Collaborative Impact Of Leverage And Weighted Average Cost Of Capital In An Asset Pricing Mechanism

Maria Sultana[*] and Bakhtiar Khan[†]

Abstract

The basic aim of this study is to analyze the collaborative role of leverage and WACC in the domain of asset pricing theory for which five factors augmented model is used to give more coherent explanation and to incarcerate the pattern in Size, Book to market, leverage and WACC. The basic stress of the study is also to ascertain the model that is best fit for describing average returns on the portfolio formed in different ways for which different version are also adopted to construct the factors. Monthly data of equity prices is used for the period of June 1998 to June 2016 for non-financial firms listed at Pakistan stock exchange. To strengthen the outcomes the Regressions are applied to have more detailed understanding into model performance specifically intercepts and its related slopes. The main significant results for all left hand side portfolios are analyzed and interpreted in the tests. The most exciting with remarkable interest, as compared to FF original three factor model the five factor model outperform on all ground and metrics. By and large, the pragmatic outcomes demonstrate the existences of these factors premium and significance of proposed asset pricing augmented model also increases.

Keywords*:* Asset Pricing Theory, Factors Model, systematic risk, Leverage effect, WACC effect.

Introduction

To withstand with business operations efficiently every organization need to raise their capital. To finance their assets base firms uses financial leverage which constitutes the best mix of capital so in finance the leverage is best system to build returns at generally safe or at low risk, if we have to comprehend the effect of leverage on risk-return. Therefore, leverage is viewed as the key wellspring of financial risk that could be the fundamental driver of indebtedness and bankruptcy of firms.

With the evolution of capital theory in 1964 it attracts the attention of many researcher, academicians and especial in later part of 20th century to examine the various aspect of asset pricing, different studies had been conducted by applying several statistical test (e.g. Fama & French three-factor model, 1992).A number of remarkable and amazing anomalies were discovered by empirical studies in finance

[*] Maria Sultana, PhD Scholar, Gomal University, Dera Ismail Khan, Pakistan, Email: mariasultana.dik@gmail.com

[†] Bakhtiar Khan, Gomal University, Dera Ismail Khan, Pakistan

during 1980s and early 1990s .In past few years these anomalies became too plentiful to ignore, indeed; these are well documented and also threatened the trustworthiness of EMH and did not gave persistent returns after some time as these differ with significance over the long-term. However, these variations have turned into the base for the quantitative type of investing tries to spot and abuse them, these differences have become into the premise. In modern finance the academicians and specialists acknowledges these factors and factor models (e.g. CAPM; APT; FF-three factor and five models, 1992, 2014; Carhart four factors model, 1997) as heart of current trading strategies. In asset management these factor based models are utilized as a part of all stages, for example, portfolio development, portfolio determination, and execution assessment.

In previous research various studies have been commenced to provide an insight how so many factors impact on equity returns such as, size, debt, growth, profitability, industrial production and book to market ratios, i.e. (Iqbal et al., 2013; Borys, 2011; Butt and Rehman and Hunjra, 2010; Lee and Jang, 2007; Rehman and Baten, 2006; Boynton and Oppenheimer, 2006).

This study also has aims to explore the degree of relevance of these factors and their pricing in equity market of Pakistan.

Literature

Leverage and Asset Pricing

In 1958 the Modigliani and Miller proposed that with raising financial leverage in firm's capital structure expected return on equity should increment and this proposition was further confirmed by many researchers such as Hamada (1969), associated the Modigliani - Miller recommendation with the capital asset pricing model (CAPM) of Sharpe (1964) and Lintner (1965). Bhandari (1988) suggested that leverage should be incorporated as a separate autonomous risk factor since it is valued in stock returns. Fama and French (1995) suggested that these three factors model has more logical control on the grounds that the money related risk emerging from increment in leverage has been caught from size and book to market factor and value factor as of now catch the financial distress so financial leverage ought not be estimated as a different risk factor. The importance of company's leverage and relative misery in asset pricing was described by Ferguson and Shockley, (2003) by arguing that proxy identification is important because CAPM was proved failure in capturing the market returns because the proxy used constitute only equity investment and ignore the debt claims. In the same lines, the study of Vassalou and Xing (2004) also estimated the default

risk as a systematic risk and stated that default factor arising from financial leverage, three factor augmented model is a superior indicator of equity returns. Similarly relationship of financial leverage, personal taxes and corporate taxes for investor on the cost of equity was examined by Dhaliwal, Heitzman and Zhen (2006) and found positive relationship between equity cost and leverage. Penman et al. (2007) further analyzed the connection of leverage with stock returns and found the positive connection between operating risk and returns and also examined negative connection of leverage among stock returns. A study conducted by Campbell et al. (2008) gave challenges for future research by reasoning that size and value factor do not represent trouble risk and investor require risk premium for stock which are financially challenged. In domain of same, Wah et al. (2008) also explored that on restricted estimations the leverage is a priced factor alongside beta, size, and book to market when analyzed separately for bullish and bearish markets. George and Hwang (2010) also watched a negative connection between stock returns and distress force or intensity and proposed that based on distress cost, firms maintain their capital structure. Following hypothesis has been constructed based on reviewing the theoretical review and presented literature:

Hypothesis 1: There exists a positive relationship between leverage premium and stock returns.

