

Factors Effecting Systematic Risk in Isolation vs. Pooled Estimation: Empirical Evidence from Banking, Insurance, and Non-Financial Sectors of Pakistan

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Abstract *The basic purpose of the financial manager is to maximize the wealth of shareholder by minimizing the risk. This study examines the validity of systematic risk determinants in banking, insurance, and non-financial sectors of Pakistan. Panel data is used for the period of 2010 to 2014. Common Effect Model, Generalized Method of Moments and Two step regression model is used to identify the impact. Common effect results identify that leverage; operating efficiency, firm size, and market value of equity have significant impact on systematic risk in the banking sector. Firm size has significant impact on insurance sector, whereas liquidity, leverage, operating efficiency, firm size, market value of equity, profitability, and dividend pay-out are significant variables in the non-financial sector. In pooled data analysis leverage, firm size, market value of equity, and dividend pay-out are significant determinants in Common Effect Model and Two Step, However in GMM indicates that profitability has also positive impact on unsystematic risk in addition to Common effect and two step regression determinants. Policy implication indicates that shareholders and investors can maximize the return at low level of risk by investing in selected portfolios. It is finally concluded that variables significance changes from sector to sector in individual spectrum but in a pooled regression leverage and market value of equity has negative impact on systematic risk, whereas firm size, profitability and dividend pay-out has positive impact on systematic risk.*

Key words Systematic risk, common effect model, GMM, two step regression, leverage, operating efficiency

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1. Introduction

The basic purpose of the financial manager is to maximize the wealth of shareholders. Every investor, shareholder is desirous to maximize the utility of wealth via maximizing the stock returns at a minimum level of risk. Risk is referred as volatility of a particular security. However risk of an investment refers to the actual return different from expected. More deviate return of investment from the expected return faces more risk. Risk and return relationship is established by CAPM Sharp (1964). CAPM shows that systematic risk (β) is directly proportional to the cost of equity or required rate of return. It is the best indication that factors influence systematic risk may also influence the cost of equity and ultimately firm value as well. CAPM helps in measuring portfolio risk and the expected return associated with that risk (Al-Qaisi, 2011).

Pakistan is a developing country and due to political, economic, and environmental instability investor hesitates to take investment in the firms. They are unwilling to invest the money in the highly risky securities. One factor which is related to investment is risk that is positively correlated with profit of any organization. Two types of risk exist in every organization first is systematic risk which is uncontrollable, undiversified, and market specific risk measured by equity beta and second is unsystematic risk which is controllable or diversifiable risk. Investor can avoid or minimize unsystematic risk through diversification or

investment in portfolio. Eldomiatiy *et al.* (2009) systematic risk is well acknowledged measure of financial risk which is dignified by beta. Value of shareholders depends upon risk of the company which decrease or increase stock prices that ultimate effect value of shareholders. Beta creates link between stock market and firm financial decision. When an investor make wrong financial decision beyond investor’s expectations so it will effect stock value negatively and as a result stock value decline which effect beta of firm. Decision making related to financing is important for managers, directors, stake holders and other financing institutions. For managers and directors low cost, low risk and higher profitability with long term capital sources is much attractive while for stakeholders and financiers attract more profit at less risk. This indicates researcher’s interest in systematic risk. This study concerned about systematic risk, market risk or external risk which is taking by investors. Beta has two ways to represent first is assets beta and second is equity beta. Assets beta represents the beta related to business risk while equity beta comprises of business risk as well as financial risk faced by shareholders. Present study is empirically examining the relationship between eight financial determinants of systematic risk as exposed by other studies, i.e. liquidity, leverage, growth, operating efficiency, firm size, market value of equity, profitability, and dividend pay-out from banking, insurance, and non-financial sectors of Pakistan. The purpose of this study is to empirically examine the determinants of systematic risk through modern evaluation techniques to further expose the factor affecting the systematic risk.

Number of studies has tested individual sector for determinants of systematic risk but this study capture the financial and non-financial sector and makes their comparison regarding to the factors associated to beta. This research considers banking, insurance and non-financial sectors of Pakistan for analysis which is still gap in the previous studies regarding to Pakistan.

This study will contribute comprehensive and knowledgeable element to the financial literature in academic and professional field and will be helpful to the investor at the time of investment, who is willing to minimize the utility by increasing the return as well as pull to policy makers who are willing raise the profitability and efficiency of the firm so that more investor attract toward investment in that company. Financial managers used this study at the time of capital budgeting to accept higher returnable projects to increase the shareholder’s wealth.

