0.004	0.02	0.028	0.052
RMSE	0.00874	0.0087	0.00866	0.00857

Standard errors in parentheses
*P < .001***, p < 0.05**, p < .01**

These results indicate that average stock returns cannot be predicted by the US stock market premium. Results indicate that there are negative significant relationship in model 4. This is might due to the negative movements of these markets.

4.2.2.6 Estimates of Downside CAPM for NYX

In the next phase downside CAPM is validated to see whether semi-variance's beta explain the returns of the Paris Stock Market. For this purpose, downside market risk is estimated by using Estrada (2002) and is regressed with the average stock returns in order to drive out the risk and return model, and results are reported in table 4.68.

TABLE 4.70: Estimates of Downside CAPM for NYX

Variables	**1**	**2**	**3**	**4**	**5**
λ_i^D	0.00145	0.000850	0.00154	0.0297	0.000617
	(0.00342)	(0.00376)	(0.00344)	(0.0190)	(0.00379)
λ_i^{2D}		0.00367		-0.155	
		(0.00942)		(0.103)	
μ_i			0.610	19.56	
			(1.154)	(12.62)	
λ_i^U					0.00122
					(0.00237)
Constant	0.00276***	0.00265***	0.00216	-0.0119	0.00287***
	(0.000719)	(0.000769)	(0.00134)	(0.00944)	(0.000753)
Adj. R^2	0.001	0.002	0.002	0.015	0.002
RMSE	0.00875	0.00877	0.00877	0.00874	0.00877

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

For Downside CAPM, a extra fifth hypothesis is tested to see the impact of the downside as well as upside beta over the average behavior of stock returns. Results report that model 1 and model 4 are statistically significantly explaining the variations in the average stock returns while all other model reports the insignificant behavior. Joint hypothesis that is tested in model 4 reports that non-linearity and inadequacy of residual terms still significant. Model 5 reports that upside beta is not contributing any extra return.

4.2.2.7 Estimates Extended Global CAPM with Industry Factor for NYX

Global model has been extended by the inclusion of industrial risk factor, and results of Fama-Macbeth regression has been reported in table 4.71. Results indicate that only the industry risk premium is significantly explaining the average returns this market, which is significant throughout all models. These results indicate that industry factor is a good contributor for explaining the variations of average stock variations in Paris Stock Exchange, France.

Table 4.71: Estimates of Extended Global CAPM for NYX

Variables	1	2	3	4
λ_i^w	0.00143	0.000897	0.000626	0.000835
	(0.00276)	(0.00308)	(0.00306)	(0.00309)
λ_i^{IND}	-0.00147	-0.00144	-0.00129	-0.000939
	(0.00117)	(0.00117)	(0.00121)	(0.00137)
λ_i^{2w}		-0.00136		0.00561
		(0.00349)		(0.0103)
μ_i			-0.643	-2.231
			(1.051)	(3.096)
Constant	0.00389***	0.00397***	0.00447***	0.00556**
	(0.00108)	(0.00111)	(0.00144)	(0.00247)
Adj. R^2	0.013	0.014	0.015	0.017
RMSE	0.00873	0.00875	0.00874	0.00876

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

Average Stock returns cannot be predicted in the French Stock Market of any risk factors, may be interpreted as due to that market efficiency prevail in the market and returns are random in nature than any other market.

4.2.2.8 Dynamics of Cost of Equity of Paris Stock Exchange

From all the above results, it can be said that any of the risk factor has unable to explain the average returns of Paris stock exchange. One of the possible explaining of this may be efficiency of this stock market. Study suggest ot use other methods or models to compute the cost of equity for this market.

4.2.2.9 Summary for Paris Stock Exchange (NYX)

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range of data as shown in chapter 3 section 3.1.

Results of all risk factors indicate that, in bivariate or multivariate CAPM failed to explain the average returns of the Paris stock exchange. These results are consistent with past studies like Hawawini and Keim (1995), as this study concludes same results that beta drove in CAPM framework cannot explain the average returns of Paris stock market. No current study be found to compare results with.

4.2.3 Data Analysis for Frankfurt Stock Exchange, Germany (FSX)

4.2.3.1 Descriptive Analysis for FSX

Descriptive analysis for the Frankfurt Stock Exchange has been reported in table 4.72. The mean of stocks returns indicate that on average one can earn .1% return on monthly basis on stocks which can deviate by 15.8% on both higher and lower tail, maximum return that as investors can earn is 529.8% return on monthly basis on both the maximum and minimum level. Stocks exhibit leptokurtic behavior (117.361) and almost no skewness (-1.021).

Overall market behavior indicates that one can earn .2% return on monthly basis from Toronto Stock Exchange which can deviate 4% for both tails. Maximum benefit that an investor earns from this market is 10.6% while maximum loss that one can suffer is 18.6% during a month. The shape of the data is showing slight leptokurtic (6.146) and skewness (-1.212).

On average, one can earn some higher return from investing in industry indexes for almost .4% which can deviate 6.9% on both sides. Maximum benefits and loss which can incur during a month are 44.2% and 39.8% respectively, while the shape of industry returns is slightly leptokurtic (7.703) with almost no skewness (-.692).

TABLE 4.72: Descriptive Analysis for FSX

Variables	Means	Std.Dev	Min	Max	Skew.	Kurt.
Stock_Return	.001	.158	-5.298	5.298	-1.021	117.361
Market_Return	.004	.063	-.293	.194	-1.046	6.299
Industry_Return	.001	.074	-.872	1.207	-.278	22.101

4.2.3.2 Correlation Analysis for FSX

The relationship of stock returns, market returns, industry returns and global index return can be seen from table 4.73. Correlation matrix reports that there exists a positive relationship between stock returns and market return, industry return and MSCI-Global return. The strength of this relationship is 0.044, .289 and 0.243 which is statistically significantly different from zero. This positive and significant behavior will help to apply cross sectional regression on these risk factors.

TABLE 4.73: Correlation Analyses for FSX

Variables	1	2	3	4
Stock Return	1			
Local Market Return	0.044***	1		
Industry Market Return	0.289***	0.126***	1	
Global Market Return	0.243***	0.132***	0.456***	1

**** P < .001, ** p < 0.05, * p < .01*

4.2.3.3 Estimates of Local CAPM for FSX

Following are the results cross-section regression for the average stocks return over the systematic risk for different models over the observed period.

TABLE 4.74: Estimates of Local CAPM for FSX

Variables	**1**	**2**	**3**	**4**
λ_i^L	0.00777***	0.00392	0.00371	0.00614**
	(0.00264)	(0.00267)	(0.00260)	(0.00258)
λ_i^{2L}		-0.0101***		0.0437***
		(0.00203)		(0.00943)
μ_i			-5.505***	-24.87***
			(0.903)	(4.267)
Constant	-0.000692	0.000221	0.00416***	0.0172***
	(0.000676)	(0.000680)	(0.00102)	(0.00299)
Adj. R^2	0.024	0.087	0.117	0.168
RMSE	0.0123	0.0119	0.0117	0.0114

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

For testing the validity of traditional CAPM in Frankfurt Stock Exchange, four models are again estimated. Model 1, presents the results for means stock returns and systematic beta and indicate that there exist a significant positive relationship between risks and average stocks returns with the slope of 0.0077 and standard error 0.00264. In model 2, further beta Square term is added to check the presence of non-linearity in the model and results report the presence of non-linearity in the relationship of risk and return which support the argument of Black (1972) that capital market line is not linear as CAPM assumed.

The adequacy of the beta factor is tested by taking residuals as an independent variable in addition to beta in the third model. Results clearly indicate the significant residual term which means that beta is not the only term that only explain the mean returns of Frankfurt Stock Markets. In the final step, joint hypothesis is regressed with beta square and residual term with beta factor against the mean stock returns. Results indicate that beta factor is statistically significantly explaining the mean stock returns but non-linearity and inadequacy of beta factor still exist.

The joint hypothesis indicates that although non-linearity and inadequacy exists but market premium is explaining variations of average stock returns of Frankfurt Stock Market, Germany. These results are brought into line with the study of Brückner et al. (2012); Elsas et al. (2003); Stehle and Schmidt (2015).

The predictive power of the model is calculated through R-square which is in increasing trend from model 1 to model 5. Model 5 exhibits the highest explanatory power of the market risk-beta, beta square and residual risk that is 16.8%. Mean root square of error is also computed for all models and model 5 exhibits the lowest value than all other models. This exhibits that residual risk and non-linearity factor should lie in the model with market risk for the determination of stock market returns.

4.2.3.4 Estimates of Global CAPM for FSX

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global or International model has been estimated for the Frankfurt Stock Exchange over the observed period and results are reported in table 4.59. For this purpose, excess global return has been calculated by taking Morgan Stanley Capital International' Index and US three months t-bill rate. In Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 values. Than in second phase, cross sectional regression has been performed taking beta as independent variable and mean returns as dependent variable and results are reported in table 4.59.

All hypothesis has been tested for Global CAPM and results has been reported in table 4.75. Except model 2, all the other hypothesis has been rejected as a results report insignificant relationship between global beta and average stock returns. Model 2 reported significant and positive relationship between global risk premium and average stock returns aligned with the significant non-linearity in this relationship. But as the residual term is added into the model, beta become

Table 4.75: Estimates of Global CAPM for FSX

Variables	1	2	3	4
λ_i^G	0.000909	0.00703***	-0.000249	0.00602
	(0.00138)	(0.00185)	(0.00136)	(0.0219)
λ_i^{2G}		-0.00555***		-0.00478
		(0.00115)		(0.0166)
μ_i			-5.198***	-0.728
			(1.078)	(15.62)
Constant	-0.000810	-0.00112	0.00484***	-0.000284
	(0.00116)	(0.00113)	(0.00163)	(0.0179)
Adj. R^2	0.001	0.063	0.063	0.063
RMSE	0.0125	0.0121	0.0121	0.0121

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

insignificant again in the next two models. This indicates that significance of risk and return relationship in model 2 may be due to non-linearity and inadequacy of the beta factor.