Cost of Capital and Asset Pricing

In developing countries, every organization faces different tasks exposed to variety of risk .This task ended up being considerably more troublesome even with organization management in developing nations. Miles and Ezzell, (1985) investigation demanded at construction a finance theory by measuring the linkage between firm's market value and financial leverage value which uncovered vigorous consequence of connection between cost of capital and financial leverage. Returns on investment are affected by cost of capital and financial leverage and its increases as the firms derives benefits from using debt but dependences on debt also increases the risk of insolvency or bankruptcy [Kane et al, (1989), Smith et al, (1990), Al Agha, (2005)]. WACC has critical connection with stock market returns, where the obligation financing has more warmth stocks market return appeared differently in relation to inside equity financing (Kareem, 2006). Numerous studies Badertscher et al., 2013; Campello and Graham, 2013; Ramalingegowda et al., 2013; Goodman et al., 2014; Shroff et al., 2014) also accept that investment is an element of various investment opportunities which are measured by different arrangement of variables. along these lines, the financial performance, tax and financing cost effected by financing choices so the

financial structure is considered as essential component in surveying and measuring corporate financial performance as it is hard to discuss an economic corporation without financial structure (Abdel Ghani, 2008).

Presently in the wake of taking a short audit of existing literature about leverage and its effect on company's execution or performance, productivity, market value included however no broad examination is finished by cost of capital in asset pricing space. In this way there is needed to examine the pricing mechanism in these business sectors or markets. To look at the impact of cost of capital on stock returns, we test the accompanying hypothesis.

Hypothesis 2: There exists a significant relationship between *WACC* premium and stock returns.

Research Methodology

The fundamental determination of the present investigation is to think about the illustrative power of Fama and French three factor model with projected five factor models. The basic concern remains on the comparison of three factors to five factor augmented model.

Data Description

All listed firms at Pakistan stock exchange are the population of study in the examination excluding the financial sector. The investigation utilizes a data collection of 250 non-financial listed firms for the period of 1998-2016. The study employs both market data and accounting data being quantitative in nature. The month to month index prices have been collected from the business recorder and KSE site whereas monthly data of risk free rate has been taken from IFS database. Data about all necessary fundamental variables has been extracted from published financial reports.

Sample, Portfolio and Factors Construction

A very common criterion used in asset pricing for selection has been applied in this study. To attain the vigorous and comparable estimates the study follows prevailing practices. Additionally, the sample assortment criterion portfolios and factors construction process employed here for investigation are in accordance with methodology embraced by Fama and French 1992 and FF five factors model.

Model Specification

To test the asset pricing mechanism in equity market of Pakistan the following baseline model will be used augmented with our new proposed factors. The regression equation OLS, that is intended to be assessed separately of the portfolios is represented as follows.

$$R_{pt} - R_{ft} = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t \quad \text{..... (1)}$$

The following five factor augmented model is proposed for experiential testing.

$$R_{pt} - R_{ft} = \alpha + \beta_1 \text{MKT}_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HLMLL_t + \beta_5 HWMLW_t + \varepsilon_t$$

Where: R_{pt} Is expected Return of portfolio 'i' for period 't', R_{ft} = Risk free Rate, MKT_t = Market Premium = $R_m - R_f$, SMB_t = Size premium = (Small – Big) returns of small size portfolio less the return of big size portfolios at time "i", HML_t = Value premium = Return of high BV/ME Ratio less the Return of low BV/ME Ratio at time "i", $HLMLL_t$ = Leverage premium = Return of high Leverage firms less the Return of low leverage firms at time "i", $HWMLW_t$ = $wacc$ premium = Return of high $wacc$ less the Return of low $wacc$ at time "i", α = The management's impact (Alpha), β_1 = Factors beta or factors loading, e = Term of random error, $\beta_1, \beta_2, \beta_3$ Are factor loading for market, size, value, leverage and cost of capital premium respectively .

Results And Discussion

Interpretation of Table 4.1

Table 4.1 illustrates the descriptive statistics for the factors returns. Descriptive statistics mainly affected by sorting or different version adopted to construct the $HML, HLMLL$ and $HWMLW$. Factors constructed on 2x3 sorts produce larger spread as they do not include stocks in the medium 40% of B/M, $HLMLL$, $HWMLW$ because they focus more on their extreme values and creates higher average returns. Same pattern of differences can be viewed in other factors returns. The T-statistics for the factors average returns are also no doubt not similar in all sorts but its results have remarkable impacts to have conclusive expressions. To check the joint control effect for small and big stock premiums, following results shows interesting discussion for such changes (In Panel A of Table 4.1). Research results in Panel B of Table 4.1 shows that smaller stock has larger value premium which also confirm the previous study of (e.g., Fama and French 1993, 2012; Loughran 1997). Value premium will be stronger for big stock if leverage and cost of capital is controlled but Value premium for small and big stock, the joint control for leverage and cost of capital does not brings decrease in the spread. For 2x2x2x2 sorts there expected a leverage premium for smaller stock and is negative for other sorts but results indicates that this larger expected premium is not so strong the difference between small and bigger leverage portfolios in 2x3 and 2x2x2x2 sorts are much higher. Similarly $wacc$ premium for smaller stock is also expected for all sorts of factors construction because of

having positive average returns and t value. As results shows sturdy confirmation that the probable $wacc$ premium is better for smaller stocks in 2x3 and 2x2x2x2 sorts except in 2x2 sorts where bigger stocks has larger $wacc$ premium than smaller stock.