2. Literature review

Table 1. Summary of the Literature Review for Determinant of Systemic Risk

Determinants of systematic risk	Theory/Hypothesis	Examples
Liquidity	Liquidity almostly have negative significant association with systematic Risk if there is no crises period.	Iqbal <i>et al.</i> (2015), Kerstetter (2015), Liu and Lin (2015) are agreed to this hypothesis. Li and Purice (2016) donot agreed to this hypothesis.
Leverage	Leverage have significant positive impact on systematic risk either crises exist or not	Ibrahim and Haron (2016), Li and Purice (2016), Tan <i>et al.</i> (2015), Liu and Lin (2015) are agreed to this hypothesis. Iqbal <i>et al.</i> (2015), Lee <i>et al.</i> (2015), Adhikari (2015) donot agreed to this hypothesis.
Growth	Growth has insignificant association with beta.	Li and Purice (2016), Adhikari (2015) and Liu and Lin (2015) are agreed to this hypothesis.
Operating Efficiency	operating efficiency is significantly negative associated with beta	Li and Purice (2016), Liu and Lin (2015) are agreed to this hypothesis. Iqbal <i>et al.</i> (2015), Adhikari (2015) donot agreed to this hypothesis.
Firm Size	company size has significant positive associated with beta	Li and Purice (2016), Adhikari (2015), Liu and Lin (2015) are agreed to this hypothesis.

		Iqbal <i>et al.</i> (2015), Lee <i>et al.</i> (2015) do not agreed to this hypothesis.
Market Value of Equity	Negative relationship between market value of equity and beta.	Iqbal and Shah (2012) are agreed to this hypothesis. Ahmad <i>et al.</i> (2011) donot agreed to this hypothesis.
Profitability	profitability is significant negatively associated with beta	Li and Purice (2016), Liu and Lin (2015), Lee <i>et al.</i> (2015) are agreed to this hypothesis. Iqbal <i>et al.</i> (2015), Adhikari (2015) donot agreed to this hypothesis.
Dividend Payout	Dividend has significant negative impact on systemic risk which is measured.	Adhikari (2015) and Jiao (2013) are agreed to this hypothesis.

Hypothesis of the Study

H1: Liquidity is negatively associated with systematic risk and has significant negative Impact on systematic risk

H2: Leverage has statistically significant positive influence over systematic risk

H3: Growth has significantly negative impact on systematic risk

H4: Operating efficiency has negative influence over systematic risk

H5: Firm size has significant positive effect on systematic risk

H6: Market value of equity is significant negative associated with systematic risk

H7: Profitability has significant positive influence over systematic risk

H8: Dividend pay-out has significant negative influence on systematic risk

3. Methodology of research

3.1. Research design

The methodology examines the impact of determinants on systematic risk.

$$\text{Beta} = f(\text{LIQ}, \text{LEV}, \text{GH}, \text{OE}, \text{FS}, \text{MVE}, \text{P}, \text{DP}) \quad (1)$$

Whereas:

LIQ = Liquidity; LEV = Leverage; GH = Growth; OE = Operating Efficiency; FS = Firm Size; MVE = Market value of Equity; P = Profitability; DP = Dividend Policy.

$$(BETA_{it}) = \beta_0 + \beta_1 LIQ_{it} + \beta_2 GH_{it} + \beta_3 OE_{it} + \beta_4 GA_{it} + \beta_5 INFV_{it} + \beta_6 INTV_{it} + \beta_7 MV_{it} + \varepsilon_{it} \quad (2)$$

The general estimation equation is narrated as below for the above function.

$$Y_{tj} = \alpha_j + \sum_{i=1}^n \beta_{nj} + X_{ntj} + \varepsilon \quad (3)$$

1. j = number of firms in each group (banks, insurance, non-financial).
2. t = time (annual data).
3. α_j = The constant of the regression equation
4. X_{ntj} = The independent variables (fundamental financial ratios)
5. β_{nj} = The coefficient of the independent variables
6. ε = The error term of the regression equation.

Common Effect Model, Generalized Methods of Moment and Two Step Regression is used to compute the sectoral comparative and pooled results.

4. Findings and discussions

Table 1 shows that mean value of beta is 1.15 which means banking stocks are more volatile than market index. It also indicates that selected companies are more riskier than market. Quick assets are 10 percent of the total assets to pay its short term obligation. Total debt to total assets ratio is 0.89 which means debt is 89.10 percent of total assets which shows that Pakistani banks more assets are financed with debt. Growth has mean value 0.20. Operating efficiency has the mean value of 0.08 and have probability value is 0.29 which shows banks total assets generate 8.23 percent revenue. Mean value of profitability is 0.02 having probability value is 0.94 which describe that banks total assets generate 1.90 percent income. Firm size, market value of equity and dividend pay-out means is 20.67, 4.66 and 0.56 having probability value is 0.75, 0.52, and 0.53 respectively.