4.2.3.5 Modified Global CAPM for FSX

Modified Global model has been used to estimate the slopes and intercept for Frankfurt stock market returns and the results are reported in following table 4.76.

These results indicate that average stock returns cannot be predicted by the US stock market premium. Results indicate that there are negative significant relationship in model 4. This is might due to the negative movements of these markets due to volatility spillover. These market may be opportunity for better portfolio management.

Table 4.76: Modified Global CAPM for NYX

Variables	**1**	**2**	**3**	**4**
$\lambda_i^{A.G}$	-0.00168	0.00339*	0.001	-0.00630**
	(0.0017)	(0.0019)	(0.0017)	(0.0027)
λ^2		-0.00360***		0.00897***
		(0.0007)		(0.0026)
μ_i			-5.689***	-16.98***
			-0.906	-3.423
Constant	-3.20E-05	8.03E-05	0.00453***	0.0133***
	(0.0007)	(0.0007)	(0.0010)	(0.0027)
$Adj.R^2$	0.003	0.071	0.103	0.132
RMSE	0.0125	0.012	0.0118	0.0117

Standard errors in parentheses
*$P < .001$***, $p < 0.05$**, $p < .01$**

4.2.3.6 Estimates of Downside CAPM for FSX

In the next phase downside CAPM is validated to see whether semi-variance's beta explain the returns of the FSX. For this purpose, downside market risk is estimated by using Estrada (2002) and is regressed with the average stock returns in order to drive out the risk and return model, and results are reported in table 4.77.

Results report that there is no relationship between downside or upside risk premium with the average stock returns of the Frankfurt Stock Exchange. So the downside CAPM cannot use for the calculation of cost of equity.

4.2.3.7 Estimates of Extended Global CAPM for FSX

Global model has been expanded by the inclusion of industrial risk factor, and results of Fama-Macbeth regression has been reported in table 4.78. Results indicate that in model 1 and model 2, Global risk premium is significantly explaining the stocks returns but industry factor is insignificant. But as in model 3 and model 4 residual terms is added, both factor become significant only at 10% with significant of non-linearity and residual term.

Table 4.77: Estimates of Downside CAPM for FSX

Variables	1	2	3	4	5
λ_i^D	0.00412	0.00432	-0.000483	-0.00578	0.00399
	(0.00333)	(0.00322)	(0.00333)	(0.00674)	(0.00337)
λ_i^{2D}		-0.0300***		0.0347	
		(0.00598)		(0.0385)	
μ_i			-5.640***	-11.84*	
			(1.078)	(6.954)	
λ_i^U					0.000645
					(0.00236)
Constant	-0.000683	0.000921	0.00507***	0.00955*	-0.000673
	(0.000775)	(0.000815)	(0.00133)	(0.00513)	(0.000777)
Adj. R^2	0.004	0.070	0.076	0.078	0.005
RMSE	0.0125	0.0120	0.0120	0.0120	0.0125

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

Table 4.78: Estimates of Extended Global CAPM for FSX

Variables	1	2	3	4
λ_i^w	0.00416***	0.00399**	0.00296*	0.00112
	(0.00159)	(0.00156)	(0.00157)	(0.00169)
λ_i^{IND}	0.00129	0.00177*	0.00220**	0.00234*
	(0.00134)	(0.00132)	(0.00129)	(0.00127)
λ_i^{2w}		-0.00363***		0.00608***
		(0.000925)		(0.00205)
μ_i			-6.035***	-12.26***
			(1.026)	(2.333)
Constant	-0.00224	-0.00141	0.00442**	0.00991***
	(0.00139)	(0.00137)	(0.00174)	(0.00253)
Adj. R^2	0.019	0.060	0.107	0.129
RMSE	0.0124	0.0121	0.0118	0.0117

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.3.8 Estimates of Industry CAPM for FSX

In the final step, study regressed the industry risk premium for explaining the average stocks returns as an individual risk factor, and results is reported for all model in table 4.88.

Results indicate that in model 2 and model 4, Industry risk premium is significantly explaining the stocks returns. This indicates that industry risk premium is also one of the important factors that explained the average stock returns.

TABLE 4.79: Estimates of Industrial CAPM for FSX

Variables	**1**	**2**	**3**	**4**
λ_i^{IND}	0.00124	0.00738***	0.000867	0.0537**
	(0.00124)	(0.00183)	(0.00121)	(0.0255)
λ_i^{2IND}		-0.00414***		-0.0336
		(0.000930)		(0.0226)
μ_i			-4.602***	33.13
			(1.047)	(25.38)
Constant	-0.00117	-0.00225*	0.00340**	-0.0428
	(0.00119)	(0.00119)	(0.00156)	(0.0311)
Adj. R^2	0.003	0.056	0.055	0.060
RMSE	0.0125	0.0121	0.0122	0.0121

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.3.9 Dynamics of Cost of Equity of FSX (Annualized)

Cost of equity has been calculated with only those CAPM models where beta is statistically significantly explaining the variations of average stocks returns as reported above. Cost of equity has been estimated and reported for Extended Global with industry factor CAPM model, and Industry CAPM model and results are reported in table 4.80.

Results indicate that, on average cost of equity for firms listed on FSX are almost 7%. Results also suggest that these versions of Capital Asset Pricing Models are producing inconsistent negative cost of equity for the cost of equity over different

TABLE 4.80: Dynamics of Cost of Equity for FSX Firms

year	K(IND)	K(W)
2003	0.228	0.210
2004	0.145	0.129
2005	0.145	0.128
2006	0.125	0.101
2007	0.075	0.036
2008	-0.360	-0.403
2009	0.123	0.151
2010	0.144	0.151
2011	-0.076	-0.089
2012	0.023	0.033
2013	0.147	0.165
2014	0.049	0.060
2015	0.083	0.093
2016	0.023	0.034
2017	0.222	0.247
Mean(K)	0.073	0.070
adj. R^2	0.107	0.060
RMSE	0.012	0.012

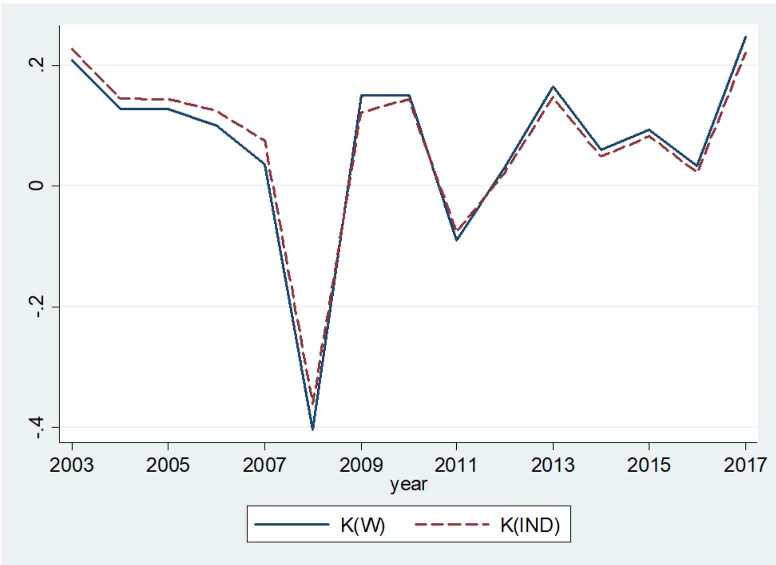

FIGURE 4.8: Dynamics of Cost of Equity For FSX Firms

years 2008, 2011. These are the years when overall FSX fall down. In only year 2008, same financial crises can be seen by high move in the graph.

4.2.3.10 Summary for Frankfurt Stock Exchange (FSX)

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range of data as shown in chapter 3 section 3.1.

Results of all tables indicate that beta calculated through global, downside, and industry risk premium show significant results. Figure 4.8 show that cost fo equity move with the rise and fall of market during year 2008, and 2011. During rise, the cost of equity fall and viz-a-viz rise as market fall and its hard to acquire financing from market. Another important conclusion that can drive is that during fall of market, the CAPM model is not able to capture the cost of equity phenomena.

4.2.4 Data Analysis for Tokyo Stock Exchange, Japan (TYO)

4.2.4.1 Descriptive Analysis for TYO

Descriptive analysis for the Tokyo Stock Exchange has been reported in table 4.81. The mean of stocks returns indicate that on average one can earn .4% return on monthly basis on stocks which can deviate by 10.2% on both side, maximum return that as investors can earn is 236.9% monthly and maximum loss that may be incurred 266.2% on the monthly basis. Stocks exhibit leptokurtic behavior (15.481) overall with no skewness (0.48).

Overall market behavior indicates that one can earn .3% return on monthly basis from Tokyo Stock exchange which can deviate 5.6% . Maximum benefit that an investor earns from this market is 12.1% while maximum loss that one can suffer is 27.2% during a month. The shape of the data is showing slight leptokurtic (5.306) and skewness (-.872).

On average, one can earn a return of .3% from investing in industry indexes, which can deviate 7.1% on both sides. Maximum benefits and loss which can incur during a month are 51.3% and 256.2% respectively, while the shape of industry returns is highly leptokurtic (406.719) with positive skewness (11.27).