Multivariate Regressions Regression Details

Regressions are applied to have further detailed understanding into model performance specifically intercepts and its related slopes. For instance, the factor from the 2x3 sorts, FF (1993) approach has been applied . The Next Section Provide More Examples of Multivariate Regression Slopes that don't line-up with Uni-variate attributes .

Interpretation of Table 4.2

Intercepts from the FF three factor regression for the $25\,size-B/M$ portfolios are shown in panel A. The portfolios of extreme small growth stock produce negative intercepts create a difficulty in explaining the returns for the three factor model as also evidenced by Fama and French (1993, 2012, and 2014) whereas large extreme growth stock generates positive intercepts. Results shows that, by itself, the lower and negative 3 factors intercepts -for explaining the expected returns on the $25\,size-B/M$ portfolios are sufficient to reject the three factor model. Coefficients obtained from five factor model for HML, $HLMLL$ and $HWMLW$ are revealed in panel B of table 4.2. To save the space the coefficients for market and SMB are not shown so here and later the main focus is on slopes for HML, $HLMLL$ and $HWMLW$ .Results for HML show the overall significantly negative pattern of five factors slopes for both micro and mega-caps portfolios in $Low\,B/M$ quintiles which are in line with finding of Jariya et al. (2013). Results of $HLMLL$ and $HWMLW$ slopes reveals that portfolios are overwhelmed by microcap whose returns acts like those having low level of leverage that grows promptly.

Interpretation of Table 4.3

Intercepts from the FF three factor regression for the $25\,size-lev$ portfolios are shown in panel A of table 4.3. The portfolios of both micro and mega caps with lowest and highest leverage produce positive intercepts whereas negative intercepts has been produced by middle portfolios. Like the $25\,size-B/M$ portfolios here the results displays that, by itself, the negative 3 factors intercepts of middle portfolios are not adequate to dismiss the three factor model and OverallThe outcomes recommend the three factor isn't probably going to have issues in applications when portfolios have solid tilts towards low or high leverage so, the $size-lev$ portfolio are not adverse for the FF three factor model.

Results of leverage slopes show the significantly positive relationship between highly leveraged stocks and equity returns however, results show the mix outcomes as positive for micro caps supports the results of (Taub, 1975; Roden and Lewellen, 1999; Champion, 1999; Ghosh and Jain, 2000; Hadlock and James, 2002 and Berger and Bonaccorsi, 2006),also supports the MM II proposition but negative for mega caps support findings of Muradoglu, G., &Sivaprasad, (2008) and proposed that it is not necessary that relationship must be positive and this negative relationship of leverage with stock returns also due to nature of industry and the firms which effectively paid (Siva &Muradoglu 2009).Rendering to Theoretical framework or background shows that increase in $wacc$ resulted as decrease in returns the same is endorsed by data analysis for smaller firms not for larger firms.

Interpretation of table 4.4

Panel A of table 4.4 demonstrates that microcaps with lowest $wacc$ create positive intercept whereas the negative intercepts produces by lowest $wacc$ quintile for smallest and mega caps portfolio are the problem for FF three factor models. However, as we switch to five factors model the intercepts moves towards zero and improve the overall depiction of average returns. Given that the subsequent pass sort variable is $wacc$, the $HWMLW$ slopes demonstrate the projected pattern-positive for $low-\text{wacc}$ portfolios and negative for $high-\text{wacc}$ portfolios which are in-line to research data. There is cognitive correspondence between HML and $HLMLL$ slopes and their characteristics as theory says that low cost of capital is related with value ($High-B/M$) and high cost of capital is related with (growth or $low-B/M$). Data analysis revealed that multivariate regression slopes slightly relate to uni-variate characteristics rather than factor exposure with reference to 25 size-WACC portfolios .

Interpretation of table 4.5

Table 4.5 shows that Regression intercepts for three and five factor models and $HLMLL$ and $HWMLW$ slopes for the 32 portfolios from 2x4x4 sorts on size, lev and wacc . Here five factor slopes for HML are not shown just to save the Space; these sorts of factors are interesting in explaining the lineup connection of factor's characteristics of stocks with their slopes. For small and big stocks, $HLMLL$ slopes are significantly positive for high leverage quartiles and negative for low leverage quartiles, $HWMLW$ slopes are significantly negative for low $wacc$ quartile and significantly positive for high $wacc$ quartiles. The connection between attributes and regression slopes slants encourages

derivations about the idea of the stocks in troublesome portfolios .The FF three factor model's issue in the test on the $32\,size-lev-wacc$ portfolios are more serious. For instance, portfolios of small stocks that consolidate low leverage and low $wacc$ turnout negative intercepts in the three factor model, however in the five factor model improvement is made but negative pattern survives as the average returns of these portfolios are consumed by negative $HWMLW$ slope which reflects the almost the same results as of five factor models associated with the results of three factor model . Overall five factors model improves the explanation of stock returns but Strong leverage and cost of capital tilts still are the troubles for the three factor model as strongly reflected in $size-lev-wacc$ sorts. As indicated by the tradeoff theory, the ideal financing blend matches with the level of financial leverage at which the advantages and expenses of obligation financing are precisely adjusted. The theory expects that a firm has an ideal capital structure in view of exchange off amongst expenses and advantages of utilizing obligation.

