# Systematic and Idiosyncratic Risk Analysis of Banking and Insurance Sector of Pakistan

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**Abstract**
*This study empirically analyze the effect of banks' and insurance companies' systematic risk and firm specific idiosyncratic risk factors on stock excess returns. Traditional CAPM model is used to measure the market or systematic risk, idiosyncratic risk exposure is measured by the idiosyncratic variables from Fama and French (1993) three factor model. This study contributes with the dynamic firm specific risk exposure, which is measured by Claim incurred ratio for insurance companies and advances to deposits and borrowings for banks. The objective of the study is to estimate the risk return dynamics of banking and insurance sector of Pakistan. The results indicate that Market beta of banks close to one indicates high volatility of banks due to low liquidity, high leverage and strong regulatory influence. Insurance sectors' firm specific operational idiosyncratic risk factor (claim incurred ratio) has very limited explanation of stock returns. Investor should consider the significance of explanatory power of Size and value factor before making and investment in financial sector. Banks and insurance companies with low operational management are highly expose to risk of loss in the market. Operational performance is the important factor deriving market returns. Findings of this study is original and can be generalized to financial sectors. This study provide implication to investors about which risk factors they should consider while making investment in banks and insurance companies. Further operational performance should be considered as important factor for stock excess returns.*
Keywords: Risk, CAPM, Fama & French, Idiosyncratic risk, Systematic Risk, Operational Risk, Banks, Insurance

Stock market predictions is always been the challenge for stock market practitioners, theorists and policy makers. Stock market volatility lead towards the investment behavior of investors and also changes the investment opportunities for investors. Stock market excess return estimation has been considered as the primary tool to measure the exposure of stock towards risk of the market. Increased volatility in stock market induce investors to hedge against the fluctuation of the market because stock market toward movement is correlated with high volatility (Campbell, 1993, 1996) and (Chen, 2002). Investors always look for large returns against least amount or risk but risk play its significant role in stock market as it represents the different outcome against the expectation of investors (Grundy & Malkiel, 1996). Market risk can be diversifiable and

undiversifiable. The overall changes due to the market at macro level considered as the undiversifiable, systematic or uncontrollable risk. Black (1972), Sharp (1964) and Lintner (1965) developed a model called Capital Asset Pricing Model (CAPM) to deal with the sensitivity created in stock prices due to overall market. This sensitivity is called market beta which was the positive linear function of expected stock returns. CAPM has is significance in financial literature measure the effect of one risk factor on stock excess returns. There are various discrepancies reported regarding the explanatory power of CAPM mode. There were certain empirical contradictions such as size factor which was introduced by (Benz, 1981). Benz introduce a model indicating that market equity provided the significant explanation of cross section of excess stock returns. Where tradition CAPM provided no explanation of leverage effect. Bhandari (1988) in his study indicated that high leveraged stocks provided higher returns. Basu (1983) used price earnings ratio to explain the stock excess returns. (Rosenberg, Reid, & Lanstein, 1985) used book to market ratio as a risk factor to explain the stock price volatility. Three factor model developed by Fama and French, (1992, 1993, 1996) introduced two significant controllable risk factors i.e. size and value of the stock, which play the significant role explaining the stock excess returns. All above risk factors allow investors to form their portfolios and management their risk and returns.

CPAM model specify the risk which cannot be diversifiable and idiosyncratic risk factors provide risk which can be diversifiable by investors. Theories and models regarding risk factors are generated with respect to developed nations. To harmonize the results generated form developed nations Khan, Hassan, and Ali (2012) conducted a study indicating the size as the significant predictor of Pakistani stock market excess returns. Javaid and Ahmad (2011) gave some understanding regarding CAPM in Pakistan Stock Exchange (PSX) by indicating the increase market beta in bullish market and low mfarket beta in bearish market. Aydoğan and Gürsoy (2000) conducted a study on nineteen developing economies and observed weak explanatory power of idiosyncratic variables. Rahman and Baten (2006) significantly applied the Fama and French three factor model in Bangladeshi stock market.