TABLE 4.81: Descriptive Analysis for TYO

Variables	Means	Std.Dev	Min	Max	Skew.	Kurt.
Stock_Return	.004	.102	-2.662	2.369	.48	15.481
Market_Return	.003	.056	-.272	.121	-.872	5.306
Industry_Return	.003	.071	-2.562	.513	-11.27	406.719

4.2.4.2 Correlation Analysis for TYO

The relationship of stock returns, market returns, industry returns and global index return can show in table 4.82. Correlation matrix reports that there exists a positive relationship between stock returns and market return, industry return and MSCI-Global return. The strength of this relationship is 0.073, .409 and 0.064 which is statistically significantly different from zero. This positive and significant behavior will help to apply cross sectional regression on these risk factors.

TABLE 4.82: Correlation Analyses for TYO

Variables	1	2	3	4
Stock Return	1			
Local Market Return	0.073***	1		
Industry Market Return	0.409***	0.115***	1	
Global Market Return	0.064***	0.696***	0.091***	1

**** P < .001, ** p < 0.05, * p < .01*

4.2.4.3 Estimates of Local CAPM for TYO

Following are the results cross-section regression for the average stocks return over the systematic risk for different models over the observed period.

Results of Fama-Macbeth cross sectional regression report significant relationship between systematic risk and average stock returns for all the hypothesis. Results note that this exists a significant positive relationship between risk and return in all the hypothesis. The assumption of linearity an adequacy of residuals is violating as beta square term and residuals is statistically significantly different from zero.

Table 4.83: Estimates of Local CAPM for TYO

Variables	1	2	3	4
λ_i^L	0.00281**	0.0136***	0.00307**	0.0313**
	(0.00122)	(0.00253)	(0.00120)	(0.0126)
λ_i^{2L}		-0.0311***		0.101***
		(0.00640)		(0.0369)
μ_i			-6.716***	-26.00***
			(1.237)	(7.145)
Constant	-0.0290***	-0.0295***	-0.0276***	-0.0218***
	(0.000248)	(0.000267)	(0.000358)	(0.00212)
Adj. R^2	0.004	0.021	0.025	0.030
RMSE	0.00528	0.00523	0.00522	0.00521

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

The empirical findings indicate that there exists a positive and significant behavior of risk and return as CAPM suggested. The main and critical condition of explicit tradeoff between market risk and average market returns is accepted. Although significant non-linearity and residuals have been reported significant for the whole period in all rest of models.

The predictive power of the model is calculated through R-square which is in increasing trend from model 1 to model 5. Model 5 exhibits the highest explanatory power of the market risk-beta, beta square and residual risk that is 3%. Mean root square of error is also calculated for all models and model 5 exhibits the lowest value than all other models. This exhibits that residual risk and non-linearity factor should lie in the model with market risk for the determination of stock market returns. These results are aligned with previous studies like Lau et al. (1974); Liu and Yadohisa (2018); Chen and Kawaguchi (2018) which support that local risk factor explain the stocks returns.

4.2.4.4 Estimates of Global CAPM for TYO

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global or International model has been estimated for the Tokyo Stock Market, Japan over the observed period and results are reported in table 4.84. For this purpose, excess global return has been calculated by taking Morgan Stanley Capital International' Index and US three months t-bill rate. In Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 values. Than in second phase, cross sectional regression has been performed taking beta as independent variable and mean returns as dependent variable and results are reported in table 4.84.

TABLE 4.84: Estimates of Global CAPM for TYO

Variables	**1**	**2**	**3**	**4**
λ_i^G	0.00153*	0.00156**	0.000898	-0.000790
	(0.000805)	(0.000786)	(0.000788)	(0.00111)
λ_i^{2G}		-0.0179***		0.0471**
		(0.00216)		(0.0219)
μ_i			-9.497***	-33.59***
			(1.109)	(11.27)
Constant	-0.0285***	-0.0280***	-0.0266***	-0.0231***
	(0.000144)	(0.000157)	(0.000270)	(0.00165)
Adj. R^2	0.003	0.051	0.054	0.057
RMSE	0.00528	0.00515	0.00515	0.00514

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

All hypothesis has been tested for Global CAPM and results has been reported in table 4.84. Model 1 is estimated to test whether global Beta estimated from the rolling window in a first step, is significantly explaining the average return of the Tokyo Stock Exchange. Model 2 is obviously indicating that world beta is significantly explaining the average return of this market. But as the residual term is added into the model, the results become insignificant for the rest two models. This mean that although the relationship was significant in model 2 but overall relationship between world beta is not significant with the average return of this market. The Study of Tsuji (2017) also report the similar results that stocks returns are responsive to international beta.

4.2.4.5 Modified Global CAPM for TYO

Modified Global model has been used to estimate the slopes and intercept for Tokyo stock market returns and the results are reported in following table 4.85. The model 2 clearly indicates that modified beta calculated from US stock market premium is significantly explaining the average stock returns of Tokyo Stock Exchange, Japan.

TABLE 4.85: Modified Global CAPM for TYO

Variables	**1**	**2**	**3**	**4**
$\lambda_i^{A.G}$	0.000389	0.00639***	0.000915	-0.00203
	(0.0008)	(0.0013)	(0.0008)	(0.0071)
λ^2		-0.0134***		0.00718
		(0.0024)		(0.0173)
μ_i			-6.774***	-10.3
			(1.1810)	(8.5820)
Constant	-0.0286***	-0.0288***	-0.0272***	-0.0264***
	(0.0002)	(0.0002)	(0.0003)	(0.0020)
$Adj.R^2$	0	0.023	0.024	0.024
RMSE	0.00529	0.00523	0.00523	0.00523

Standard errors in parentheses
$P < .001^{***}$, $p < 0.05^{**}$, $p < .01^{*}$

These results indicate that average stock returns cannot be predicted by the US stock market premium. Results indicate that there are negative significant relationship in model 4. This is might due to the negative movements of these markets.

4.2.4.6 Estimates of Downside CAPM for TYO

In the next phase downside CAPM is validated to see whether semi-variance's beta explain the returns of the TYO. For this purpose, downside market risk is estimated by using Estrada (2002) and is regressed with the average stock returns in order to drive out the risk and return model, and results are reported in table 4.102.

Table 4.86: Estimates of Downside CAPM for TYO

Variables	**1**	**2**	**3**	**4**	**5**
λ_i^D	0.00404***	0.00672***	0.00387***	-0.00289	0.00390***
	(0.00126)	(0.00145)	(0.00125)	(0.00492)	(0.00127)
λ_i^{2D}		-0.0249***		0.0594	
		(0.00675)		(0.0418)	
μ_i			-4.929***	-15.70**	
			(1.239)	(7.679)	
λ_i^U					0.000674
					(0.000887)
Constant	-0.0287***	-0.0285***	-0.0277***	-0.0259***	-0.0288***
	(0.000160)	(0.000173)	(0.000315)	(0.00128)	(0.000163)
Adj. R^2	0.008	0.017	0.019	0.020	0.008
RMSE	0.00527	0.00524	0.00524	0.00524	0.00527

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

The results indicate that all the hypothesis has been accepted except 4. This indicates that downside beta has a positive relationship from Model 1 to 3 as well as 5 with the significant non-linearity and residual term. The joint hypothesis reports that there is not any relationship of downside beta and average firms return in the presence of non-linearity and residuals. The intercept term is significant and negative which also indicate that mispricing behavior exists in this market.

4.2.4.7 Estimates Extended Global CAPM with Industry Factor for TYO

Global model has been expanded by the inclusion of industrial risk factor, and results of Fama-Macbeth regression has been reported in table 4.87. Results indicate that in model 1, and 2, Global risk premium is significantly explaining the stocks returns while industry factor is insignificant. But as in model 3 and 4, when residual terms is added, global factor become insignificant while industry factor is significant at 10%.

Table 4.87: Estimates of Extended Global CAPM for TYO

Variables	**1**	**2**	**3**	**4**
λ_i^w	0.00416***	0.00399**	0.00196	-1.12e-05
	(0.00159)	(0.00156)	(0.00157)	(0.00169)
λ_i^{IND}	0.00129	0.00177	0.00220*	0.00234*
	(0.00134)	(0.00132)	(0.00129)	(0.00127)
λ_i^{2w}		-0.00363***		0.00608***
		(0.000925)		(0.00205)
μ_i			-6.035***	-12.26***
			(1.026)	(2.333)
Constant	-0.00224	-0.00141	0.00442**	0.00991***
	(0.00139)	(0.00137)	(0.00174)	(0.00253)
Adj. R^2	0.019	0.060	0.107	0.129
RMSE	0.0124	0.0121	0.0118	0.0117

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

These results indicate that in the presence of non-linearity, and significant of residual terms with industry factor, beta drive from global factor cannot explain the average returns of Tokyo stock exchange.

4.2.4.8 Estimates of Industry CAPM for TYO

In the final step, study regressed the industry risk premium for explaining the average stocks returns as an individual risk factor, and results is reported for all model in table **??**.

Results indicate that in model 1 and model 3, Industry risk premium is significant but negatively explaining the stocks returns which is against the CAPM framework. But this issue is due to the the non-linearity factor, as it added to the model, relationship become positve although significant. This indicates that industry risk premium is not explaining the average stock returns of TYO market.

TABLE 4.88: Estimates of Industrial CAPM for TYO

Variables	**1**	**2**	**3**	**4**
λ_i^{IND}	-0.00301***	0.00261	-0.00280***	0.0127
	(0.000445)	(0.00190)	(0.000450)	(0.0101)
λ_i^{2IND}		-0.00273***		-0.00786
		(0.000896)		(0.00509)
μ_i			-3.680***	7.585
			(1.304)	(7.407)
Constant	-0.0256***	-0.0282***	-0.0250***	-0.0343***
	(0.000454)	(0.000969)	(0.000500)	(0.00606)
Adj. R^2	0.032	0.039	0.038	0.040
RMSE	0.00520	0.00519	0.00519	0.00519

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.4.9 Dynamics of Cost of Equity of FSX (Annualized)

Cost of equity has been calculated with only those CAPM models where beta is statistically significantly explaining the variations of average stocks returns as reported above. Cost of equity has been estimated and reported for Local and downside CAPM model in table 4.89.