Conclusion

To put the research on successful track and to test the proposed asset pricing model for its significance different version adopted to construct the factors. Five factors model is used to observe the pattern in $size-B/M$, leverage and $wacc$ and the basic stress of the study also to ascertain the model which is good fit for describing average returns. Regressions are applied to have more detailed understanding into model performance specifically intercepts and its related slopes. Finally two main significant results for all left hand side portfolios are analyzed and interpreted in the tests. **First**, in the given model, almost same results have been obtained for the factors constructed by adopting different sorts of version such as 2x2, 2x3, 2x2x2x2. **Second**but most exciting with remarkable interest, as compared to FF original three factor model the five factor model outperform on all ground and metrics. By and large, the pragmatic outcomes demonstrate the existences of these factors premium and significance of proposed asset pricing augmented model also increases.

Since average returns captures lots of same common story, however this study focuses on slopes $HML, HLMLL, HWMLW$ for different set of left hand side portfolios in describing average returns but here the question arises which makes the motivation for future work that whether the factor slopes lineup with B/M , leverage and cost of capital characteristics, the frequently answer is, yet not generally yes. Since

constantly, the regression slopes are in harmony with the features which are utilized to frame left hand side portfolios but not frequently with other characteristics. There is, however by holding other explanatory variable constant the uni-variate characteristics does not in accordance with slopes of multivariate regression which estimates the trivial effect. Hence, in fact regression slope be described more carefully.

References

Aivazian, A., Ying, G., & Jiaping, Q. (2003). The impact of leverage on firm investment: Canadian evidence. *Journal of Corporate Finance, 1*, 114-132.

Aivazian, V. A., Ge, Y., & Qiu, J. (2005). Debt Maturity Structure and Firm Investment. *Financial Management, 34*(4), 1-14.

Bhandari, L. C. (1988). Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence. *The Journal of Finance, 43*(2),

Borys, M. M. (2011). A Factor Analysis Approach to Measuring European Loan and Bond Market Integration. *Journal of Banking and Finance, 35*(4), 1011-1025.

Boynton, W., & Oppenheimer, H. R. (2006). Anomalies in Stock Market Pricing: Problems in Return Measurements. *The Journal of Business, 79*(5), 2617-2632.

Butt, B. Z., Rehman, K. U., & Hunjra, A. I. (2010). Financial Management Practices and Their Impact on Organizational Performance. *World Applied Sciences Journal, 9*(9), 997-1002.

Campbell, J. Y., Hilscher, J., & Szilagyi, J. (2008). In Search of Distress Risk. *The Journal of Finance, 63*(6), 2899-2939.

Carhart, M. M. (1997). On Persistence in Mutual Fund Performance. *The Journal of Finance, 52*(1), 57-82.

Campello, M., & Graham, J. R. (2013). Do stock prices influence corporate decisions? Evidence from the technology bubble. *Journal of Financial Economics, 107*(1), 89-110.

Dhaliwal, D., Heitzman, Shane, & Li, O. Z. (2006). Taxes, Leverage, and the Cost of Equity Capital. *Journal of Accounting Research, 44*(4), 691-723.

Fama, E. F., & French, K. R. (1993). Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics, 33*(1), 3-56.

Fama, E. F., & French, K. R. (2015). A Five Factor Asset Pricing Model. *Journal of Finance Economics, 116*(1), 1-22.

Ferguson, M. F., & Shockley, R. L. (2003). The Journal of Finance. *Equilibrium "Anomalies", 58*(6), 2549-2580.

George, T. J., & Hwang, C. Y. (2010). A Resolution of the Distress Risk and Leverage Puzzles in the Cross Section of Stock Returns. *Journal of Financial Economics, 96*(1), 56-79.

Hamada, R. S. (1969). Portfolio Analysis, Market Equilibrium and Corporation Finance. *The Journal of Finance, 24*(1), 13-31.

Iqbal, N., Ahmed, N., & Kanwal, M. (2013). Impact of Corporate Social Responsibility on Profitability of Islamic and Conventional Financial Institutions. *Applied Mathematics in Engineering, Management and Technology, 1*(2), 26-37.

Jariya, A. I., Al, M. S., & Rimziya, A. F. (2013). Relationship between Stock Returns and Firm Size, and Book-To-Market Equity: Empirical Evidence from Selected Companies Listed on Milanka Price Index in Colombo Stock Exchange. *Journal of Emerging Trends in Economics and Management Sciences, 4*(2), 217-225.

Kareem, A. (2006). Testing and Assessing the Relationship between Capital Cost and Stock Market Returns, an Empirical Study on Industrial Companies Listed at Amman Stock Exchange for the Period 1994 – 2004. *Humanities Journal, 4*(29), 1-24.

kane, A., Markus, A. J., & Robert, L. (1989). The Impact of Financial Leverage & The Cost Of capital On Return Of Investment. *Journal of Financial and Quantitative Analysis, 20*(41), 1-10.

Loughran, T. (1997). Book-to-Market across Firm Size, Exchange, and Seasonality: Is There an Effect? *Journal of Financial and Quantitative Analysis, 32*(3), 249-268.

Lee, J. S., & Jang, S. S. (2007). The Systematic-Risk of the US Airline Industry. *Tourism Management, 28*(1), 434-442.

Lintner, J. (1965). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics, 47*(1), 13-37.

Miles, J., & Ezzell, J. (1985). Reformulating tax Shield Valuation: A Note. *Journal of Finance, 40*(1), 1485-1492.

