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Impact of WACC in Elucidation of Cross Sectional Stock Returns by Stylized Portfolios: Pragmatic Evidence from Pakistan Stock Exchange

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Abstract *The fundamental structure of the present theory of asset pricing underscored clarifying the path as to how the systematic risk is estimated and how investors are adapted to behavior for such risk. The mixed expense of debt and equity that an association should procure to raise funds for its assignments impacts its stock returns through investment choices and is an additional significant segment of business valuation work on the grounds that for putting resources into more risky resources, investors request better yields or higher returns, for legitimizing better yields this risk premium emerging from such risks is included in the returns. Hence, in clarifying portfolio returns, the three-factor model is increased with WACC to analyze its logical force that if WACC is estimated by the market or not through multivariate regressions. Two principle results are deduced by the examination; first; the findings attest to the presence of market premium, size impact, value impact, WACC premium in the equity market of Pakistan. Second, however generally exciting with exceptional interest, when contrasted with FF unique 3-factor model, the models which join WACC outperformed, which also affirmed from Adj.R2 results.*

Key Words: Asset Pricing Theory, CAPM, APT, FF Three Factors Model, Size Effect, Value Effect, WACC Effect

Introduction

The decisions of the organization's leaders concerning participation and funding have been expressed by signals outside of speculators and investors who came to them, who, with a clear aim in mind, from managers and overseers. Signalling theory implies that buyers will respond to the moment the market is informed with new facts.

A wide variety of money tactics and plans are developed around these ideas. Asymmetry of information means that information is not equally available to all. Popping what is known in addition to being the case with this inference, signalling takes into consideration. All this is done in order to provide money at the best possible price, in the most profitable manner, to investors who want to get the greatest return on their investment.

As is the case when you examine the overall debt and acquisition costs, if a company is able to meet those obligations with higher returns but can't do so by issuing debt, it fails to do so in providing value to customers. Since Lambert and colleagues examined the factor impact of all non-stock market forces on returns, their study believed that clients ought to receive an inverse exposure to market and information risk premium (Easley and O'Hara, 2004). (Lambert et al. 2012).

The price of capital is an important part of the financial administration as well as investment decision-making. Overall, the company's cost of capital is made up of the total capital it would raise and the total cost of its debt and equity. The company's cost of capital (operating and investment) has a direct effect on the overall market value. The greater the chance of failure, the greater the return investors need, whether they choose to use investments in higher-risk assets. Because of this, then, the cost of capital is factoring is often assessed in determining stock returns. The three-factor model is used to further explain a variety of returns in order to further illustrate its analytical force.

Problem Statement

risk-return relationships are written into the concept in literature when the market never concludes if these movements are entirely random or deliberate. One of the main problems in applying systemic risk models is that they fail to provide a dependable way to estimate present stable performance in a capital structure. As you can see, it's also possible that the differences in the stock market regulations, corporate governance rituals, and financial restrictions will have a significant impact on the risk factors. Since then, meticulous asset estimates have increasingly been addressed by researchers and empiricists in financial markets. It has a strategy to gauge the variables' value in the Pakistani stock market. In addition, this research does include an elective model which includes weighted average cost of capital, scale, and additionally seeks to identify whether components need to be established in order to define the market's return on equity.

Significance of the Study

The significance of the current investigation is multifarious; initially, to catch the present elements of the equity market through covering the work in the area of asset pricing, this examination is a push to overcome the cavity in prevailing writing. Next, the significance of the cost of capital has incredible importance in a company's capital construction; however, its job in asset pricing is under-examined and stayed a problematic subject. Supposedly, the current writing in such a manner is soundless, despite restricted investigations along these lines; none has brought these variables into the asset pricing model in the comparative soul. Thirdly Last but not least, Estimating the equity cost for the activities in settling on capital planning choices *CAPM* is broadly utilized as suggested by reasonable proof. Similarly, for business directors, the projected model has more noteworthy utility as it encourages them to gauge cost values appropriately.