TABLE 4.89: Dynamics of Cost of Equity for TYO Firms

Year	K(L)	K(d)
2005	0.114	0.119
2006	0.352	0.383
2007	0.468	0.560
2008	0.190	0.878
2009	0.549	0.650
2010	0.296	0.388
2011	0.262	0.332
2012	0.386	0.390
2013	0.288	0.256
2014	0.203	0.233
2015	0.176	0.167
2016	0.069	0.046
2017	0.063	0.064
Mean(K)	0.263	0.344
Adj. R^2	0.030	0.019
RMSE	0.00521	0.00524

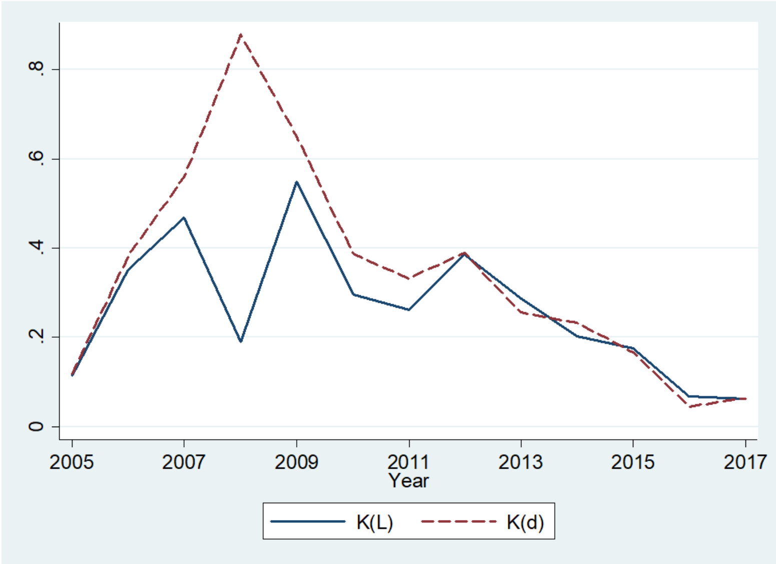

FIGURE 4.9: Dynamics of Cost of Equity For TYO Firms

Results indicate that, on average cost of equity for firms is 26.2% per year in local model, and 34.4% per year in downside model which is surprising very high. While revising the cost of equity in Japan from literature Shoven and Topper (1992) guide that against systematic risk, cost of capital can go to 20%. No current study is found for the comparison. Another important thing that one can observe from figure 4.9 is that CAPM models produce positive although high cost of equity during the world stock recession period specially year 2008. Downside CAPM report increasing cost trend in year 2008, while local CAPM showing decreasing and increasing trend. This can show that markets react to such recession and CAPM has ability in this market to price such information.

4.2.4.10 Summary for Tokyo Stock Exchange (TYO)

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range of data as shown in chapter 3 section 3.1.

Results of all tables indicate that beta calculated through local, and downside risk factor show significant results. Figure 4.9 shows that cost fo equity movement with the rise and fall of market during a recession year 2008. A high cost of equity can be seen from table 4.89 and figure 4.9. This indicates that opportunity cost of doing business is rising in Japan after visiting current data.

4.2.5 Data Analysis for London Stock Exchange, UK (LSE)

4.2.5.1 Descriptive Analysis for LSE

Descriptive analysis for the London Stock Exchange has been reported in table 4.90. The mean of stocks returns indicate that on average one can earn .3% return on monthly basis on stocks which can deviate by 11.9% on both side, maximum return that investors can earn is 127.3% monthly and maximum loss that may be incurred 152.6% on the monthly basis. Stocks exhibit leptokurtic behavior (13.786) overall with no skewness (-0.317).

Overall market behavior indicates that one can earn .1% return on monthly basis from London Stock exchange which can deviate 4.0%. Maximum benefit that an investor earns from this market is 8.3% while maximum loss that one can suffer is 14.0% during a month. The shape of the data is showing slight leptokurtic (3.836) and almost no skewness (-.712).

On average, one can earn a return of .4% from investing in industry indexes, which can deviate 6.9% on both sides. Maximum benefits and loss which can incur during a month are 86.1% and 64.4% respectively, while the shape of industry returns is highly leptokurtic (13.974) with almost no skewness (=.669).

Table 4.90: Descriptive Analysis for LSE

Variables	Means	Std.Dev	Min	Max	Skew.	Kurt.
Stock_Return	.003	.119	-1.526	1.273	-.317	13.786
Market_Return	.001	.04	-.14	.083	-.712	3.836
Industry_Return	.004	.069	-.644	.861	-.669	13.974

4.2.5.2 Correlation Analysis for LSE

The relationship of stock returns, market returns, industry returns and global index return can show in table 4.91. Correlation matrix reports that there exists a positive relationship between stock returns and market return, industry return and MSCI-Global return. The strength of this relationship is 0.018, .415 and 0.062 which is statistically significantly different from zero. This positive and significant behavior will help to apply cross sectional regression on these risk factors.

TABLE 4.91: Correlation Analyses for LSE

Variables	**1**	**2**	**3**	**4**
Stock Return	1			
Local Market Return	0.018***	1		
Industry Market Return	0.415***	0.040***	1	
Global Market Return	0.062***	0.844***	0.101***	1

**** P < .001, ** p < 0.05, * p < .01*

4.2.5.3 Estimates of Local CAPM for LSE

Following are the results cross-section regression for the average stocks return over the systematic risk for different models over the observed period.

Results of Fama-Macbeth cross sectional regression report significant relationship between systematic risk and average stock returns for all the hypothesis. Results indicate that beta calculated from market risk premium is not significantly explaining the average stock returns. note that this exists a significant positive relationship between risk and return in all the hypothesis. Same results are reported by Nikolaos (2009) and conclude that market risk premium can not explain the average stock returns.

4.2.5.4 Estimates of Global CAPM for LSE

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global or International model has been estimated for the Tokyo Stock Market, Japan over the

TABLE 4.92: Estimates of Local CAPM for LSE

Variables	1	2	3	4
λ_i^L	-0.000682	-0.00396	-0.00228	-0.00535
	(0.00262)	(0.00271)	(0.00259)	(0.00442)
λ_i^{2L}		-0.0221***		-0.0408***
		(0.00619)		(0.0475)
μ_i			-4.263***	3.734
			(1.224)	(9.381)
Constant	0.00205***	0.00310***	0.00570***	0.000792
	(0.000586)	(0.000641)	(0.00119)	(0.00583)
Adj. R^2	0.000	0.062	0.059	0.062
RMSE	0.00823	0.00799	0.00801	0.00801

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

observed period and results are reported in table 4.93. For this purpose, excess global return has been calculated by taking Morgan Stanley Capital International' Index and US three months t-bill rate. In Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 values. Than in second phase, cross sectional regression has been performed taking beta as independent variable and mean returns as dependent variable and results are reported in table 4.84.

All hypothesis has been tested for Global CAPM and results has been reported in table 4.93. Results of cross sectional regression indicate that beta drive from global risk premium in model 1, is negative significantly explaining the variations of average returns of UK stocks. But as non-linearity and residual term is added into the existing model, relationship become positive as CAPM framework proposed but it is significant at 10% significant level. Lewis (2011) discuss that global risk factor cannot explain the returns of stocks than as local factors. Hau (2011) study also report the negative relationship in beta and returns, and author suggested to use most liquid stock should be part of MSCI index which help in valuation of cost of equity.

TABLE 4.93: Estimates of Global CAPM for LSE

Variables	**1**	**2**	**3**	**4**
λ_i^G	-0.00722***	-0.00211	-0.00687***	0.0237*
	(0.00267)	(0.00305)	(0.00262)	(0.0139)
λ_i^{2G}		-0.0206***		-0.133**
		(0.00640)		(0.0593)
μ_i			-3.479***	20.46*
			(1.165)	(10.75)
Constant	0.00283***	0.00347***	0.00572***	-0.0100
	(0.000641)	(0.000658)	(0.00116)	(0.00713)
Adj. R^2	0.036	0.085	0.078	0.101
RMSE	0.00808	0.00789	0.00792	0.00784

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.5.5 Estimates of Modified Global CAPM for LSE

Sabal (2002); **?** constructed a modified version of Global CAPM. The results of average estimates are provided in the following table 4.94.

Results for model 2 indicate that modified in explaining the average returns of London Stock Exchange with non-linear term. All other models indicate the insignificant relationship between risk premium and average stock returns.

This indicate that model 2 can be used for the calculation of cost of equity for this market.

4.2.5.6 Estimates of Downside CAPM for LSE

In the next phase downside CAPM is validated to see whether semi-variance's beta explain the returns of the TYO. For this purpose, downside market risk is estimated by using Estrada (2002) and is regressed with the average stock returns in order to drive out the risk and return model, and results are reported in table 4.95.