Table 1. Descriptive Statistics of Banking Sector

	BETA	LIQ	LEV	G	OE	FS	MVE	PROF	DP
Mean	1.15	0.10	0.89	0.20	0.08	20.67	4.66	0.02	0.56
Median	1.18	0.11	0.89	0.16	0.08	20.66	4.66	0.02	0.65
Maximum	1.30	0.14	0.92	2.27	0.10	21.35	5.72	0.03	1.40
Minimum	0.86	0.05	0.86	-0.68	0.07	19.92	3.71	0.00	0.00
Std. Dev.	0.15	0.03	0.02	0.48	0.01	0.38	0.57	0.01	0.45
Skewness	-1.13	-0.09	-0.34	3.06	0.75	-0.04	0.25	-0.06	0.15
Kurtosis	2.83	1.50	1.97	15.10	2.59	2.27	2.00	3.33	1.93
Jarque-Bera	5.34	2.38	1.58	191.41	2.50	0.56	1.31	0.13	1.28
Probability	0.07	0.30	0.45	0.00	0.29	0.75	0.52	0.94	0.53
Sum	28.73	2.50	22.28	4.99	2.06	516.77	116.47	0.47	13.89
Sum Sq. Dev.	0.57	0.02	0.01	5.59	0.00	3.44	7.91	0.00	4.94
Observations	25	25	25	25	25	25	25	25	25

Table 2 indicates that beta is only significantly positively correlated with dividend pay-out ratio but significantly negatively associated with liquidity, leverage, firm size and market value of equity. As the series have no multicollinearity and all independent variable are independent from one another so we can say that there is no multicollinear effect. However leverage has negative significant association with profitability and market value of the firm.

Table 2. Correlation Matrix of Banking Sector

	BETA	LIQ	LEV	OE	PROF	FS	G	DP	MVE
BETA	1								
LIQ	-0.149	1							
LEV	-0.407	0.120	1						
OE	0.079	-0.177	-0.234	1					
PROF	0.068	-0.491	-0.504	0.542	1				
FS	-0.371	0.468	0.090	-0.752	-0.572	1			
G	0.034	-0.264	-0.019	-0.002	-0.066	0.137	1		
DP	0.117	0.046	-0.371	0.427	0.629	-0.452	-0.195	1	
MVE	-0.313	-0.422	-0.410	-0.083	0.623	0.079	-0.054	0.189	1

Table 3 Common effect model shows that leverage, operating efficiency, firm size, and market value of equity are significant at $p < 0.05$ and adjusted R^2 is 0.689 which shows that shared variance of independent variables. Independent variables explain 68.9% to dependent variable. Liquidity, profitability, growth, and dividend pay-out are found to be insignificant variables in the model.

Table 3. Common Effect Model of Baking Sector

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	15.638	2.950	5.302	0.000
LIQ	0.316	1.181	0.267	0.793
LEV	-5.767	1.038	-5.557	0.000*
OE	-13.761	3.443	-3.997	0.001*
PROF	7.031	8.403	0.837	0.415
FS	-0.359	0.127	-2.839	0.012*
G	0.029	0.046	0.632	0.536
DP	-0.074	0.066	-1.123	0.278
MVE	-0.197	0.067	-2.943	0.010*
R-squared	0.793	Mean dependent var		1.149
Adjusted R-squared	0.689	S.D. dependent var		0.154
S.E. of regression	0.086	Akaike info criterion		-1.795
Sum squared resid	0.118	Schwarz criterion		-1.356
Log likelihood	31.438	Hannan-Quinn criter.		-1.673
F-statistic	7.642	Durbin-Watson stat		0.758
Prob(F-statistic)	0.000			

Significant at 0.05*

Significant at 0.10**

Table 4 shows the result of variance inflation factors to check the multicollinearity. Liquidity, leverage, Growth, operating efficiency, firm size, market value of equity, profitability, and dividend pay-out and have centered variance inflation factors 4.238, 1.522, 1.619, 3.675, 7.46, 4.791, 8.202, and 2.874 respectively. All independent variables have centered value is less than 10 that represent there is no multicollinearity exist in the data.

Table 4. Variance inflation factor of baking sector

Variables	Coefficient Variance	Uncentered VIF	Centered VIF
C	8.701	29406.280	NA
LIQ	1.395	51.557	4.237
LEV	1.077	2891.629	1.522
OE	11.852	274.983	3.675
PROF	70.603	91.878	8.202
FS	0.016	23148.780	7.461
G	0.002	1.908	1.619
DP	0.004	7.356	2.874
MVE	0.005	333.442	4.791

Table 5 represent the heteroskedasticity test in the panel data. F statistics is 0.725 and probability value of whole model is 0.575 and 0.944 shows that test is insignificant which elaborates that there exist no heteroskedasticity. Adjusted R^2 is -0.101 and the probability value of 0.669 is also insignificant. So we accept null hypothesis that there is no heteroskedasticity exist. Probability value of all independent variables i.e. liquidity, leverage, growth, operating efficiency, firm size, profitability, firm size, growth, dividend pay-out and market value of equity is 0.157, 0.211, 0.177, 0.701, 0.180, 0.383, 0.819 and 0.423 respectively which indicates that each variable is insignificant so there is no Heteroskedasticity. Heteroskedasticity rejection improves the significance of the ordinary least square estimate.