Literature Review

Various forms of fund acquisition hinge on one criterion—the degree to which an asset is backed by sources of credit. Debt and equity are two main means of finance since they are the results of property acquisitions is called overall liabilities (AL-Agha, 2005 P. 14), to be caught by managing both the proprietor value and interest) (Kareem, 2006, p2). Miles and Ezz (1985) calculated the interdependence between the market valuation of a business and its financial leverage during growth planning for finance theory. When American companies were used as examples, a significant correlation was found between the cost of capital and non-systematic risk exposure to be seen between the firm and genuine assets.

In comparison, companies increase their cost of capital and the overall return but make it more difficult for them to stay out of debt [Smith et al., (1990), Kane et al. (1989) state] Opportunity costs likewise played a role in limiting investment decisions and compromising the chance to accumulate capital (Bitro and John, 2001). Non-creative correlation is correlated with investment returns, where the debt-financed stock outperformed (Kareem, 2006). Various arrangements (e. Lang et al., 1996; Polk and Sapienn, 2009; Graham et al., 2013; Aivazian et al., 2005; even, Badsca et al., 2013; etc.) define and estimate investment openings (placements). There is no such thing as the financial success of a corporation without talking about both the financial arrangement and the way in which it is financed (Abdel Ghani, 2008). though predicting that expansion of leverage and the best capital structure will lead to higher efficiency in the long term

It is a vital consideration in building a company's resources and ignored in asset pricing. It is hoped that the new assessment would lead to the improvement of the model in the Pakistani industry. to study the relationship between capital gains and movements in stock prices in order to see how they can affect your money

Hypothesis: There occurs a significant connection between $wacc$ premium and stock returns.

Data and Research Methodology

Data and sample

Monthly data is utilized by the current study for the companies listed at the Pakistan stock exchange to probe the mechanism of asset pricing in the Pakistan context for the time frame of 216 months. Published financial reports are used for the collection of basic accounting data of the companies as both accounting and market data are numeric in nature. To measure the stock returns, month-end closing prices are taken from (Business Recorder), and yahoo finance is used for index data; a proxy of 3-month T-bill rate is utilized and taken from IFS browser. These entire sites considered for

collection of data is an authentic and reliable source of data. 250 companies Non-financial in nature constitute the sample.

Methodology

Firm's characteristics base the construction of these factors in the sphere of asset pricing for explaining the stock returns and their cross-sectional differences affectability (Fama and French, 1992, Fama and French, 1993, Fama and French, 1996, Fama and French, 1998, and Fama and French, 2014; Carhart 1997). For instance, this identification of the set of qualities is the utmost terrifying matter as based on this, assets are ordered.

Likewise, this study is an effort to investigate and analyses the illustrative power of the 3-factor model of Fama and French with estimated factors models augmented with size, B/M and WACC factors. In this way, for sorting of stocks, the study uses the comparable approach used by Fama and French (1992); however, portfolio and factors construction relies upon the model of Fama and French (2015).
An illustration of factors is given below:

Table 1

Sort (2X2)	Factors and Their elements
sorts on SIZE and B/M, or SIZE and WACC	SMB=(SH+SL+SHL+SLL+SHW+SLW)/6-(BH+BL+BHL+BLL+BHW+BLW)/6 HML= [(SH-SL) /2 + (BH - BL)] /2 HWMLW= [(SHW-SLW) + (BHW-BLW)] /2

Model Estimation

Measurement of Multivariate Regressions: This study measures three asset pricing models for portfolios sorted on three arrangements, for instance (25-Size-B/M, 25-size-WACC, 32-Size-B/M-WACC) where we utilized factors (2x2) sorted as the independent variable and (5X5, and2x4x4) arranged portfolio's returns as the dependent variable.; to pass judgment on the upgrades for expansion of these elements each model is augmented with MKT and SMB with one or two variables to evaluate the enhancements for the addition of these variable factors.
The Basic Three-Factor Model:

$R_{pt} - R_{ft} = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + e_t$

The Three-Three Factor Model:

$R_{pt} - R_{ft} = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HWMLW_t + e_t$

The Three-Four Factor Model:

$R_{pt} - R_{ft} = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HWMLW_t e_t$

Where;

R_{pt} = Expected Portfolio Return

R_{ft} = Risk free Rate

MKT_t = Market Premium

SMB_t = Size premium

HML_t = Value premium

$HWMLW$ = $WACC$ premium

α = (Alpha), the management's impact

β_1 = factor's loading beta of factors or

e = Term of random error.