Moh'd Al-Tamimi, K. A., & Obeidat, S. F. (2013). Impact of Cost of Capital, Financial Leverage, and the Growth Rate of Dividends on Rate of Return on Investment An Empirical Study of Amman Stock Exchange. *International Journal of Academic Research in Economics and Management Sciences, 2*(4), 59-69.

Muradoglu, G., & Sivaprasad, S. (2008). An Empirical Test on Leverage and Stock Returns. *Working Paper*, 1-25.

Penman, S. H., Richardson, S. A., & Tuna, I. (2007). The Book-to-Price Effect in Stock Returns: Accounting for Leverage. *Journal of Accounting Research, 45*(2), 427-467.

Ramadan, I. Z., & Ramadan, Z. S. (2015). Capital Structure and Firm's Performance of Jordanian Manufacturing Sector. *International Journal of Economics and Finance, 7*(6), 279-284.

Ross, S. A. (1976). The Arbitrage Theory of Capital Asset Pricing. *Journal of Economics Theory, 13*(3), 341-360.

Ramalingegowda, Wang, S. H., San, C., & Yu, Y. (2013). The Role of Financial oporting uality in Mitigating the Constraining Effect of Dividend Policy on Investment Decisions.

Sharpe, W. F. (1964). Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk. *The Journal of Finance, 19*(3), 425-442.

Smith, I., & John, J. (1990). Inflation Accounting And Comparisons of Corporations Of Corporate Returns on Equity. *Accounting & Business Research, 27*(4), 1.

Vassalou, M., & Xing, Y. (2004). Default Risk in Equity Returns. *The Journal of Finance, 59*(2), 831-868.

Wah Ho, R., Strange, R., & Piesse, J. (2008). Corporate Financial Leverage and Asset Pricing in the Hong Kong Market. *International Business Review, 17*(1), 1-7.

TABLES:

Table 4.1: Descriptive Statistics for Monthly Percent Factor Returns July 1998-July 2016,216 months

Panel A illustrates the descriptive statistics (mean, standard deviation and t-value) for the factors returns panel B shows the differences of factorsSmall and big stock portfolios basically used to construct the value, leverage and cost of capital factors and panel C shows the correlation for each set of factors.

Panel A: Descriptive Statistics for Monthly Percent Factor Returns

	2X3 FACTORS					2X2FACTORS					2x2x2x2 FACTORS				
	Rm-Rf	SMB	HML	HLMLL	HWMLW	Rm-Rf	SMB	HML	HLMLL	HWMLW	Rm-Rf	SMB	HML	HLMLL	HWMLW
Mean	-0.071	0.012	0.002	-0.002	0.009	-0.071	0.003	0.002	0.004	0.01	-0.071	0.001	0.002	-0.002	0.007
Std.Dev	0.095	0.177	0.078	0.035	0.052	0.095	0.046	0.061	0.057	0.055	0.095	0.054	0.061	0.026	0.035
T-Value	-10.933	1.018	0.318	-0.978	2.427	-10.933	0.837	0.551	1.072	2.676	-10.933	0.191	0.585	-1.403	2.966

Panel B:	HML_S	HML_B	HML_{S-B}	$HLMLL_S$	$HLMLL_B$	$HLMLL_{S-B}$	$HWMLW_S$	$HWMLW_B$	$HWMLW_{S-B}$
				2X3 FACTORS					
Mean	0.002	0.001	0.001	-0.001	-0.003	0.002	0.01	0.007	0.002
Std.Dev	0.065	0.104	0.077	0.049	0.04	0.057	0.069	0.047	0.056
t-Statistics	0.550	0.133	0.282	-0.339	-1.29	0.61	2.078	2.32	0.627
				2X2FACTORS					
Mean	0.003	0.001	0.002	-0.002	0.01	-0.012	0.009	0.011	-0.002
Std.Dev	0.053	0.082	0.065	0.05	0.108	0.122	0.056	0.074	0.093
t-Statistics	0.943	0.205	0.515	-0.541	1.396	-1.45	2.41	2.148	-0.265
				2x2x2x2 FACTORS					
Mean	0.014	0.006	0.008	0.003	-0.003	0.006	0.029	0.028	0.001
Std.Dev	0.212	0.326	0.259	0.142	0.148	0.15	0.196	0.149	0.208
t-Statistics	0.949	0.253	0.457	0.325	-0.324	0.626	2.15	2.732	0.068

Panel C: Correlation Matrix between Different Factors

	2X3 Factors					2x2 Factors					2X2X2X2 Factors				
	Rm-Rf	SMB	HML	HLMLL	HWMLW	Rm-Rf	SMB	HML	HLMLL	HWMLW	Rm-Rf	SMB	HML	HLMLL	HWMLW
Rm-Rf	1					1					1				
SMB	0.49	1				-0.18	1				-0.27	1			
HML	-0.22	0.55	1			-0.30	0.10	1			-0.30	-0.09	1		
HLMLL	0.16	-0.18	-0.43	1		0.43	-0.02	0.33	1		0.02	0.20	-0.15	1	
HWMLW	-0.11	0.51	0.74	-0.587	1	-0.18	-0.30	0.80	0.26	1	-0.09	-0.55	0.47	-0.23	1

Table 4.2: Regressions for 25 Value-Weighted, Size-B/M Portfolios (July 1998 to July 2016, 216 Months)