Financial intermediaries such as banks and insurance companies contribute significantly in the development of the economy. From past couple of decades these two sector are contributing exceptionally in economic growth and capital market. Banks provide growth at both firm and country level (Sensarma & Jayadev, 2009). Banks and insurance companies are playing important role in bringing up the gap between individuals and financial markets. The strong involvement of these sectors in financial market make them the significant player of stock markets as these sectors also play the role of brokerage firms and asset management firms. According to researcher best knowledge financial sector has dropped from the sample due to strong leverage and high leverage. Barber

and Lyon (1997) did not found any difference between listed financial and non-financial firms in NYSE, explaining systematic and nonsystematic risk and return relationship. Research in Pakistan ignores these sector but these two sector comprise the 20% of the listed companies in PSX (Business Recorder, 2013). It will contribute in the body of knowledge while tapping these sectors as they contribute a lot in shaping the risk and return relationship in stock market. The study considered well established risk factors of size and value generated by (Fama & French, 1996). Banks and insurance sector has their own operational instruments which contribute in their operations and performance. Bank operations are depend on advances to deposits and their ratio to borrowings. The higher the ratio determines the severity of risk of banks and with the enhanced deposits advances to borrowing ratios will enhance the volatility of bank security prices in market. Researcher measure this operational risk factor by high deposit advances to borrowing ratio (ADB) minus low deposit advances to borrowing ratio (ADB). Insurance companies' fundamentals are also different from rest of the sectors. Claims incurred ratio which represents number of claims incurred against the amount of premium. The increased ratio represents the high risk which ultimately lead to the volatile securities. This factor also play the significant role in shaping the risk of insurance company. So this factor is measured by high Claim incurred ratio (CP) minus low claim incurred ratio (CP). Two idiosyncratic risk factors represents the operational factor or fundamental factor of banks and insurance companies.

Banking and insurance sector provide the backbone to the financial sector of Pakistan and contributes significantly in the economic growth. The main objective of this study is to analyze and estimate the risk and return relationship behavior of banking and insurance sector in Pakistan.

Systematic risk and return explanation is the primary objective as it is imperative to measure the influence of market beta

H1: There is positive significant impact of systematic risk factor on excess returns

Second objective of this study is to analyze the extent of influence generated by idiosyncratic risk factors, which can give investors of PSX diversification benefits. These idiosyncratic risk factor not only include the traditional size and value factors proposed by (Fama & French, 1995) but also the firm specific operational idiosyncratic risk factors i.e. claim incurred ratio and advances to deposits and borrowing ratio.

H2: Idiosyncratic risk factors has significant impact on stock excess returns

Idiosyncratic risk factors include both established risk factors and also risk factors imperative specifically with the fundamental riskiness of banking and insurance sector.

**Literature Review**

The study elaborate the risk and excess return relationship of banks and insurance listed companies in PSX. Insurance companies and banks are highly ignore by the body of knowledge due to high leveraged nature. Banking sector has its foundations from the nationalization regime in Pakistan, when centralized control was with the government and private sector was discouraged to perform. After nationalization and commencement of privatization, security and capital market started growing. From past couple of decades the growth of financial sector in Pakistan is exceptional and it contributes in development and growth of capital and equity market. These sectors cannot be ignored as the results and interpretations of any development will be spurious with the exclusion of stated sectors (Faruqi, 2011).

CAPM model set the foundations for the development of systematic risk, undiversifiable or uncontrollable risk factor. Size, liquidity, value and momentum are the factors which are diversified and play significant role in shaping the portfolio of investment. The study is imperative and new in terms contemporary financial risk management. Theriou, Maditinos, and Chadzoglou (2005) empirically analyze the effects of three factor model proposed by Fama and French (1992) in Athens Stock Exchange (ASE) and they found that these factors significantly derive the Athens stock market. The study indicate that ASE securities have low returns when they have large size and small size stock provide more returns because of their level of risk[1]. Values and growth stock also show their significance in Athens Stock market just like investigated by many researchers[2]. The study post its significance regarding idiosyncratic risk factors explaining the stock returns.

Drew, Naughton, and Veeraragavan (2005) conducted a study in developing economy i.e. shanghai stock exchange and present results which were in line with the multifactor model and signify that stock market returns are not just effected by the traditional single factor model but there are certain unsystematic factors involve in shaping the returns in stock market.