Results Analysis and Discussion

Descriptive Statistics of Constructed Factors

Interpretation: The descriptive statistics is elucidated in Table 4.1 for the constructed factors returns. Here the results show the positive average returns for all factors constructed by adopting the 2x2 sorting. The results of 2x2 sorting factors are encouraging; however, because of unsound financial markets in Pakistan, variation in mean and standard deviation results exist because of the association of various uncertain conditions with factors components. Skewness shows the normal distribution of data, and the results of the study show positive Skewness except for the market

factor. Kurtosis values are larger than 3 and sows that data is sharpened than normal. The maximum loss and gain of returns range from (-0.213% to 0.5782%).

Results of 3 Factors Model for 25-Size-b/m Portfolios

Interpretation: Table 4.2 displays the regression outcomes of market factor *(MKT), SMB and HML* factors for the (5x5 value-weighted) portfolios arranged on size to B/M for the basic three factors model. Results confirm the size and value effect as according to size effect; the return must be decreased as we move from smaller to larger organization and Value effect portrays the relationship between normal returns and B/M ratio which says that smaller stock has a greater effect than larger stock implies that with every size bunch average returns ought to be incremented with expansion in B/M ratio and is reliably appear in table 4.2 that in every size column average returns increases with B/M ratio to the high proportion of B/M these results and confirms the findings of Banz (1981) and Fama and French (1992), Hassan and Javed (2011).

Results of 3-3 Factors Model for 25 Size-Wacc Portfolios

interpretation: regression results are displays in table 4.3 for the *MKT*, *SMB* and *HWMLW* factors intended for the (5x5) value-weighted portfolios sorted on size to WACC for the three-three factors model. These 25 size-wacc portfolios are better in explaining the returns for the three-three factors model augmented with wacc factor as it can be inferred from results that WACC premium has a significantly positive relationship in the Pakistani equity market and is priced by the market. These results also in accordance with the work of Easley and O'Hara (2004), which analyzed that cost of capital is affected by data or information encompassing the stock returns.

An investor reacts to the fresh introduction of data/information that went into the market, and the expense of capital is the rate of return which may be sorted out by remembering the ultimate objective to satisfy fulfil the investor's interest. These markers have the cornerstone of financial plans, systems and correspondence projects, and it very well maybe because of expansion in information risk as Hughes et al. (2007) likewise analyzed expanded degree of information asymmetry prompts greater cost of capital, however, keeping in view of other micro and macro factors here increase in return is associated with an increase in the cost of capital which also shows that if smaller and larger firms deal with their expense of capital adequately it acquires a positive increment returns which likewise affirms the association operational, administrative execution and great corporate administration.

Results of 3-4 Factors Model for 32-Size-b/m-wacc Portfolios

interpretation: Table 4.4 displays regression upshots of *MKT*, *SMB*, *HML,* and *HWMLW factors* for the 32 value-weighted portfolios arranged on *SIZE-B/M-WACC* for the three-Four factors model. Here results show the significant effect for all factors as these have strong tilts towards B/M and WACC and also give according to results means Increase in average returns has been observed for smaller stocks with the upsurge in B/M by controlling the WACC and the same pattern also observed for larger stocks which shows the greatest control of operational exercises and great administration of corporations. However, with growing wacc smaller organization with high B/M gives affluent results apart from middle quartiles which could be the upshots of other basic aspects likewise financial downturn, and other micro and macroeconomic factors. In the same way, with high B/M for bigger stocks, the effect of WACC regarding size and book to market displays average returns rises as size and B/M increments with a coalition of wacc.

This outstanding condition supports the company's operational and managerial performance in addition to other imperative factors. Generally, it can be deduced from results that for clarifying the 32 portfolio's returns arranged on size to B/M to WACC, the three-four factors model is considered healthier.