Factors are created by means of separate 2x3 sorts on size and each of B/M, lev and wacc. Three factors intercept formed by the MKT, *SMB and HML* are shown in panel A of Table 4.2 and panel B illustrates the five factor intercept and slopes of HML, $HLMLL$, $HWMLW$ and also T-statistics and p values for these slopes

B/M	Low	2	3	4	High	Low	2	3	4	High	Low	2	3	4	High
Panel A: Three-Factor Intercepts: Rm-Rf, SMB, HML															
			(α)					*T(α)*					*P(α)*		
Small	-0.002	0.000	0.004	0.003	0.010	-0.38	0.04	0.68	0.60	1.49	0.70	0.96	0.49	0.54	0.13
2	0.000	0.000	-0.002	0.006	-0.001	-0.03	-0.00	-0.64	1.26	-0.15	0.97	0.99	0.51	0.20	0.87
3	-0.004	0.000	-0.002	-0.004	-0.004	-0.97	0.13	-0.37	-0.90	-1.09	0.33	0.89	0.70	0.36	0.27
4	-0.004	-0.003	-0.003	-0.002	-0.003	-1.07	-0.86	-0.71	-0.35	-0.50	0.28	0.38	0.47	0.72	0.61
Big	0.002	0.003	0.006	-0.003	0.003	0.42	0.47	1.44	-0.63	0.87	0.67	0.63	0.15	0.52	0.38
Panel B: Five-factor Intercept: Rm-Rf, SMB, HML, HLMLL, HWMLW															
			(α)					*T(α)*					*P(α)*		
Small	0.003	0.004	0.010	0.005	0.011	0.62	0.76	1.90	1.20	1.86	0.53	0.44	0.05	0.23	0.06
2	0.006	-0.001	-0.003	0.008	0.002	1.28	-0.32	-1.04	1.74	0.57	0.20	0.74	0.29	0.08	0.56
3	0.001	0.002	-0.008	-0.009	-0.006	0.20	0.54	-2.26	-2.39	-1.71	0.84	0.58	0.02	0.01	0.08
4	-0.002	0.000	-0.008	-0.009	-0.001	-0.57	-0.01	-2.31	-2.01	-0.21	0.56	0.99	0.02	0.04	0.82
Big	0.002	0.001	0.002	-0.005	0.000	0.56	0.11	0.49	-1.07	-0.06	0.57	0.90	0.62	0.28	0.94
Panel B: Five-factor coefficients :Rm-Rf, SMB, HML, HLMLL, HWMLW															
			(β)HML					*P(HML)*					*P(HML)*		
Small	-0.48	-0.27	0.11	0.32	0.92	-4.97	-2.55	1.13	3.94	7.85	0.00	0.01	0.25	0.00	0.00
2	-0.68	-0.02	-0.04	0.26	1.15	-7.10	-0.25	-0.60	2.93	14.66	0.00	0.80	0.54	0.00	0.00
3	-0.14	-0.28	0.06	0.45	1.09	-1.83	-4.43	0.92	6.41	15.85	0.06	0.00	0.35	0.00	0.00
4	-0.67	-0.33	-0.49	-0.26	1.32	-8.80	-4.90	-7.49	-2.93	11.24	0.00	0.00	0.00	0.00	0.00
Big	-0.80	-0.55	-0.78	-0.03	0.15	-11.14	-4.92	-11.03	-0.28	2.23	0.00	0.00	0.00	0.77	0.03
			(β)LEV					*T(LEV)*					*P(LEV)*		
Small	0.48	0.01	-0.03	0.17	1.32	2.65	0.03	-0.14	1.09	6.08	0.00	0.97	0.88	0.27	0.00
2	0.34	-0.07	0.08	-0.31	-0.09	1.91	-0.49	0.65	-1.88	-0.61	0.05	0.62	0.51	0.06	0.53
3	-0.05	-0.14	-0.14	-0.11	-0.21	-0.31	-1.16	-1.11	-0.84	-1.62	0.75	0.24	0.26	0.40	0.10
4	0.36	0.10	-0.34	-0.35	-0.50	2.56	0.83	-2.81	-2.14	-2.27	0.01	0.40	0.00	0.03	0.02
Big	-0.02	0.54	-0.50	-0.67	-0.37	-0.12	2.62	-3.74	-3.97	-2.92	0.90	0.00	0.00	0.00	0.00
			(β)WACC					*T(WACC)*					*P(WACC)*		
Small	-0.56	-0.51	-0.80	-0.29	0.07	-3.45	-2.88	-4.80	-2.13	0.38	0.00	0.00	0.00	0.03	0.70

2	-0.77	0.16	0.19	-0.36	-0.40	-4.82	1.15	1.81	-2.44	-3.06	0.00	0.25	0.07	0.01	0.00
3	-0.64	-0.21	0.83	0.65	0.24	-4.91	-1.92	7.08	5.49	2.09	0.00	0.05	0.00	0.00	0.03
4	-0.18	-0.36	0.59	0.87	-0.32	-1.39	-3.25	5.38	5.94	-1.63	0.16	0.00	0.00	0.00	0.10
Big	-0.08	0.38	0.40	0.11	0.37	-0.62	2.03	3.32	0.73	3.21	0.53	0.04	0.00	0.46	0.00

Table 4.3: Regressions for 25 Value-Weighted, Size-Lev Portfolios (July 1998to July 2016-216 Months)

The factors are developed by utilizing independent 2x3 sorts on size and each of $B/M-lev$, $wacc$. Three factors intercept formed by the MKT, SMB and HML are appeared in panel A of Table 4.3 and panel B illustrates the five factor intercept and slopes of $HML, HLMLL, HWMLW$ and also t-statistics for these slopes .