Table 5. Heteroskedasticity of Baking Sector

F-statistic	0.725	Prob. F(8,16)	0.669	
Obs*R-squared	6.649	Prob. Chi-Square(8)	0.575	
Scaled explained SS	2.847	Prob. Chi-Square(8)	0.944	
Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	0.207	0.251	0.823	0.423
LIQ	0.149	0.101	1.484	0.157
LEV	0.115	0.088	1.305	0.211
OE	-0.414	0.293	-1.412	0.177
PROF	0.280	0.716	0.390	0.701
FS	-0.015	0.011	-1.403	0.180
G	0.004	0.004	0.897	0.383
DP	-0.001	0.006	-0.233	0.819
MVE	0.005	0.006	0.822	0.423
R-squared	0.266	Mean dependent var		0.005
Adjusted R-squared	-0.101	S.D. dependent var		0.007
S.E. of regression	0.007	Akaike info criterion		-6.720
Sum squared resid	0.001	Schwarz criterion		-6.281
Log likelihood	92.997	Hannan-Quinn criter.		-6.598
F-statistic	0.725	Durbin-Watson stat		1.504
Prob(F-statistic)	0.668			

Table 6 shows that mean value of beta is 1.02 having probability value is 0.55 which means bank stocks are more volatile than market index. It also indicates that selected companies are more risky than market. Quick assets are 7 percent of the total assets to pay its short term obligation. Total debt to total assets ratio is 0.54 which means debt is 54 percent of total assets which shows that Pakistani insurance companies more assets are financed with debt. Growth has mean value of -0.89 having probability value is 0.00. Operating efficiency has the mean value of 0.04 having probability value is 0.68 which shows banks total assets generated 4 percent revenue. Mean value of profitability is 0.04 having probability value is 0.79 which describe that banks total assets generate 4 percent income. Firm size, dividend pay-out, and market value of equity means are 16.26, 0.3, and 4.63 having probability value is 0.03, 0.21, and 0.50 respectively.

Table 6. Descriptive statistics of insurance sector

	BETA	LIQ	LEV	G	OE	FS	MVE	PROF	DP
Mean	1.02	0.07	0.54	-0.89	0.04	16.26	4.63	0.04	0.30
Median	0.91	0.07	0.53	0.35	0.04	16.97	4.53	0.03	0.28
Maximum	1.91	0.19	0.94	2.30	0.09	17.72	6.08	0.12	0.95
Minimum	-0.02	0.00	0.11	-16.97	-0.01	13.36	3.62	-0.03	0.00
Std. Dev.	0.66	0.05	0.25	3.88	0.03	1.36	0.72	0.03	0.23
Skewness	-0.26	0.44	0.04	-3.14	0.17	-1.28	0.26	0.33	0.76
Kurtosis	2.07	3.29	2.38	13.24	2.21	3.06	1.98	2.86	3.81
Jarque-Bera	1.18	0.88	0.41	150.23	0.78	6.83	1.38	0.47	3.12
Probability	0.55	0.64	0.82	0.00	0.68	0.03	0.50	0.79	0.21
Sum	25.57	1.84	13.46	-22.18	0.94	406.47	115.73	0.97	7.47
Sum Sq. Dev.	10.49	0.05	1.48	360.39	0.02	44.34	12.51	0.03	1.26
Observations	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00

Table 7 shows beta is positively correlated with liquidity, leverage, firm size, and dividend pay-out and negatively correlated with growth, operating efficiency, market value of equity, and profitability significantly.

Table 7. Correlation matrix of insurance sector

	BETA	LIQ	LEV	G	OE	FS	MVE	PROF	DP
BETA	1								
LIQ	0.138	1							
LEV	0.180	0.868	1						
G	-0.197	0.068	0.167	1					
OE	-0.372	-0.444	-0.606	0.008	1				
FS	0.853	0.259	0.279	-0.163	-0.412	1			
MVE	-0.607	-0.143	-0.062	0.182	0.169	-0.479	1		
PROF	-0.331	-0.122	-0.115	0.362	0.695	-0.396	0.321	1	
DP	0.499	0.195	0.320	0.061	-0.381	0.753	0.034	-0.210	1

Table 8 Common Effect Model elaborates that only Firm Size has positive significant impact at $p < 0.05$. R^2 is 0.829 and adjusted R^2 is 0.743 which elaborates high explanation of independent variable to dependent variable.