Evaluation of adj.r^2 for all Models

For all three different sets of arrangement run for three different estimated models, assessment has been done, and just to save the space here results are not shown, but a comparison of Adj.$R^2$for all these results demonstrates that explanatory power increases for each underlying model as we change from simple to complicated but overall results shows that larger stocks have higher R^2as compared to smaller stocks and confirms the in explaining the expected returns augmented model gives an improvement of variation with both value and WACC factors.

Conclusion

Stock returns are affected bycost of capital through investment choices and are a significant part of business valuation work on the grounds
that for putting resources into less secure resources,, investors request better yields; for justifying better yields, this risk premium emerging from the cost of capital is included in returns. In clarifying portfolio returns,, the three-factor model is increased with WACC to analyze its logical force. The current study examines the mechanism of asset pricing in the Pakistani equity market by utilizing month to month data of stock prices from 2000-2018.

This study measures three asset pricing models through multivariate regressions for portfolios sorted on three arrangements, for example (5x5 Size-B/M), (5x5 size-WACC), (2x4x4 Size-B/M-WACC). An equally, weighted portfolio has been constructed by using the approach of Fama and French 2015 but with the incorporation of one new variable and factors has been constructed by using 2x2 sorting where each factor is independently arranged on (size to book to market), WACC or B/M and WACC.

Through multivariate regressions, two main results are inferred by the study; first, the findings affirm the premium's existence of market, size, value and WACC effect in the equity market of Pakistan. Next and the most interesting one with significant attention is that as matched to the Fama and French novel model, the model which incorporates WACC outperformed, which also confirmed from Adj.R^2 results. In addition, the results of the examination are intense and can be tried toward summed up to different periods and furthermore in different markets to see its generalization.

List of Tables

Table 2. Descriptive Statistics of Constructed Factors

Descriptive Statistics of Factors Returns				
	MKT	**SMB**	**HML**	**HWMLW**
Mean	0.0173	0.0026	0.0023	0.0101
Median	0.0220	0.0023	0.0041	0.0126
Standard Deviation	0.0838	0.0464	0.0608	0.0552
Kurtosis	4.8765	14.2673	40.6406	49.2196
Skewness	-0.9904	1.1184	3.0718	0.8509
Range	0.6900	0.5501	0.8693	0.9434
Minimum	-0.4489	-0.2136	-0.2911	-0.4362
Maximum	0.2411	0.3365	0.5782	0.5071
Sum	3.7443	0.5713	0.4926	2.1726

Table 3. Results of 3 Factors Model for 25 size-B/M Portfolios

$$R_{pt} - R_{ft} = \alpha + \beta_1 (R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$$

Regressions for 25 Value-Weighted, Size-B/M Portfolios for 3-Factorsmmodell										
B/M	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
Panel A: Three-factor intercepts: MKT, SMB, HML										
			(α)					t(α)		
SMALL	-0.010	-0.010	-0.002	-0.010	-0.007	-2.12	-1.71	-0.45	-2.36	-1.16
2	-0.011	-0.010	-0.010	-0.006	-0.014	-2.19	-1.82	-2.16	-1.14	-2.34
3	-0.013	-0.007	-0.012	-0.017	-0.018	-2.23	-1.67	-1.83	-2.75	-2.80
4	-0.014	-0.013	-0.013	-0.009	-0.011	-2.71	-3.08	-2.80	-1.53	-1.52
BIG	-0.011	-0.006	-0.004	-0.011	-0.008	-3.93	-0.96	-0.81	-2.19	-1.57