TABLE 4.94: Estimates of Modified Global CAPM for LSE

Variables	1	2	3	4
λ	-0.00323	0.0106**	-0.00252	0.000254
	(0.003)	(0.005)	(0.003)	(0.032)
λ^2		-0.0239***		-0.00506
		(0.008)		(0.058)
μ			-3.891***	-3.078
			(1.218)	(9.385)
C	0.00290***	0.00196**	0.00610***	0.00523
	(0.001)	(0.001)	(0.001)	(0.010)
$Adj.R^2$	0.007	0.056	0.056	0.056
RMSE	0.0082	0.00802	0.00802	0.00804

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

TABLE 4.95: Estimates of Downside CAPM for LSE

Variables	**1**	**2**	**3**	**4**	**5**
λ_i^D	0.00101	0.00286	0.00120	0.00646	0.00127
	(0.00281)	(0.00291)	(0.00278)	(0.00698)	(0.00311)
λ_i^{2D}		-0.0161**		-0.0513	
		(0.00740)		(0.0624)	
μ_i			-2.484**	5.690	
			(1.188)	(10.01)	
λ_i^U					0.00436*
					(0.00232)
Constant	0.00201***	0.00266***	0.00418***	-0.000889	0.00345***
	(0.000598)	(0.000663)	(0.00119)	(0.00628)	(0.000661)
Adj. R^2	0.001	0.024	0.023	0.026	0.023
RMSE	0.00823	0.00815	0.00816	0.00816	0.00869

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

The results indicate that all the hypothesis has been rejected. This indicates that downside beta is unable t explain the variations in stocks returns. Although upside beta show significant explanatory power to explain the average returns but at 10%

significant.

4.2.5.7 Estimates Extended Global CAPM with Industry Factor for LSE

Global model has been expanded by the inclusion of industrial risk factor, and results of Fama-Macbeth regression has been reported in table 4.87. Results indicate that in all the hypothesis are rejected as beta cannot explain the variations of average stock returns.

TABLE 4.96: Estimates of Extended Global CAPM for LSE

Variables	**1**	**2**	**3**	**4**
λ_i^w	-0.00401	-0.000992	-0.00343	-0.000693
	(0.00302)	(0.00306)	(0.00296)	(0.00343)
λ_i^{IND}	-0.00122	-0.000831	-0.000444	-0.000903
	(0.00149)	(0.00145)	(0.00148)	(0.00150)
λ_i^{2w}		-0.0288***		-0.0326
		(0.00830)		(0.0207)
μ_i			-3.620***	0.573
			(1.173)	(2.914)
Constant	0.00320**	0.00391***	0.00623***	0.00352
	(0.00138)	(0.00136)	(0.00167)	(0.00240)
Adj. R^2	0.011	0.069	0.057	0.069
RMSE	0.00821	0.00798	0.00803	0.00800

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

These results indicate that all the models reports insignificant relationship between global beta, and industrial beta and average stock returns. These results suggests that London stock market is an efficient market and no risk factor predict the variations of stocks returns.

4.2.5.8 Estimates of Industry CAPM for LSE

In the final step, study regressed the industry risk premium for explaining the average stocks returns as an individual risk factor, and results is reported for all model in table 4.97. Results indicate that beta calculated through industry returns also not explaining the stocks returns that again indicate that al these factors cannot explaining the average stock return of London stock exchange.

TABLE 4.97: Estimates of Industrial CAPM for LSE

Variables	**1**	**2**	**3**	**4**
λ_i^{IND}	-0.00142	0.000954	-0.00131	0.00519
	(0.00164)	(0.00589)	(0.00167)	(0.0229)
λ_i^{2IND}		-0.00134		-0.00389
		(0.00320)		(0.0136)
μ_i			-0.524	1.180
			(1.444)	(6.158)
Constant	0.00137	0.000524	0.00180	-0.00204
	(0.00147)	(0.00251)	(0.00188)	(0.0136)
Adj. R^2	0.004	0.005	0.005	0.005
RMSE	0.00876	0.00877	0.00877	0.00880

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.5.9 Dynamics of Cost of Equity of LSE

This study try to attempt to see whether any model significantly help to determine the cost of equity but none of the risk factor significantly explain the average return of stock of this market. this can be concluded two major points, one is that either there are other risk factors that explain the average stocks returns which this study did not cover, or London stock exchange is an efficient market, and any new information is quickly priced into the price and returns derive from such price is move on random walk that no one can predict. Study recommendation is to use any other method than CAPM to capture the cost of equity phenomenon in this market.

4.2.5.10 Summary for London Stock Exchange (LSE)

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range of data as shown in chapter 3 section 3.1.

Results of all tables indicate that beta calculated from all risk factors cannot explain the variations in the stock returns so these models unable to calculate estimate the cost of equity over the different years.

4.2.6 Data Analysis for New York Stock Exchange, USA (NYSE)

4.2.6.1 Descriptive Analysis for NYSE

Descriptive analysis for the New York Stock Exchange has been reported in table 4.98. The mean of stocks returns indicate that on average one can earn .5% return on monthly basis on stocks which can deviate by 11.8% on both side, maximum return that as investors can earn is 278.7% monthly and maximum loss that may be incurred 339.3% on the monthly basis. Stocks exhibit leptokurtic behavior (23.381) overall with no skewness (-.785).

Overall market behavior indicates that one can earn .3% return on monthly basis from New York Stock exchange which can deviate .44% . Maximum benefit that an investor earns from this market is 10.8% while maximum loss that one can suffer is 21.7% during a month. The shape of the data is showing slight leptokurtic (5.893) and skewness (-.964).

On average, one can earn a return of .4% from investing in industry indexes, which can deviate 7.2% on both sides. Maximum benefits and loss which can incur during a month are 35.8% and 64.1% respectively, while the shape of industry returns is slightly leptokurtic (9.642) with negative skewed (-1.174).

Table 4.98: Descriptive Analysis for NYSE

Variables	Means	Std.Dev	Min	Max	Skew.	Kurt.
Stock_Return	.005	.118	-3.393	2.787	-.758	23.381
Market_Return	.003	.044	-.217	.108	-.946	5.893
Industry_Return	.004	.072	-.641	.358	-1.174	9.642

4.2.6.2 Correlation Analysis for NYSE

The relationship of stock returns, market returns, industry returns and global index return can show in table 4.99. Correlation matrix reports that there exists a positive relationship between stock returns and market return, industry return and MSCI-Global return. The strength of this relationship is 0.054, .572 and 0.395 which is statistically significantly different from zero. This positive and significant behavior will help to apply cross sectional regression on these risk factors.

Table 4.99: Correlation Analyses for NYSE

Variables	1	2	3	4
Stock Return	1			
Local Market Return	0.054***	1		
Industry Market Return	0.572***	0.089***	1	
Global Market Return	0.395***	0.185***	0.600***	1

**** P < .001, ** p < 0.05, * p < .01*

4.2.6.3 Estimates of Local CAPM for NYSE

Following are the results cross-section regression for the average stocks return over the systematic risk for different models over the observed period.

Results of Fama-Macbeth cross sectional regression report insignificant relationship between systematic risk and average stock returns for all the hypothesis. The non-applicability of CAPM is properly debate in the literature review chapter. The discussion of Fernandez (2015) also support the above results.

Table 4.100: Estimates of Local CAPM for NYSE

Variables	**1**	**2**	**3**	**4**
λ_i^L	0.000439	0.00216	0.000412	0.00598
	(0.00142)	(0.00145)	(0.00140)	(0.00566)
λ_i^{2L}		-0.0172***		-0.0550
		(0.00384)		(0.0542)
μ_i			-4.843***	10.80
			(1.094)	(15.44)
Constant	0.00392***	0.00438***	0.00562***	0.00159
	(0.000252)	(0.000269)	(0.000458)	(0.00400)
Adj. R^2	0.000	0.022	0.022	0.023
RMSE	0.00722	0.00714	0.00714	0.00714

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.6.4 Estimates of Global CAPM for NYSE

In the second phase of analysis, Solinik (1974); Stulz (1999)'s Global or International model has been estimated for the Tokyo Stock Market, Japan over the observed period and results are reported in table 4.101. For this purpose, excess global return has been calculated by taking Morgan Stanley Capital International' Index and US three months t-bill rate. In Fama-Macbeth regression, for the first phase, this excess global premium is used as independent variable for the estimation of time invariant global market risk on last 36 values. Than in second phase, cross sectional regression has been performed taking beta as independent variable and mean returns as dependent variable and results are reported in table 4.101.

Model 1 and 3 reported a significant negative relationship between systematic risk and average stock returns. But as beta square is added into the second model, the relationship become significantly positive but joint model report insignificant results for all the variables.

4.2.6.5 Estimates of Downside CAPM for NYSE

In the next phase downside CAPM is validated to see whether semi-variance's beta explain the returns of the TYO. For this purpose, downside market risk is

Table 4.101: Estimates of Global CAPM for NYSE

Variables	1	2	3	4
λ_i^G	-0.00444***	0.00302**	-0.00386***	0.00439
	(0.000444)	(0.00148)	(0.000453)	(0.00490)
λ_i^{2G}		-0.00373***		-0.00448*
		(0.000709)		(0.00265)
μ_i			-7.216***	1.585
			(1.447)	(5.398)
Constant	0.00753***	0.00464***	0.00930***	0.00367
	(0.000440)	(0.000699)	(0.000562)	(0.00337)
Adj. R^2	0.101	0.128	0.125	0.128
RMSE	0.00610	0.00601	0.00602	0.00602

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

estimated by using Estrada (2002) and is regressed with the average stock returns in order to drive out the risk and return model, and results are reported in table 4.102.