Table 8. Common effect model of insurance sector

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.175	2.480	-2.086	0.053
LIQ	-2.401	3.303	-0.727	0.478
LEV	-0.095	0.787	-0.121	0.905
G	-0.014	0.021	-0.668	0.514
OE	-7.888	5.596	-1.410	0.178
FS	0.462	0.126	3.653	0.002*
MVE	-0.179	0.150	-1.195	0.249
PROF	5.811	3.959	1.468	0.162
DP	-0.652	0.663	-0.983	0.340
R-squared	0.829	Mean dependent var		1.023
Adjusted R-squared	0.743	S.D. dependent var		0.661
S.E. of regression	0.335	Akaike info criterion		0.924
Sum squared resid	1.795	Schwarz criterion		1.363
Log likelihood	-2.549	Hannan-Quinn criter.		1.046
F-statistic	9.693	Durbin-Watson stat		0.504
Prob (F-statistic)	0.000			

Significant at 0.05*

Significant at 0.10**

Table 9 shows the result of variance inflation factors to check the multicollinearity. Liquidity, leverage, Growth, operating efficiency, firm size, market value of equity, profitability, and dividend payout and have centered variance inflation factors 5.105, 8.176, 1.413, 5.485, 6.320, 2.512, 3.978, and 4.955 respectively. All independent variables have centered value is less than 10 which represents that there is no multicollinearity exist in the data.

Table 9. Variance Inflation Factor of Insurance Sector

Variables	Coefficient Variance	Uncentered VIF	Centered VIF
C	6.152	1371.021	NA
LIQ	10.913	18.339	5.105
LEV	0.619	48.182	8.176
G	0.000	1.490	1.413
OE	31.311	15.318	5.485
FS	0.016	948.341	6.320
MVE	0.023	110.046	2.512
PROF	15.676	9.217	3.978
DP	0.440	13.701	4.955

Table 10 represent the heteroskedasticity in the data. F statistics is 0.65 and probability value of whole model is 0.634 and 0.995 shows that test is insignificant that means there is no heteroskedasticity exists in the data. R^2 and adjusted R^2 is 0.245 and -0.133 respectively and have probability value of 0.728 which is insignificant. So we accept null hypothesis that there is no presence heteroskedasticity exist. Probability value of all independent variables i.e Liquidity, leverage, Growth, operating efficiency, firm size, market value of equity, profitability, and dividend payout have the probability value 0.21, 0.342, 0.651, 0.914, 0.381, 0.857, 0.71 and 0.418 respectively which indicate each variable insignificant so there is no heteroskedasticity. Heteroskedasticity non-impression improves the significance of the ordinary least square estimates.

Table 10. Heteroskedasticity of insurance sector

F-statistic	0.648	Prob. F(8,16)	0.728	
Obs*R-squared	6.118	Prob. Chi-Square(8)	0.634	
Scaled explained SS	1.338	Prob. Chi-Square(8)	0.995	
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.496	0.597	0.831	0.418
LIQ	-1.039	0.795	-1.308	0.210
LEV	0.185	0.189	0.979	0.342
G	0.002	0.005	0.461	0.651
OE	0.147	1.346	0.109	0.914
FS	-0.027	0.030	-0.901	0.381
MVE	-0.007	0.036	-0.183	0.857
PROF	-0.365	0.953	-0.383	0.707
DP	0.133	0.160	0.832	0.418
R-squared	0.245	Mean dependent var		0.072
Adjusted R-squared	-0.133	S.D. dependent var		0.076
S.E. of regression	0.081	Akaike info criterion		-1.925
Sum squared resid	0.104	Schwarz criterion		-1.487
Log likelihood	33.067	Hannan-Quinn criter.		-1.804
F-statistic	0.648	Durbin-Watson stat		1.342
Prob(F-statistic)	0.728			

Table 11 indicates that mean value of beta is 0.77 with probability value of 0.33, this element means that bank stocks are less volatile than market index. It also indicates that selected companies are less risky than market. Quick assets are 8.3 percent of the total assets to pay its short term obligation. Total debt to total assets ratio is 0.09 which means debt is 9 percent of total assets which shows that Pakistani non-financial companies are more rely on owner's equity. Growth has mean value of 0.47 having $p < 0.0001$ value. Operating efficiency has the mean value of 2.12 with $p < 0.01$ which indicates that banks total assets generate more revenue. Mean value of profitability is 0.21 having p-value 0.75 which describe that banks total assets generate 21 percent income. Firm size, dividend pay-out, and market value of equity means are 15.59, 0.58, and 6.34 having probability value is 0.56, 0.22, and 0.75 respectively.

Table 11. Descriptive Statistics of Non-Financial Sector

	BETA	LIQ	LEV	G	OE	FS	MVE	PROF	DP
Mean	0.77	0.83	0.09	0.47	2.12	15.59	6.34	0.21	0.58
Median	0.68	0.51	0.03	0.26	1.95	15.67	6.45	0.21	0.45
Maximum	1.66	2.81	0.45	3.75	3.71	16.90	9.14	0.43	1.00
Minimum	0.15	0.07	0.00	-0.70	1.43	13.90	4.02	0.02	0.25
Std. Dev.	0.55	0.80	0.12	0.87	0.53	0.80	1.48	0.11	0.27
Skewness	0.50	1.05	1.50	2.22	1.26	-0.31	0.07	0.34	0.49
Kurtosis	1.94	2.99	4.86	9.23	4.38	2.15	2.28	2.71	1.61
Jarque-Bera	2.22	4.63	12.97	60.96	8.60	1.15	0.57	0.58	2.99
Probability	0.33	0.10	0.00	0.00	0.01	0.56	0.75	0.75	0.22