Panel B: Three-factor coefficient, t value: MKT, SMB, HML										
			(β1) MKT					t(β1)		
SMALL	0.55	0.69	0.39	0.69	0.85	9.04	9.38	6.03	13.45	11.02
2	0.73	0.74	0.64	0.74	0.84	12.15	10.54	10.81	12.13	11.50
3	0.74	0.59	0.85	1.03	1.01	10.38	11.35	10.65	13.05	12.27
4	0.89	0.80	0.87	0.77	0.80	13.55	15.04	15.26	10.46	8.71
BIG	0.89	0.80	0.91	0.84	0.96	25.69	10.19	15.08	12.88	14.31
			(β2) SMB					t(β2)		
SMALL	1.16	1.11	0.82	0.79	1.41	11.09	8.84	7.48	9.07	10.72
2	1.15	0.29	0.36	0.55	0.36	11.19	2.44	3.54	5.24	2.90
3	0.27	0.13	-0.31	-0.06	-0.11	2.22	1.51	-2.24	-0.44	-0.80
4	0.22	0.23	-0.57	-0.76	-0.74	1.99	2.59	-5.86	-6.03	-4.74
BIG	-0.02	-0.66	-0.60	-0.90	-0.38	-0.29	-4.93	-5.88	-8.12	-3.34
			(β3) HML					t(β3)		
SMALL	-0.36	0.39	0.26	0.95	1.53	-4.28	3.94	3.03	13.72	14.59
2	-0.54	1.05	0.92	1.18	2.18	-6.66	10.97	11.54	14.14	21.97
3	0.43	0.37	1.85	2.26	2.79	4.42	5.30	17.00	21.01	25.04
4	0.07	0.28	1.15	1.56	2.67	0.82	3.90	14.77	15.50	21.37
BIG	-0.12	0.45	0.70	1.44	1.75	-2.56	4.17	8.52	16.40	19.22

Table 4. Results of 3-3 Factors Model for 25 Size-WACC Portfolios

$R_{pt} - R_{ft} = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HWMLW_t + e_t$

Regressions for 25 Value-Weighted, SIZE-WACC Portfolios

LEV	**LOW**	**2**	**3**	**4**	**HIGH**	**LOW**	**2**	**3**	**4**	**HIGH**
Panel A: 3-3 factor intercepts: MKT, SMB, HWMLW										
			(α)					t(α)		
SMALL	0.004	-0.029	-0.013	-0.009	-0.008	0.76	-4.25	-2.20	-1.88	-1.56
2	-0.016	-0.021	-0.007	-0.025	-0.017	-3.15	-3.61	-1.48	-3.86	-2.75
3	-0.024	-0.026	-0.033	-0.027	-0.019	-3.81	-4.19	-4.98	-4.35	-3.18
4	-0.010	-0.021	-0.019	-0.032	-0.020	-2.00	-3.46	-3.32	-4.01	-3.87
BIG	-0.013	-0.018	-0.027	-0.018	-0.006	-1.84	-4.13	-3.84	-3.68	-1.54
Panel B: 3-3 factor coefficients value: MKT, SMB, HWMLW										

			(β1) MKT					t(β1)		
SMALL	0.38	0.82	0.53	0.52	0.64	5.61	10.08	7.74	8.97	10.24
2	0.72	0.69	0.62	0.65	0.66	11.63	10.06	10.51	8.25	8.75
3	0.72	0.75	0.76	0.69	0.76	9.58	10.05	9.73	9.37	10.83
4	0.80	0.70	0.60	0.87	0.72	13.61	9.74	8.57	9.01	11.66
BIG	0.87	0.80	0.79	0.94	0.75	10.58	15.31	9.44	16.53	16.71
			(β2) SMB					t(β2)		
SMALL	0.66	1.74	1.45	1.03	1.48	5.30	11.47	11.46	9.52	12.82
2	0.87	1.09	0.98	1.03	0.93	7.53	8.49	8.98	7.06	6.66
3	0.63	1.02	0.57	0.71	0.59	4.55	7.38	3.93	5.16	4.54
4	0.03	0.19	0.02	0.38	0.29	0.25	1.44	0.12	2.10	2.53
BIG	-0.49	-0.30	-0.22	0.54	-0.13	-3.24	-3.12	-1.45	5.14	-1.59
			(β3) HWMLW					t(β3)		
SMALL	-0.38	1.00	0.55	0.18	0.95	-3.64	7.89	5.14	2.01	9.84
2	0.36	0.79	0.11	2.11	1.41	3.76	7.36	1.21	17.30	12.06
3	0.96	0.89	2.20	2.19	1.69	8.17	7.73	18.11	19.03	15.41
4	-0.17	0.44	0.80	2.79	1.70	-1.86	3.93	7.37	18.65	17.67
BIG	0.25	0.61	2.20	1.02	0.98	1.98	7.55	16.91	11.51	14.03