Understanding the risk and return relationship in financial sector. Elyasiani, Mansur, and Pagano (2007) conducted studies in US banks and found high market risk for large size banks of US. This high size high risk relationship post the reason of high leverage of large banks as compared to small banks and also large size banks credit risk9 and low liquidity enable market prices more volatile. These findings are asserted by (Demsetz & Strahan, 1997) in their studies. Petersen and Rajan (2002) proposed that due to geographical restrictions, localized operations, banks

[1] The inference is supported by Reinganum (1983), Keim (1983, 1986) and Benz (1981)

[2] Nelson (1999), Basu (1983), Lewellen (1999) and Fama and French (1989, 1992 and 1996)

cannot diversify their portfolio and mitigate their idiosyncratic risk. Insurance company risk factors and volatility of stock returns. Insurance company play the vital role in developing the stock market. Insurance companies provide long term funds to stock market and play the role in development of equity markets (Faruqi, 2011). Financial institutions post their importance in financial markets growth it can be seen from the financial crises which was faced by the financial markets all over the world (Bartram & Bodnar, 2009). This study contribute to the body of knowledge as financial institutions effects the dynamics of stock markets quite significantly.

Guan, Hansen, Leikam, and Shaw (2007) also post the same results i.e. idiosyncratic risk factors better explanatory power than CAPM beta. They suggested that there is no effect of idiosyncratic risk factors if true beta value is posted by securities but if there is insignificant value of beta then two alternatives are shown by authors, one is beta is insignificant with one or more significant unsystematic factors and there may be the possibility that with significant idiosyncratic variable beta value also post significant results.

Kubota and Takehara (2010) introduced five factor model and specify that five factor model results are more significant than Fama and French (F&F) three factor model when applied to Tokyo stock market. Mouselli (2010) divides its portfolios in to categories, one category represents securities of small stocks and other represents securities of large stocks. He conducted his study in UK stock market from 1991 to 2006. The results were in line with the body of knowledge, small capitalized stocks provide more returns and large capitalized stock provide lesser returns. His study also explains that growth stock due to their low risky nature provide less returns as compared to value stocks. These results are in line with the results posted by (Brooks, & Miffre, 2007).

Aydoğan and Gürsoy (2000) indicate insignificant results of price earnings ratio and book to market ratio as compared to CAPM betas in emerging economies. Against these results Rahman and Baten (2006) indicated that both systematic and unsystematic risk factors provide significant explanatory power of stock returns of Bangladeshi Stock Market.

Javaid and Ahmad (2011) study the effect of CAPM beta and trends in stock market they indicated the increased beta value in bullish market and decreased beta value in bearish market. They also proposed the significance of diversifiable risk factors in Pakistani Stock Market. Khan et al. (2012) used market, size and leverage premiums to explain stock returns of Pakistan Stock Exchange (PSX) and found that size premium has significant explanatory power as compared to other idiosyncratic risk factors.

Malagon, Moreno and Rodríguez (2015) suggested that while assessing the asset pricing model idiosyncratic risk factors regarding investors perspective are considered important. They suggested that firm

specific idiosyncratic risk factor should be taken for better pricing of stocks. Firm level factors are based on managerial decisions so they have a role in explaining the idiosyncratic risk. This study also considered two factors which are specifically related managerial decision making i.e. advance to borrowing and deposit ratio of banking sector and claim incurred ratio of insurance sector of Pakistan.

## ResearchMethodology

Researcher used business recorder and Pakistan stock exchange (PSX) websites for the source of collecting data. Annual firms' data is collected form state bank of Pakistan (SBP). 22 Banks and 25 insurance companies are taken as a sample from the financial sector of Pakistan. some banks and insurance companies are dropped from the sample because they are either not listed in PSX or there is limited annual and daily data available. Rest of the financial sector is dropped from the data because the research objective concerns only banking and insurance companies the objectives of financial institutions other than banks and insurance do not come under the domain of this study. Daily closing prices of banking and insurance companies are collected from January 01, 2011 to December 31, 2015. Annual data of market capitalization of stocks is taken as size proxy and annual data of book to market ratio determines the value of stock. Deposits and borrowings advances (ADB) is taken as bank's operational idiosyncratic risk factor proxy and Claim Incurred ratio (CP) is selected as the operational idiosyncratic risk factor proxy of insurance companies. Annual data is collected from state bank of Pakistan publications. Percentiles of big caps stocks and small caps stocks are identified for size factor and further high Book to market (BM) ratio and low BM ratio stocks, high ADB, low ADB and high CP, low CP stocks are identify. Above 75 percentile stocks are considered as high stock and below 25 percentile stocks are considered as low stocks. Tbill rates are taken as the appropriate risk free rate.