	BETA	LIQ	LEV	G	OE	FS	MVE	PROF	DP
Sum	19.32	20.70	2.18	11.81	52.93	389.81	158.51	5.29	14.38
Sum Sq. Dev.	7.30	15.35	0.34	18.18	6.85	15.16	52.63	0.27	1.76
Observations	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00

Table 12 shows beta is positively correlated with leverage, growth, firm size, and dividend pay-out means increase in the financial variables so beta will be increase and negatively correlated with liquidity, operating efficiency, market value of equity, and profitability which indicate higher these variables will decrease beta. These relationships are very much fruitful to check the multicollinearity. If all independent variable are independent from one another so we can say that there prevails no multicollinearity. However high correlation exists between variables indicate that there may be cause of multicollinearity.

Table 12. Correlation Matrix of Non-Financial Sector

	BETA	LIQ	LEV	G	OE	FS	MVE	PROF	DP
BETA	1								
LIQ	-0.258	1							
LEV	0.171	-0.527	1						
G	0.170	-0.189	0.036	1					
OE	-0.647	-0.206	-0.118	0.146	1				
FS	0.644	0.283	-0.297	-0.064	-0.760	1			
MVE	-0.608	0.175	-0.565	-0.234	0.566	-0.271	1		
PROF	-0.469	0.098	-0.531	0.077	0.713	-0.510	0.798	1	
DP	0.248	-0.650	0.143	0.214	0.476	-0.229	0.115	0.277	1

Table 13 Common effect model shows that liquidity, operating efficiency, market value of equity have negative impact on the systematic risk. Whereas leverage, firm size, profitability and dividend pay-out has significant positive impact on systematic risk. Adjusted R² is 95.8% which indicates that independent variables are highly explaining the systematic risk.

Table 13. Common Effect Model of Non-Financial Sector

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.738	1.617	-4.168	0.001
LIQ	-0.136	0.049	-2.756	0.014*
LEV	1.347	0.468	2.878	0.011*
G	-0.053	0.034	-1.581	0.133
OE	-0.415	0.120	-3.451	0.003*
FS	0.566	0.093	6.070	0.000*
MVE	-0.287	0.036	-7.903	0.000*
PROF	4.916	0.704	6.986	0.000*
DP	0.616	0.172	3.575	0.003*
R-squared	0.972	Mean dependent var		0.773
Adjusted R-squared	0.958	S.D. dependent var		0.551
S.E. of regression	0.113	Akaike info criterion		-1.245
Sum squared resid	0.205	Schwarz criterion		-0.806
Log likelihood	24.557	Hannan-Quinn criter.		-1.123
F-statistic	69.089	Durbin-Watson stat		1.946
Prob(F-statistic)	0.000			

Significant at 0.05*

Significant at 0.10**

Table 14 shows the result of variance inflation factors to check the multicollinearity. Liquidity, leverage, Growth, operating efficiency, firm size, market value of equity, profitability, and dividend payout and have centered variance inflation factors 2.907, 5.72, 1.607, 7.705, 6.291, 5.392, 5.378, and 4.071 respectively. All independent variables have centered value is less than 10 that represent there is no multicollinearity exist in the data.

Table 14. Variance Inflation Factor of Non-Financial Sector

Variables	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.613	5093.341	NA
LIQ	0.002	6.153	2.907
LEV	0.219	8.954	5.720
G	0.001	2.1	1.607
OE	0.014	133.794	7.704
FS	0.009	4135.136	10.291
MVE	0.001	108.371	5.392
PROF	0.495	53.533	10.379
DP	0.030	23.221	4.071

Table 15 represent the heteroskedasticity in the data. F statistics is 0.553 and probability value of whole model is 0.738 and 0.988 shows test is insignificant that means there is no heteroskedasticity exist in the data. R^2 and adjusted R^2 is 0.207 and -0.189 respectively and have insignificant p-value > 0.823. So we accept null hypothesis that there prevails no heteroskedasticity. Probability value of all independent variables i.e liquidity, leverage, growth, operating efficiency, firm size, market value of equity, profitability, and dividend payout have the probability value 0.272, 0.693, 0.382, 0.648, 0.825, 0.504, 0.927, and 0.322 respectively which indicates that each variable is insignificant so there prevails no heteroskedasticity.