Table 4.102: Estimates of Downside CAPM for TYO

Variables	1	2	3	4	5
λ_i^D	0.00404***	0.00672***	0.00387***	-0.00289	0.00390***
	(0.00126)	(0.00145)	(0.00125)	(0.00492)	(0.00127)
λ_i^{2D}		-0.0249***		0.0594	
		(0.00675)		(0.0418)	
μ_i			-4.929***	-15.70**	
			(1.239)	(7.679)	
λ_i^U					0.000674
					(0.000887)
Constant	-0.0287***	-0.0285***	-0.0277***	-0.0259***	-0.0288***
	(0.000160)	(0.000173)	(0.000315)	(0.00128)	(0.000163)
Adj. R^2	0.008	0.017	0.019	0.020	0.008
RMSE	0.00527	0.00524	0.00524	0.00524	0.00527

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

The results indicate that all the hypothesis has been accepted except 4. This indicates that downside beta has a positive relationship from Model 1 to 3 as well as 5 with the significant non-linearity and residual term. The joint hypothesis reports that there is not any relationship of downside beta and average firms return in the presence of non-linearity and residuals. The intercept term is significant and negative which also indicate that mispricing behavior exists in this market.

4.2.6.6 Estimates Extended Global CAPM with Industry Factor for NYSE

Global model has been expanded by the inclusion of industrial risk factor, and results of Fama-Macbeth regression has been reported in table 4.103. Results indicate that in model 2, report the significant and positive relationship of global and industrial beta with average return at 10% and 5% respectively. But all model report insignificant results and can be interpreted that global beta and industrial beta unable to explain the variations of average returns so model cannot be used for further estimation of the cost of equity.

TABLE 4.103: Estimates of Extended Global CAPM for NYSE

Variables	**1**	**2**	**3**	**4**
λ_i^w	-0.000436	0.00186*	0.00113	-0.00101
	(0.000866)	(0.00106)	(0.000872)	(0.00142)
λ_i^{IND}	-0.00462***	0.00973***	-0.00370***	-0.00409
	(0.000693)	(0.00243)	(0.000687)	(0.00515)
λ_i^{2w}		-0.00394**		0.00675*
		(0.00153)		(0.00383)
μ_i			-6.863***	-10.28***
			(0.974)	(3.384)
Constant	0.00832***	0.00225*	0.0104***	0.0116***
	(0.000728)	(0.00123)	(0.000767)	(0.00332)
Adj. R^2	0.052	0.101	0.102	0.110
RMSE	0.00704	0.00686	0.00685	0.00683

Standard errors in parentheses
**** $P < .001$, ** $p < 0.05$, * $p < .01$*

4.2.6.7 Estimates of Industry CAPM for NYSE

In the final step, study regressed the industry risk premium for explaining the average stocks returns as an individual risk factor, and results is reported for all model in table 4.104.

Results again reported the same results as in the above model. Model 1 and 3 indicating the negative and significant relationship between beta and returns, but these results can be understood due to non-linearity and residual terms. However, as this phenomenon can be understood due to the non-linearity issue. As this variable added into the second model, relationship becomes positive and significant. But joint hypothesis (Model 4) indicates that as all variables incorporated into the single model, all variables become insignificant. So industry premium also unable to explain the variations in the average stock returns of this market.

Table 4.104: Estimates of Industrial CAPM for NYSE

Variables	1	2	3	4
λ_i^{IND}	-0.00459***	0.0119***	-0.00386***	0.0152
	(0.000676)	(0.00282)	(0.000676)	(0.0125)
λ_i^{2IND}		-0.00782***		-0.00949
		(0.00130)		(0.00621)
μ_i			-7.881***	1.776
			(1.358)	(6.457)
Constant	0.00846***	0.000766	0.0106***	-0.00135
	(0.000705)	(0.00146)	(0.000783)	(0.00784)
Adj. R^2	0.049	0.086	0.084	0.086
RMSE	0.00704	0.00690	0.00691	0.00691

Standard errors in parentheses
**** P < .001, ** p < 0.05, * p < .01*

4.2.6.8 Dynamics of Cost of Equity of NYSE

This study try to attempt to see whether any model significantly help to determine the cost of equity but none of the risk factor significantly explain the average return of stock of this market that emerged tow major conclusions, one is that either there are other risk factors that explain the average stocks returns which this study did not cover, or London stock exchange is an efficient market, and any new information is quickly priced into the price and returns derive from such price is move on random walk that no one can predict. Study recommendation is to use any other method than CAPM to capture the cost of equity phenomenon in this market.

4.2.6.9 Summary for New York Stock Exchange (NYSE)

Different risk factors have been analyzed in capital asset framework by estimating the beta by using 36 months rolling window, on each month, and then regressed against average returns to check the validity of that risk factor over the range of data as shown in chapter 3 section 3.1.

Results of all tables indicate that beta calculated from all risk factors cannot explain the variations in the stock returns so these models unable to calculate estimate the cost of equity over the different years.

4.3 Comparison Across Emerging and Developed Market

All the selected and extended models are estimated using Fama and Macbeth (1973). Results are reported for four different steps and for downside CAPM, an extra step has been used to set up and downside behavior of the stock market. Different risk factors are reported significant as well as insignificant for different countries and the cost of equity is only calculated for significant risk factors.

All models are summarized into table 4.105 for Emerging stock markets and table 4.106 for Developed markets. Results indicate that Local Market Premium is significantly explaining the average returns of Pakistan, India, Germany, and Japan's, and hence can be used for the calculation of cost of equity. The cost of equity calculated through the local factors may be different which may not be used for the international investment's purpose.

Global CAPM model is also used to provide the cost of equity for the international investment perspectives. In first steps Global risk premium is calculated using MSCI Developed Market Index using the 36 month recursive window. Results indicate that Global risk factor is significantly explaining the averages stock returns of Pakistan, Russia, Germany and Japan. So Global CAPM model can be used for the calculation of cost of equity.

On the lines of Sabal (2002), Modified Global CAPM is used to calculate the cost of equity for different stock markets. Results indicate that modified risk premium is significantly explaining the average stocks returns of Russia, South Africa, Canada, Japan and London. The corporate manager of these can used this model for the calculation of cost of equity.

Downside CAPM is estimated to capture the high volatility behavior of stock markets of both emerging and developed markets. Results indicate that downside risk factor is significantly explaining the average returns of Pakistan, India, Brazil and Canada. This also indicate that, downside CAPM can be used to calculate the cost of equity of both emerging as well as developed stock market. The cost of equity calculated with the help of this model may be higher than the previous models as it provide more premium to volatility than other models.

The cost of equity phenomena is emerging market is capture through hybrid CAPM. Hybrid CAPM captures the emerging market premium along with the global market premium to arrive at cost of equity for international companies. The results of this model indicate that global market risk factor is significant for Russia only, while emerging market premium risk is significant for Pakistan only.

Extended CAPM model is also design on same framework, in which additional industry risk premium is added and results indicate that after inclusion of this factor, global and emerging risk factor become significant for many stock markets. Industry risk premium is significantly explaining the average stock returns of Pakistan, India, South Africa and Canada while in China and Brazil is significant in second model.

Table 4.105: Overview of Selected and Extended Models

Country	Model	λ^L	λ^G	$\lambda^{M.G}$	λ^{EMR}	λ^D	λ^{IND}	λ^2	μ	C	$Adj.R^2$
Pakistan	Local	Sig						Sig	InSig	Sig	0.357
	Global		Sig					InSig	InSig	InSig	0.041
	M.Global			Insig				InSig	InSig	InSig	0.032
	Downside					Sig		Sig	InSig	Sig	0.037
	Hybrid		InSig		Sig			InSig	InSig	InSig	0.123
	Ext Hybrid		InSig		Sig		Sig	InSig	InSig	InSig	0.131
India	Local	Sig						InSig	InSig	InSig	0.021
	Global		InSig					InSig	InSig	InSig	0.004
	M.Global			Insig				InSig	InSig	InSig	0.003
	Downside					Sig		InSig	InSig	InSig	0.034
	Hybrid		InSig		Insig			InSig	InSig	Sig	0.01
	Ext Hybrid		InSig		Sig		Sig	InSig	InSig	Sig	0.131
China	Local	InSig						InSig	InSig	Sig	0.025
	Global		InSig					InSig	InSig	Sig	0.016
	M.Global			Insig				InSig	InSig	Sig	0.009
	Downside					InSig		InSig	InSig	Sig	0.007
	Hybrid		InSig		Insig			InSig	InSig	Sig	0.024
	Ext Hybrid		InSig		Insig		InSig	InSig	InSig	Sig	0.029
Brazil	Local	InSig						InSig	InSig	InSig	0.019
	Global		InSig					InSig	InSig	InSig	0.013
	M.Global			Insig				InSig	InSig	InSig	0.033
	Downside					Sig		InSig	InSig	InSig	0.14
	Hybrid		InSig		Insig			InSig	InSig	InSig	0.056
	Ext Hybrid		InSig		Insig		InSig	InSig	InSig	InSig	0.071
Russia	Local	InSig						InSig	InSig	InSig	0.005
	Global		Sig					InSig	InSig	InSig	0.045
	M.Global			Sig				InSig	InSig	InSig	0.051
	Downside					InSig		InSig	InSig	InSig	0.046
	Hybrid		Sig		Insig			Sig	InSig	Sig	0.092
	Ext Hybrid		Sig		Insig		InSig	Sig	InSig	Sig	0.111
South Africa	Local	InSig						InSig	InSig	InSig	0.061
	Global		InSig					InSig	InSig	InSig	0.079
	M.Global			Sig				Sig	Sig	Sig	0.077
	Downside					InSig		InSig	InSig	InSig	0.027
	Hybrid		InSig		Insig			Sig	Sig	Sig	0.138
	Ext Hybrid		InSig		Sig		Sig	Sig	Sig	Sig	0.099