## Research Methodology

Market risk is measured by the CAPM model, first model represents the systematic risk model

$$R_{it} - R_f = \alpha + \beta(R_{mt} - R_f) + e \qquad (1)$$

Second model represents the idiosyncratic risk factors which is value (HML), size (SMB) which is proposed by Fama and French (1993)

$$R_{it} - R_f = \alpha + \beta_i(R_{mt} - R_f) + \beta_s SMB_t + \beta_v HML_t + \varepsilon_t \qquad (2)$$

Ri represents average return of the security or portfolio of securities. SMB is measured by the difference between large capitalized

stocks and small capitalized stocks. HML is calculated by the difference between value stocks and growth stocks.

$$R_{it}^{Bnk} - R_f = \alpha + \beta_i\left(R_{mt} - R_f\right) + \beta_s SMB_t^{Bnk} + \beta_v HML_t^{Bnk} + \beta_a ADB_t^{Bnk} + \varepsilon_t \quad (3)$$

Equation 3 represents the relationship of independent variables i.e. systematic risk factors and idiosyncratic risk factors on bank excess returns. ADB is calculated by difference between high advances to deposit and borrowing firms and low advances to deposit and borrowing firms.

$$R_{it}^{Ins} - R_f = \alpha + \beta_i\left(R_{mt} - R_f\right) + \beta_s SMB_t^{Ins} + \beta_v HML_t^{Ins} + \beta_a CP_t^{Ins} + \varepsilon_t \quad (4)$$

Above equation represents the regression line regarding the insurance companies showing the effect of risk factors on returns. Claim incurred ratio is selected as the idiosyncratic variable specific for the operations of insurance companies in Pakistan.

## Data Analysis and Discussion

Researcher used the Kolmogorov Smirnov (KS) test (result provided in Appendix A) to ensure the normality of excess returns, the daily stock market data of both banks and insurance do not follow the normal distribution. KS test represents a non-parametric analysis to observe whether data is fit for particular probability distribution i.e. uniform or normal (Poshakwale, 1996). According to table 1A, The KS stated that the daily data do not follow the normal distribution. Ordinary least square model will not provide optimal results as data is not normally distributed. For better model specification Generalized Linear Model (GLM) is used for analysis. The model resolve the normality and heteroscedasticity issue in the data.

Table 1. *Banking Sector Analysis*

| | Dependent variable: $R_{i(banks)} - R_f$ | | | |
|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 |
| Capm β | 0.901*** | 0.858*** | 0.662*** | 0.305*** |
| SMB (Banks) | | | 0.062*** | 0.026*** |
| HML (Banks) | | | 0.174*** | 0.355*** |
| ADB | | 0.0067*** | | 0.181*** |
| Pearson Chi Square | 0.079*** | 0.073*** | 0.058*** | 0.031*** |
| Likelihood ratio chi square | 930.81*** | 1023.86*** | 1302.01*** | 2094.32*** |

Level of significance * 10%, ** 5%, *** 1%

Above table provides results regarding banks which are listed in Pakistan Stock Exchange using generalize linear model. Model 2 and 4 indicates another factor which is bank specific i.e. advances to deposit and borrowing (ADB). All factors posted highly significant results as p-values of all factors are less than 1%. Chi-square also indicate that all four models are in accordance to the goodness of fit hypothesis.