Table 15. Heteroskedasticity of non-financial sector

F-statistic	0.523	Prob. F(8,16)	0.823	
Obs*R-squared	5.179	Prob. Chi-Square(8)	0.738	
Scaled explained SS	1.725	Prob. Chi-Square(8)	0.988	
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.063	0.166	0.378	0.710
LIQ	-0.006	0.005	-1.138	0.272
LEV	-0.019	0.048	-0.402	0.693
G	-0.003	0.004	-0.899	0.382
OE	0.006	0.012	0.465	0.648
FS	-0.002	0.01	-0.225	0.825
MVE	-0.003	0.004	-0.685	0.504
PROF	0.007	0.072	0.093	0.927
DP	-0.018	0.018	-1.023	0.322
R-squared	0.207	Mean dependent var		0.008
Adjusted R-squared	-0.189	S.D. dependent var		0.011
S.E. of regression	0.012	Akaike info criterion		-5.793
Sum squared resid	0.002	Schwarz criterion		-5.354
Log likelihood	81.410	Hannan-Quinn criter.		-5.671
F-statistic	0.523	Durbin-Watson stat		2.612
Prob(F-statistic)	0.823			

Pooled Regression

Table 16 shows the results of common effect model with pooled data which is pooled combination of all three sectors. Results predict that whole model is significant at 0.05 with four independent variables i.e.

leverage, firm size market value of equity, and dividend pay-out. R^2 is 0.569 and adjusted R^2 is 0.517 which represent shared variance of independent variables that means change in dependent variable due to change in independent variables is 56.94% which represent fitness of model that more change in dependent variable is due to eight independent variables. Liquidity, growth and operating efficiency are found insignificant variables in common effect model. Profitability is significant at 0.1.

Table 16. Common effect model

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.541	0.497	1.087	0.281
LIQ	-0.088	0.098	-0.898	0.372
LEV	-0.791	0.26	-3.043	0.003*
G	-0.019	0.019	-1.031	0.306
OE	-0.154	0.102	-1.503	0.138
FS	0.128	0.03	4.318	0.000*
MVE	-0.311	0.059	-5.241	0.000*
PROF	1.981	1.100	1.800	0.076**
DP	0.364	0.142	2.565	0.013*
R-squared	0.569	Mean dependent var		0.982
Adjusted R-squared	0.517	S.D. dependent var		0.522
S.E. of regression	0.363	Akaike info criterion		0.924
Sum squared resid	8.698	Schwarz criterion		1.202
Log likelihood	-25.631	Hannan-Quinn criter.		1.035
F-statistic	10.907	Durbin-Watson stat		0.706
Prob(F-statistic)	0.000			

Significant at 0.05*

Significant at 0.10**

Table 17 shows the impact of liquidity, leverage, growth, operating efficiency, firm size, and market value of equity, profitability, and dividend payout on systematic risk by using Generalized Method of Moments. Results predict that five independent variables i.e. leverage, firm size, market value of equity, profitability, and dividend pay-out are significant at $p < 0.05$ and only one variable is significant at $p < 0.10$. R^2 is 0.546 and adjusted R^2 is 0.491 which indicates the explanatory power of independent variables to dependent variable. Leverage, growth and market value of equity has negative impact on systematic risk and firm size, profitability and dividend payout has positive significant impact on systematic risk. The J statistics is less than 0.0000 which indicate that whole model is significant at $p < 0.05$.

Table 17. Generalized Method of Moments

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	0.446	0.49	0.911	0.366
LIQ	-0.034	0.091	-0.376	0.708
LEV	-0.676	0.289	-2.341	0.022*
G	-0.022	0.011	-1.985	0.051**
OE	-0.098	0.1	-0.992	0.325
FS	0.127	0.027	4.644	0.000*
MVE	-0.31	0.044	-7.109	0.000*
PROF	1.748	0.815	2.146	0.036*
DP	0.288	0.104	2.764	0.007*
R-squared	0.546	Mean dependent var		0.982
Adjusted R-squared	0.491	S.D. dependent var		0.522
S.E. of regression	0.373	Sum squared resid		9.162
Durbin-Watson stat	0.641	J-statistic		24.621
Instrument rank	10	Prob(J-statistic)		0.000

Significant at 0.05*

Significant at 0.10**

Table 18 indicates the forward step wise regression and results indicate that liquidity, market value of equity have negative impact. However firm size, profitability, and dividend pay-out has positive significant impact on systematic risk. R^2 explains that 56.9% dependent variable is explained by independent variables.

Table 18. Forward Step Wise Regression

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.541	0.497	1.087	0.281
LIQ	-0.088	0.098	-0.898	0.372
LEV	-0.791	0.26	-3.043	0.003*
G	-0.02	0.019	-1.031	0.306
OE	-0.154	0.102	-1.503	0.138
FS	0.128	0.03	4.318	0.000*
MVE	-0.310	0.059	-5.241	0.000*
PROF	1.981	1.100	1.800	0.076**
DP	0.364	0.142	2.565	0.013*
R-squared	0.569	Mean dependent var		0.982
S.D. dependent var	0.522	S.E. of regression		0.363
Akaike info criterion	0.924	Sum squared resid		8.698
Schwarz criterion	1.202	Log likelihood		-25.631
Hannan-Quinn criter.	1.035	F-statistic		10.907
Durbin-Watson stat	0.706			

Selection method: Stepwise forwards
 Stopping criterion: p-value forwards/backwards = 0.5/NA

Significant at 0.05*

Significant at 0.10**

Table 19 results indicate that leverage, market value of equity has negative impact on systematic risk whereas firm's size, profitability and dividend pay-out have positive impact on systematic risk by using backward step wise regression. The value of R^2 indicates that 56.93% portion of dependency is explained by the independent variables.