Table 4.106: Overview of Selected and Extended Models

Country	Model	λ^L	λ^G	$\lambda^{M.G}$	λ^D	λ^{IND}	λ^2	μ	C	$Adj R^2$
Canada	Local	InSig					InSig	InSig	InSig	0.033
	Global		InSig				InSig	InSig	InSig	0.056
	M.Global			Sig			Sig	Sig	InSig	0.037
	Downside				Sig		Sig	Sig	Sig	0.055
	Ext Hybrid		InSig			Sig	InSig	InSig	Sig	0.161
France	Local	InSig					InSig	InSig	InSig	0.012
	Global		InSig				Sig	Sig	InSig	0.033
	M.Global			Sig (Negative)			Sig	Sig	Sig	0.052
	Downside				InSig		InSig	InSig	InSig	0.015
	Ext Hybrid		InSig			InSig	InSig	InSig	Sig	0.161
Germany	Local	Sig					Sig	Sig	Sig	0.168
	Global		InSig				InSig	InSig	InSig	0.063
	M.Global			Sig (Negative)			Sig	Sig	Sig	0.132
	Downside				InSig		InSig	InSig	InSig	0.078
	Ext Hybrid		InSig			InSig	Sig	Sig	Sig	0.129
Japan	Local	Sig					Sig	Sig	Sig	0.03
	Global		InSig				Sig	Sig	Sig	0.057
	M.Global			Sig			Sig	Sig	Sig	0.023
	Downside				InSig		Sig	Sig	Sig	0.02
	Ext Hybrid		InSig			InSig	Sig	Sig	Sig	0.129
London	Local	InSig					Sig	InSig	InSig	0.062
	Global		InSig				Sig	InSig	InSig	0.101
	M.Global			Sig			Sig	Sig	Sig	0.056
	Downside				InSig		InSig	InSig	InSig	0.026
	Ext Hybrid		InSig			InSig	InSig	InSig	Sig	0.069
USA	Local	InSig					InSig	InSig	InSig	0.023
	Global		InSig				InSig	InSig	InSig	0.128
	Downside				InSig		InSig	Sig	Sig	0.026
	Ext Hybrid		InSig			InSig	InSig	InSig	Sig	0.069

Chapter 5

Conclusion and Policy Implications

The main purpose of the study is to investigate the changing dynamics of validity of CAPM in the wake of its different models. Furthermore, the study elaborates checking the robustness of risk factors that in turn explains the average returns of the respective stock markets. Based on robustness and sensitivity, various models have been selected and transformed to measure the cost of equity for both emerging and developed markets. The study attempts to decide whether asset pricing models established in developed countries can be applied in emerging markets and in the other way round, in order to estimate the cost of equity dynamics. In addition, industry risk premium as suggested by extant literature is examined empirically in a comprehensive setting. Although prior literature suggests incorporating industry risk premium in the CAPM framework, but no empirical evidence is noted in this context.

Academicians and practitioners both require an estimate of firm's cost of equity and have mostly relied on the CAPM. The CAPM serves to characterize the risk of a particular firm's investment and assigns a discount rate that reflects risk related to the investment. Corporations create their value in choosing projects that possess a higher promised rate of return beyond the level of risk estimated by CAPM in terms of the required rate of return. Various asset pricing models are practiced to calculate the cost of equity for developed and emerging economies. Graham and Harvey (2001) highlight that 73.5% of corporate firms and investors determine the cost of equity by using CAPM. Nevertheless,, to capture an accurate cost of equity through CAPM is greatly debated till yet. Premised on the ambiguity whether to apply CAPM, this study attempts to provide, a new insight into this debate by offering recent empirical evidence on the validity of widely used models under CAPM.

For the purpose, aforementioned, the study gathers a wide range of data on emerging and developed countries (see table 3.1). Fama-Macbeth cross sectional regression is applied for calculation of estimators which is a recommended methodology for testing the validity of different risk factors for capital assets pricing framework (Cederburg and O'DOHERTY, 2016; Fama and French, 2015). It is a two-step regression; in the first step, each security's return is regressed against one or more risk factors over the last 36 months to determine the beta for rest of all periods. In the second step, the cross section of average returns is regressed against the factor exposures.

Analysis of the study is classified into three principal sections. In first section, the study provides univariate analysis of stock returns and each risk factors for each country; in terms of their mean which reflects their average payoffs, in terms of standard deviations which presents per unit of their movements on positive and negative side, in terms of minimum & maximum payoffs and eventually in terms of shape of its distributions i.e. kurtosis and skewness. In the subsequent section, study provides correlation analysis, which exhibits the relationships of stock returns with all other risk factors. While in the last section, study provides comprehensive results of regression through the betas obtained from relevant risk factors with an average return of stocks into four different models to check the validity of each risk factors in bivariate and multivariate CAPM framework.

In emerging countries, the validity of Local, Global, Modified Global, Downside, Hybrid and Lessard's hierarchical model, with extended industrial risk factor is tested over the range of data. Empirical results have been drawn for six emerging countries. The results for Pakistan indicate that betas calculated through local risk premium, global risk premium, downside risk premium, emerging market premium and industry risk premium are significantly explaining the mean return of stocks but issue of non-linearity and inadequacy of risk factor also persist in most of the models. The cost of equity is calculated based on significant risk factor's models. Wherein results indicate that on average, firms in the PSX, incur 15% equity cost over its investment in Pakistan. For India, results indicate that betas calculated through local risk premium, downside risk premium, emerging market premium and industry risk premium are significantly explaining the mean returns of stocks and on average cost of equity vary from 9% to 15% over different years for different models. For China, results indicates that beta calculated through all other risk factor except industry risk factor, show insignificant results. Beta calculated with the help of industry risk premium, explain the variations of average stock returns. Still the cost of equity calculated with this factor, provide unusual results as most of year value is negative.

The results for the Brazilian stock exchange also report that beta calculated through all other risk factor indicates the insignificant results except downside risk and industry risk factor. Beta calculated with the help of downside risk premium and industry risk premium, explained the variations of average stock returns with adjusted R^2 as 14% and 7.10%, which also indicate that downside model is a better performer than the other. Cost of equity for Brazilian firms moves between 11% to 12%. For Moscow stock exchange, results that betas calculated through global and modified global risk premium significantly explain the variations of average stocks returns than any of the other models. Global and Modified Global CAPM report 3.3% cost of equity for Brazilian firms. For South Africa, local, modified global risk premium and emerging risk factor, show significant results.

For developed countries, the validity of local, global, downside, hybrid model with industry factor and industry CAPM is tested over the observed period. Data for six countries have been empirical examined. For Toronto Stock Exchange, results indicate that betas calculated through global, downside, and industry risk premium show significant results. Cost fo equity movement with the rise and fall of the market during the year 2008, 2011 and 2015. During rise, the cost of equity falls and vice versa. Another important conclusion that can drive is that during the fall of the market, the CAPM model is not able to capture the cost of equity phenomena and it become negative. For Paris stock exchange, all the models failed to explain the average stock returns that also indicates the efficiency of price adjustment.

Frankfurt stock market empirical examined for over the range of observed period. Results suggest that betas calculated through global, downside, and industry risk premium significantly explain the variations of stock returns. For Tokyo Stock Exchange, results indicate that betas calculated through local, and downside risk factor show significant results. But calculated cost of equity through these models is more than 30% of this market which is quite higher. Results for UK and USA markets indicate that CAPM cannot explain the variations of stocks returns.

The Goldman Sachs' Model, Godfrey and Espinosa's model, and Lessard's hierarchical model are also used for the estimation of the cost of equity for emerging stock markets. The results are surprisingly negative for most of the years which is against the limited liability concept of doing business. Therefore, results of these models are not taken into account. Study also concludes that multiplicative beta's model like Lessard's hierarchical model is not suitable as compared to hybrid (additive model) model.

Moreover, the results have been found paradoxical as some version of CAPM fails in one country and other fail in another and hence cost of equity is calculated from different models over variant countries. The reasons for such failure and success is based on model's assumptions and its variable constructions (Fama and French, 2004). In spite of the fact that, study incorporated non-linearity and joint hypothesis assumptions via different hypothesis to provide the optimal risk and return relationship, other basic assumptions are still abandoned. For market portfolio, the study used different proxies i.e. industrial market index, the local market index, MSCI emerging market index, and MSCI developed market index. For each proxy, the study presents the results which indicate that with some proxies, results are validated and while with others the results are not validated. The problem of non-linearity, endogeneity, or circularity may be counted to its failure as well (Lai and Stohs, 2015). The selection of non-stochastic risk free rate is also one of the problems as it appears to be stochastic (Lai and Stohs, 2015). Behavioral school of thought discuss its failure in relations to non-rationality that they think prevails in the financial world (Dempsey, 2013).

To a significant extent, the failure of some versions of CAPM, may be in response to following factors i.e. divergent from basic assumptions, wrong selection of market portfolio, different level of diversification of market portfolio, high risky and low risky economical and political system of country, variant quality of financial information and reporting and financial disclosures, ownership structure of companies and divergent corporate governance system etc.

CAPM also assume that security returns are normally distributive but mostly market indices as well as securities are not follow this assumptions. Results also indicate the low level of correlations between market portfolio and securities may results CAPM failure (Giannakopoulos, 2013). He also pointed out that CAPM results are sensitive to the choice of market portfolio, the market return and its standard deviation. The selection of the risk free rate is also considered as an important factor. According to them, someone may manipulate these variables and get the desired results that may not be consistent with reality. The frequency of the data for testing the CAPM, may be also a possible reason for failure and success of the CAPM (Gilbert et al., 2014).

Roll (1992) also pointed out that some national indices are more diversified than others. Its mean that the number of stocks in the index may change the results of the CAPM. Political situation in one country is also different from other country, so the political risk premium may be a reason that causes such difference in results. Bekaert et al. (2016) discussed the example of valuation for power generation project in Pakistan. According to authors, if this project started in any developed country, the cost of equity would be no more than 4.95%. But when the cost of equity for this project is calculated after consideration of political risk, it was 11.91%.