Lev	Low	2	3	4	High	Low	2	3	4	High	Low	2	3	4	High
Panel A: Three-Factor Intercepts: Rm-Rf, SMB, HML															
			(α)					*T(α)*					*P(α)*		
Small	0.001	0.007	0.002	0.003	0.002	0.15	1.49	0.33	0.46	0.34	0.87	0.13	0.74	0.64	0.73
2	0.002	0.005	-0.002	0.003	-0.005	0.31	1.24	-0.42	0.60	-1.00	0.75	0.21	0.67	0.54	0.31
3	-0.003	-0.001	-0.002	-0.004	-0.003	-0.69	-0.28	-0.66	-1.12	-0.83	0.48	0.77	0.50	0.26	0.40
4	0.001	-0.003	-0.003	-0.008	-0.003	0.36	-0.90	-0.84	-1.47	-0.65	0.71	0.36	0.40	0.14	0.51
Big	0.003	0.002	0.005	0.002	0.000	0.68	0.38	1.51	0.30	-0.01	0.49	0.70	0.13	0.76	0.99
Panel B: Five-Factor Intercept: Rm-Rf, SMB, HML, HLMLL, HWMLW															
			(a)					*T(α)*					*P(α)*		
Small	0.003	0.009	0.007	0.008	0.006	0.52	2.02	1.44	1.53	1.15	0.60	0.04	0.15	0.12	0.25
2	-0.002	0.009	-0.003	0.007	0.001	-0.49	2.04	-0.66	1.60	0.30	0.62	0.04	0.51	0.11	0.75
3	-0.009	-0.002	-0.003	-0.004	-0.002	-2.45	-0.58	-0.87	-1.25	-0.57	0.01	0.55	0.38	0.21	0.56
4	-0.003	-0.009	-0.003	-0.006	-0.001	-0.80	-2.44	-0.88	-1.09	-0.23	0.42	0.01	0.37	0.27	0.82
Big	-0.001	-0.005	0.006	0.001	-0.006	-0.15	-1.43	2.05	0.11	-1.03	0.87	0.15	0.04	0.91	0.30
Panel B: Five-Factor Coefficients: Rm-Rf, SMB, HML, HLMLL, HWMLW															
			(β)HML					*T(HML)*					*P(HML)*		
Small	-0.35	0.19	0.50	-0.30	0.55	-3.48	2.12	5.31	-3.11	5.09	0.00	0.04	0.00	0.00	0.00
2	-0.09	0.02	-0.10	0.47	0.37	-0.92	0.24	-1.27	5.38	4.69	0.36	0.81	0.20	0.00	0.00
3	-0.04	0.14	0.33	0.63	0.13	-0.59	2.11	4.98	9.47	1.79	0.56	0.04	0.00	0.00	0.07
4	-0.12	0.18	-0.43	0.47	-0.50	-1.86	2.64	-6.27	4.46	-6.57	0.06	0.01	0.00	0.00	0.00
Big	-0.43	0.01	-0.50	-0.91	-0.23	-6.99	0.18	-8.33	-7.69	-2.11	0.00	0.86	0.00	0.00	0.04
			(ϐ)LEV					*T(LEV)*					*P(LEV)*		

Small	-0.29	-0.13	0.08	0.68	1.60	-1.52	-0.76	0.46	3.78	8.01	0.13	0.45	0.65	0.00	0.00
2	-0.48	-0.13	-0.18	-0.15	0.91	-2.71	-0.87	-1.28	-0.95	6.20	0.01	0.39	0.20	0.34	0.00
3	-0.26	-0.14	-0.20	-0.21	0.22	-1.92	-1.12	-1.61	-1.70	1.61	0.06	0.27	0.11	0.09	0.11
4	-0.32	-0.17	-0.46	-0.26	0.46	-2.59	-1.33	-3.59	-1.31	3.21	0.01	0.19	0.00	0.19	0.00
Big	-0.70	-0.23	-0.41	0.81	-0.56	-6.09	-1.73	-3.68	3.69	-2.75	0.00	0.09	0.00	0.00	0.01
	(ß)WACC					*T(WACC)*					*P(WACC)*				
Small	-0.32	-0.36	-0.68	-0.52	-0.20	-1.84	-2.39	-4.30	-3.19	-1.08	0.07	0.02	0.00	0.00	0.28
2	0.42	-0.47	0.09	-0.61	-0.60	2.63	-3.44	0.69	-4.18	-4.57	0.01	0.00	0.49	0.00	0.00
3	0.77	0.11	0.05	0.02	-0.07	6.23	0.97	0.49	0.19	-0.61	0.00	0.34	0.63	0.84	0.54
4	0.46	0.62	-0.08	-0.30	-0.12	4.15	5.54	-0.69	-1.70	-0.94	0.00	0.00	0.49	0.09	0.35
Big	0.23	0.86	-0.30	0.33	0.63	2.25	7.08	-3.02	1.66	3.44	0.03	0.00	0.00	0.09	0.00

Table 4.4: Regressions for 25 Value-Weighted, Size-Wacc Portfolios (July 1998 to July 2016-216 Months)

The factors intercept formed by the MKT, SMB and HML are shown in panel A of Table 4.4 and panel B illustrates the five factor intercept and slopes of HML, $HLMLL$, $HWMLW$ and also T-statistics for These Slopes .