Table 19. Backward Step Wise Regression

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	0.540739	0.497421	1.087084	0.2810
LIQ	-0.088267	0.098278	-0.898134	0.3724
LEV	-0.790995	0.259970	-3.042632	0.0034*
G	-0.019456	0.018864	-1.031388	0.3061
OE	-0.153972	0.102444	-1.502997	0.1376
FS	0.128411	0.029739	4.317932	0.0001*
MVE	-0.310078	0.059161	-5.241253	0.0000*
PROF	1.980720	1.100259	1.800230	0.0764**
DP	0.363788	0.141835	2.564869	0.0126*
R-squared	0.569349	Mean dependent var		0.981672
S.D. dependent var	0.522436	S.E. of regression		0.363027
Akaike info criterion	0.923489	Sum squared resid		8.698057
Schwarz criterion	1.201587	Log likelihood		-25.63082
Hannan-Quinn criter.	1.034530	F-statistic		10.90706
Durbin-Watson stat	0.705956			

Selection method: Stepwise backwards
 Stopping criterion: p-value forwards/backwards = 0.5/NA

Significant at 0.05*

Significant at 0.10**

5. Summary of Results

Common effect Model			
	Bank	Insurance	Non-Financial
LIQ	Insignificant	Insignificant	Significant Negative
LEV	Significant Negative	Insignificant	Significant Positive
G	Insignificant	Insignificant	Insignificant
OE	Significant Negative	Insignificant	Significant Negative
FS	Significant Negative	Significant Positive	Significant Positive
MVE	Significant Negative	Insignificant	Significant Negative
PROF	Insignificant	Insignificant	Significant Positive
DP	Insignificant	Insignificant	Significant Positive

Pooled Regression			
	Common Effect Model	Generalized Model of Movement	Forward and Backward Step wise regression
LIQ	Insignificant	Insignificant	Insignificant
LEV	Significant Negative	Significant Negative	Significant Negative
G	Insignificant	Insignificant	Insignificant
OE	Insignificant	Insignificant	Insignificant
FS	Significant Positive	Significant Positive	Significant Positive
MVE	Significant Negative	Significant Negative	Significant Negative
PROF	Insignificant	Significant Positive	Significant Positive
DP	Significant Positive	Significant Positive	Significant Positive

6. Conclusions

A number of researchers have tried to identify the determinants of systematic risk of different sectors of different countries from different periods in individualism perspective. This study captures the financial and non-financial sector and makes their comparison regarding factors associated to systematic risk. This study examines the validity of systematic risk determinants in banking, insurance, and non-financial sectors of Pakistan. Panel data is used for the period of 2010 to 2014. Common Effect Model, Generalized Method of Moments and Two step regression model is used to identify the impact. It is concluded that in banking sector systematic risk is only significantly positively correlated with dividend pay-out ratio but significantly negatively associated with liquidity, leverage, firm size and market value of equity. However leverage has negative significant association with profitability and market value of the firm. Further common effect model shows that leverage, operating efficiency, firm size, and market value of equity are significant. In insurance sector systematic risk is positively correlated with liquidity, leverage, firm size, and dividend pay-out and negatively correlated with growth, operating efficiency, market value of equity, and profitability significantly. Common effect model for insurance sector elaborates that only firm size has positive significant impact on systematic risk. Further results for non-financial sectors conclude that systematic risk is positively correlated with leverage, growth, firm size, and dividend pay-out. Common effect model for non-financial sector indicates that liquidity, operating efficiency, market value of equity have negative impact on the systematic risk. Whereas leverage, firm size, profitability and dividend pay-out has significant positive impact on systematic risk.

In pooled regression generalized method of moments results conclude leverage, growth and market value of equity has negative impact on systematic risk and firm size, profitability and dividend payout has positive significant impact on systematic risk. Further forward step wise regression results conclude that liquidity, market value of equity has negative impact. However firm size, profitability, and dividend pay-out has positive significant impact on systematic risk. Moreover results conclude that leverage, market value of equity has negative impact on systematic risk whereas firms' size, profitability and dividend pay-out have positive impact on systematic risk by using backward step wise regression. It is concluded that variables significance changes from sector to sector in individual spectrum but in a pooled regression leverage and

market value of equity has negative impact on systematic risk and firm size, profitability and dividend payout has positive impact on systematic risk.

The limitation of the study is its sample size and accuracy of the available data and convenient sampling is used in this study that is not applied at whole population. Future research can be performed in the different markets perhaps in the Asian market with different modern techniques applicable for analysis of the data and large sample size can be used to generalize at whole population.

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