Table 2. *Analysis of Insurance Companies*

| | Dependent variable: $R_{i(Insurance)} - R_f$ | | | |
|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 |
| CAPM β | 0.547*** | 0.360*** | 0.137*** | 0.137*** |
| SMB | | | 0.424*** | 0.425** |
| Insurance | | | | |
| HML | | | 0.106** | 0.196** |
| Insurance | | | | |
| CP | | 0.002 | | 0.000 |
| Pearson Chi Square | 0.059*** | 0.058*** | 0.015*** | 0.015*** |
| Likelihood ratio chi square | 267.56*** | 269.86*** | 1915.24*** | 1915.34*** |

Level of Significance * 10%, ** 5%, *** 1%

Table 2 represents the risk and return analysis of Insurance sector of Pakistan. All factors has significant effect on excess return except claim incurred ratio (CP). All Models are overall good fit and all models are significant against the null model as indicated by likelihood ratio chi square

## Results and Interpretations

Market risk has significant effect on stock excess returns. Value of market beta is close to 1 which indicate that banking sector of Pakistan is highly sensitive to the information provided by the market. It moves according to the benchmark index and show more fluctuations. This risky nature of banking companies is due to the high leverage and most of banks are also brokerage houses which allow them to have more inside information and makes them more sensitive to the information floating in the market (DeAngelo & Stulz, 2013). Fama French (1993) three factor model has its significance for banking sector of Pakistan both size and value factor has significant effect on excess stock returns of banking sector. Small stock and high value stock has more returns as compare to big stocks and low value stocks in banking sector of Pakistan. According to model 2 and 4 the research analysis shows that bank operational risk factor significantly effects the stock excess returns. High ADB stocks are more risky as compared to low ADB stocks. Pearson chi square provide

the overall fitness of the model which is significant in each case and likelihood ratio chi square indicate the better fitness of stated model in comparison with the null model. All models are better fit than null model.

The insurance sector analysis indicates the significance of market beta with the value of 0.547. This supports that insurance companies also moves in the same direction as PSX but in comparison to banking sector they are less sensitive. This sensitivity reduces with the inclusion of idiosyncratic variables. Insurance companies move in same direction as of KSE100 index but these companies are stable and less volatile. Insurance companies operational idiosyncratic risk factor i.e. Claim incurred ratio (CP) fails to explain the daily returns and has no significant effect on stock excess returns. FF (1993) holds its significance in insurance companies in Pakistan.

## Conclusions

The contribution of banking and insurance sector in stock market is significant. Despite insurance company operational risk factor (CP), all other risk factors has significant impact on excess returns. Stocks of banks are highly volatile which is in line with (Elyasiani et al., 2007). Banks has high exposure against market. This high exposure is due to high leverage nature of banks and less liquidity. Small size banks has provided more returns as compared to large size stock due to the risk level. Firm specific variable of banking sector i.e. advances to deposits and borrowing for banks, has their significance in shaping the stock returns of banks. Investors can see this risk factor before determining their portfolios risk and return profile. The overall analysis of banks and insurance companies indicate that stocks move in accordance with the market and volatility of stocks is according to the market movement. Systematic risk has its significance in stock market and investors has to look forward to cascading effect which market has on stocks. Size and value factor of both banks and insurance companies is the most significant idiosyncratic factors investors to look for. Fama and French three factor model has significant explanations in Banks and insurance companies of Pakistan. This study comprises over identification of important operational factors in addition to well establish FF three factor model, furthermore operational and firm specific factors, such as momentum, investment profitability, can be used to see the effect on firm value. These operational factors are specific to banking and insurance sector only and can be use.

## Research Contributions

This study will provide insight to policy makers, investors and researchers to understand the risk and return dynamics of banking and insurance sector of Pakistan. The findings of this study can be generalizable in financial sector of developing nations. Research provide evidence that macroeconomic factors has significant role in shaping the market behavior of banks. All firms specific idiosyncratic risk factor effect

stock excess return beside claim incurred ratio. Further contribution can be done to analyze the firm specific idiosyncratic risk and return behavior of all sectors of Pakistan and compare it with rest of the world. Lack of data and insufficient journal databases post challenges for the completion of this article and provide significant limitations for study.

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**Appendix A**

Table 1A. *Kolmogorov Smirnov Test*

| | | $Ri_{bnk}$-Rf | $Ri_{ins}$-Rf |
|---|---|---|---|
| N | | 1238 | 1238 |
| Normal Parameters | Mean | -.0012 | -.0010 |
| | Std. Deviation | .01166 | .00766 |
| Most Extreme Differences | Absolute | .059 | .067 |
| | Positive | .059 | .047 |
| | Negative | -.058 | -.067 |
| Kolmogorov-Smirnov Z | | 2.091 | 2.348 |
| Asymp. Sig. (2-tailed) | | .000 | .000 |