Quality of financial information and corporate disclosures is another possible reason for such results. Botosan (1997) reports that there is an association between the cost of equity and the level of financial disclosure by the companies. Countries with low disclosure have more cost of equity than those with high disclosure.

Another reason may be the corporate governance system in the country. Many studies indicate that corporate governance quality has a reducing effect on cost of equity capital (Carvalhal and Nobili, 2011; Ramly, 2012).

King (1966), and Lessard (1996) and others suggested in their studies that industry risk premium should be treated separately from the market risk premium. Therefore, the present study initiate the inclusion of industry risk premium into hybrid CAPM that enhances the model predictability both for developed as well for emerging markets. The results of extended hybrid CAPM, clearly indicate that industry risk premium is explaining the variations of stock returns significantly. Results also indicate that industry risk premia is a better proxy of CAPM's market portfolio than the local market risk premia. Moreover, study concluded that industry risk premium is an important component while determining cost of equity both domestically and internationally.

Although the current results of the study does not concisely allow to state definitively, that which risk factors are priced in financial markets, or even how many factors are relevant, but it is clear that systematic, economy wise risk factors that have pervasive impact on all the financial assets, are important. This study argue that judicious use of the CAPM, without the overreliance on the historical data, is still the most effective way to dealing with the calculation of cost of equity in different markets of the world.

Based on empirical results and conclusions, study suggestions are as fellows:

1. The estimation of the cost of equity is an exigent for the assessment of firm's investment, and it required a sound estimators. This study suggests using multiple methods for the calculation of cost of equity. Specifically speaking, different variants of CAPM should be utilized to the estimation of the cost of equity. It will provide a comprehensive insight about the matter mentioned above.

2. Industrial risk premium is an important determinant for the estimation of cost of equity which provides more predictive power to the existing models as well also

explains the average returns of stocks individually. It should be empirically tested with other risk factors at multi-factor models over the bigger sample. So this study recommends to investors, industry analysts, company financial officers, company executives and academicians to use industry risk premium while calculating the cost of equity.

3. It is advised to see the validity of risk factors before to be employed in the calculation of cost of equity. It will provide embracing results in this regard. This procedure provides additional accurate results than as before.

4. It is recommended to employ CAPMs developed in the emerging market in developed markets and the other way round. As the results indicate that downside beta significantly explain the variations of average stocks returns of developed markets more significantly than other models. Additionally, beta derived from global risk premium significantly explains variations in the stocks related to the emerging markets.

5. These results also provide an insight that stocks having more exposure to the market movements; CAPM translates such exposures into higher and lower cost of equity accordingly. Additionally, in extreme situations when the market is overwhelmed, for instance in 2008 stock market reaction, most of CAPMs report negative cost of equity. Thus the study recommends to use models other than CAPM for such situations.

6. This study also captures the impact of unsystematic risk factors in the form of residuals (μ_i). Significant outcomes of this factor in several models indicate that firms should take into account idiosyncratic risk while valuating cost of equity. These idiosyncratic risks may include the quality of relationship between management and company's employee, the quality of the product and the like.

7. Study also recommends to analyze, to take into the consideration of non-linearity which is another persistent issue, while estimating cost of equity through CAPMs. It is reasoned on this study's results indicating significant presence of beta square terms, in most of risk and return relationships.

5.1 Study Limitations and Future Directions

The study has following limitations which can be transformed into future directions:

1. All the limitations of CAPM framework, is the limitation of this study. This study also assume that all stock markets are efficient, information are priced as disseminated and CAPM translates all possible risk into expected returns.

2. Study applies only monthly data of different range for twelve emerging and developed countries. More frequency of the data i.e. daily or weekly with more range and more countries may provide even more comprehensive results.

3. The number of firms in each country is not same due to non-availability of data.

4. Robustness of these results can be further re-checked by using different techniques like Fama-French and any other related methodology.

5. More CAPM based and Non-CAPM based models (like, three factors and four factors and five factors CAPMs and APT) can be taken into account while estimating cost of equity.

6. Study is also limited to use single period CAPMs. Dynamic CAPM are not evaluated in this study.

Concluding what has been discussed above, after grappling with the issue of cost of equity, study offers a comprehensive stage to corporations for its estimation. Additional risk factor is only welcomed by the CAPM framework, if it is premised on a better theoretical, methodological, and empirical support. Industry risk premium furnishes robustness and improved explanatory power to the existing models. Study along the same lines suggests employing multiple CAPMs to boost the cost of equity phenomena. It is implied, in addition, that any model developed in any regime, can be employed to any stock market, subject to the condition if it is explaining the variations of stock returns.

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Appendix-1

ICB industry classification structure

Industry	Supersector	Sector	Subsector
0001 Oil & Gas	0500 Oil & Gas	0530 Oil & Gas Producers	0533 Exploration & Production
			0537 Integrated Oil & Gas
		0570 Oil Equipment, Services & Distribution	0573 Oil Equipment & Services
			0577 Pipelines
1000 Basic Materials	1300 Chemicals	1350 Chemicals	1353 Commodity Chemicals
			1357 Specialty Chemicals
	1700 Basic Resources	1730 Forestry & Paper	1733 Forestry
			1737 Paper
		1750 Industrial Metals	1753 Aluminum
			1755 Nonferrous Metals
			1757 Steel
		1770 Mining	1771 Coal
			1773 Diamonds & Gemstones
			1775 General Mining
			1777 Gold Mining
			1779 Platinum & Precious Metals

Industry	Supersector	Sector	Subsector
2000 Industrials	2300 Construction & Materials	2350 Construction & Materials	2353 Building Materials & Fixtures
			2357 Heavy Construction
	2700 Industrial Goods & Services	2710 Aerospace & Defense	2713 Aerospace
			2717 Defense
		2720 General Industrials	2723 Containers & Packaging
			2727 Diversified Industrials
		2730 Electronic & Electrical Equipment	2733 Electrical Components & Equipment
			2737 Electronic Equipment
		2750 Industrial Engineering	2753 Commercial Vehicles & Trucks
			2757 Industrial Machinery
		2770 Industrial Transportation	2771 Delivery Services
			2773 Marine Transportation
			2775 Railroads
			2777 Transportation Services
			2779 Trucking
		2790 Support Services	2791 Business Support Services
			2793 Business Training & Employment Agencies
			2795 Financial Administration
			2797 Industrial Suppliers
			2799 Waste & Disposal Services

Industry	Supersector	Sector	Subsector
3000 Consumer Goods	3300 Automobiles & Parts	3350 Automobiles & Parts	3353 Automobiles
			3355 Auto Parts
			3357 Tires
	3500 Food & Beverage	3530 Beverages	3533 Brewers
			3535 Distillers & Vintners
			3537 Soft Drinks
		3570 Food Producers	3573 Farming & Fishing
			3577 Food Products
	3700 Personal & Household Goods	3720 Household Goods	3722 Durable Household Products
			3724 Nondurable Household Products
			3726 Furnishings
			3728 Home Construction
		3740 Leisure Goods	3743 Consumer Electronics
			3745 Recreational Products
			3747 Toys
		3760 Personal Goods	3763 Clothing & Accessories
			3765 Footwear
			3767 Personal Products
		3780 Tobacco	3785 Tobacco
4000 Health Care	4500 Health Care	4530 Health Care Equipment & Services	4533 Health Care Providers
			4535 Medical Equipment
			4537 Medical Supplies
		4570 Pharmaceuticals & Biotechnology	4573 Biotechnology
			4577 Pharmaceuticals
5000 Consumer Services	5300 Retail	5330 Food & Drug Retailers	5333 Drug Retailers
			5337 Food Retailers & Wholesalers
		5370 General Retailers	5371 Apparel Retailers
			5373 Broadline Retailers
			5375 Home Improvement Retailers
			5377 Specialized Consumer Services
			5379 Specialty Retailers
	5500 Media	5550 Media	5553 Broadcasting & Entertainment
			5555 Media Agencies
			5557 Publishing
	5700 Travel & Leisure	5750 Travel & Leisure	5751 Airlines
			5752 Gambling
			5753 Hotels
			5755 Recreational Services

Industry	Supersector	Sector	Subsector
6000 Telecommunications	6500 Telecommunications	6530 Fixed Line Telecommunications	6535 Fixed Line Telecommunications
		6570 Mobile Telecommunications	6575 Mobile Telecommunications
7000 Utilities	7500 Utilities	7530 Electricity	7535 Electricity
		7570 Gas, Water & Multiutilities	7573 Gas Distribution
			7575 Multiutilities
			7577 Water
8000 Financials	8300 Banks	8350 Banks	8355 Banks
	8500 Insurance	8530 Nonlife Insurance	8532 Full Line Insurance
			8534 Insurance Brokers
			8536 Property & Casualty Insurance
			8538 Reinsurance
		8570 Life Insurance	8575 Life Insurance
	8700 Financial Services	8730 Real Estate	8733 Real Estate Holding & Development
			8737 Real Estate Investment Trusts
		8770 General Financial	8771 Asset Managers
			8773 Consumer Finance
			8775 Specialty Finance
			8777 Investment Services
			8779 Mortgage Finance
		8980 Equity Investment Instruments	8985 Equity Investment Instruments
		8990 Nonequity Investment Instruments	8995 Nonequity Investment Instruments
9000 Technology	9500 Technology	9530 Software & Computer Services	9533 Computer Services
			9535 Internet
			9537 Software
		9570 Technology Hardware & Equipment	9572 Computer Hardware
			9574 Electronic Office Equipment
			9576 Semiconductors
			9578 Telecommunications Equipment