Table 5. Results of 3-4 Factors Model for 32 Size-B/M-WACC Portfolios

$R_{pt} - R_{ft} = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HWMLW_t e_t$

Three-Four Factors Regressions results for 32 Value-weighted, SIZE-B/M-WACC portfolios													
Three-Four Factors intercepts, coefficients, t value: Rm-Rf, SMB,HML, HWMLW													
SMALL												**BIG**	
B/M	**LOW**	**2**	**3**	**HIGH**	**LOW**	**2**	**3**	**HIGH**	**LOW**	**2**	**3**	**HIGH**	**L**
			(α)				**tα)**				**(α)**		
L.WACC	-0.013	-0.008	-0.003	-0.006	-2.19	-1.41	-0.40	-1.16	0.00	-0.01	-0.02	-0.01	-
2	-0.018	-0.025	-0.005	-0.014	-2.37	-4.36	-0.84	-2.18	-0.01	-0.01	-0.02	-0.01	-
3	-0.011	-0.010	0.002	-0.015	-1.57	-1.73	0.37	-2.81	-0.02	-0.02	-0.01	-0.02	-
H. WACC	-0.018	-0.019	-0.004	-0.004	-2.58	-2.34	-0.80	-0.99	0.00	-0.02	0.00	-0.02	-
			(β)MKT				t(MKT)				(β)MKT		
L.WACC	0.80	0.57	0.55	0.69	11.06	8.07	6.40	10.39	0.82	0.95	0.89	0.70	7
2	0.89	0.85	0.68	0.71	10.02	12.34	9.63	9.52	0.92	0.70	0.84	0.85	1
3	0.79	0.82	0.50	0.74	9.51	11.84	8.16	11.95	0.91	0.90	0.93	0.99	1
H. WACC	0.87	0.82	0.73	0.56	10.55	8.67	11.36	10.52	0.73	0.96	0.59	1.04	1
			(β)SMB				t(SMB)				(β)SMB		
L.WACC	0.69	0.53	0.32	0.82	4.42	3.54	1.75	5.77	-0.32	-0.38	-0.44	-0.65	-
2	1.27	1.00	0.74	0.59	6.70	6.70	4.90	3.67	-0.31	-0.18	-0.66	-0.08	-
3	0.50	0.82	0.30	0.97	2.80	5.55	2.25	7.29	-0.57	-0.67	0.07	-0.72	-
H. WACC	0.73	-0.01	1.07	0.85	4.12	-0.04	7.72	7.36	0.00	-0.16	0.12	-0.49	-
			(β)HML				t(HML)				(β)HML		
L.WACC	0.97	0.64	1.42	0.00	5.05	3.45	6.25	-0.01	-0.03	0.55	1.13	2.60	-
2	2.01	0.77	1.20	0.42	8.62	4.24	6.47	2.11	0.29	0.76	1.35	2.00	2
3	1.98	0.78	0.65	-0.10	9.00	4.29	4.01	-0.60	0.75	0.97	1.32	2.17	4
H. WACC	1.47	0.82	0.98	-0.21	6.81	3.30	5.81	-1.45	-0.27	0.85	0.00	2.00	-
			(β)HWMLW				t(HWMLW)				(β)HWMLW		
L.WACC	-0.11	0.06	-1.10	-0.42	-0.52	0.28	-4.30	-2.16	-0.62	-0.41	0.16	-1.02	-
2	-0.26	0.89	-0.57	-0.16	-1.00	4.35	-2.74	-0.70	-0.50	-0.63	0.20	-0.16	-
3	0.22	-0.26	0.03	-0.12	0.89	-1.29	0.14	-0.64	0.65	0.48	0.36	1.34	3
H. WACC	1.03	1.38	0.11	0.34	4.24	4.98	0.60	2.17	0.28	0.89	0.07	1.14	2

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