Wacc	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**	**Low**	**2**	**3**	**4**	**High**
Panel A: Three-Factor Intercepts: Rm-Rf, SMB, HML															
			(α)					*T(α)*					*P(α)*		
Small	0.005	-0.006	0.001	0.001	0.013	0.86	-0.98	0.19	0.14	2.27	0.39	0.33	0.85	0.89	0.02
2	-0.004	-0.004	0.003	0.003	0.004	-0.93	-1.01	0.60	0.65	0.84	0.35	0.31	0.55	0.52	0.40
3	-0.007	-0.008	-0.004	0.001	0.006	-1.73	-2.05	-1.08	0.34	1.68	0.09	0.04	0.28	0.74	0.09
4	-0.003	-0.010	-0.008	0.002	0.003	-0.74	-2.25	-1.80	0.28	0.94	0.46	0.03	0.07	0.78	0.35

Big	-0.002	-0.004	0.001	0.004	0.012	-0.37	-1.10	0.08	1.17	3.26	0.71	0.27	0.94	0.24	0.00

Panel B: Five-Factor Intercept: Rm-Rf, SMB, HML, HLMLL, HWMLW

	(a)					*T(α)*					*P(α)*				
Small	0.012	-0.002	0.005	0.006	0.013	2.24	-0.42	0.85	1.21	2.32	0.03	0.68	0.39	0.23	0.02
2	-0.001	-0.001	0.013	0.001	-0.001	-0.16	-0.29	2.81	0.24	-0.22	0.88	0.77	0.01	0.81	0.83
3	-0.004	-0.004	-0.009	-0.004	0.000	-0.93	-0.92	-2.52	-1.34	0.14	0.36	0.36	0.01	0.18	0.89
4	0.000	-0.005	-0.003	-0.011	-0.002	0.03	-1.18	-0.70	-2.26	-0.77	0.98	0.24	0.48	0.03	0.44
Big	-0.002	-0.004	-0.008	0.004	0.006	-0.38	-1.11	-1.40	1.02	1.90	0.70	0.27	0.16	0.31	0.06

Panel C: Five-Factor Coefficients: Rm-Rf, SMB, HML, HLMLL, HWMLW

	(β)HML					*T(HML)*					*P(HML)*				
Small	-0.19	0.34	0.09	0.03	0.32	-1.96	3.12	0.81	0.32	3.04	0.05	0.00	0.42	0.75	0.00
2	-0.23	0.09	0.25	0.66	-0.10	-3.14	1.19	2.77	7.82	-1.18	0.00	0.23	0.00	0.00	0.24
3	0.20	0.36	0.34	0.34	-0.05	2.75	4.78	4.86	5.56	-0.91	0.00	0.00	0.00	0.00	0.36
4	-0.76	0.11	0.28	0.03	-0.07	-11.52	1.29	3.52	0.37	-1.22	0.00	0.19	0.00	0.71	0.23
Big	-0.61	-0.45	-0.14	-0.09	-0.63	-5.47	-	-	-	-	0.0	0.0	0.1	0.2	0.00

							6.03	1.36	1.26	10.4	0	0	8	1	
	(ß)LEV					*T(LEV)*					*P(LEV)*				
Small	-0.01	0.60	0.12	0.41	0.84	-0.07	2.99	0.58	2.35	4.28	0.95	0.00	0.56	0.02	0.00
2	0.26	0.09	-0.05	-0.19	-0.17	1.94	0.57	-0.31	-1.19	-1.09	0.05	0.57	0.75	0.23	0.28
3	0.03	0.15	-0.28	-0.25	-0.25	0.21	1.09	-2.17	-2.19	-2.25	0.84	0.28	0.03	0.03	0.03
4	-0.04	0.23	-0.34	-0.22	-0.37	-0.34	1.49	-2.27	-1.27	-3.32	0.74	0.14	0.02	0.21	0.00
Big	0.58	-0.64	-0.82	0.05	-0.30	2.77	-4.68	-4.17	0.32	-2.71	0.01	0.00	0.00	0.75	0.00
	(ß)WACC					*T(WACC)*					*P(WACC)*				
Small	-0.90	-0.29	-0.45	-0.58	0.17	-5.36	-1.59	-2.49	-3.71	0.94	0.00	0.11	0.01	0.00	0.35
2	-0.33	-0.37	-1.30	0.19	0.58	-2.72	-2.74	-8.51	1.31	4.08	0.00	0.01	0.00	0.19	0.00
3	-0.39	-0.59	0.57	0.65	0.66	-3.15	-4.68	4.91	6.37	6.62	0.00	0.00	0.00	0.00	0.00
4	-0.35	-0.61	-0.70	1.57	0.67	-3.16	-4.38	-5.14	10.18	6.72	0.00	0.00	0.00	0.00	0.00
Big	0.13	-0.14	0.89	0.07	0.71	0.72	-1.17	4.98	0.56	7.09	0.47	0.25	0.00	0.57	0.00

Table 4.5: Regressions for 32 Value-Weighted, SIZE-LEV-WACC Portfolios (July 1998 to July 2016, 216 Months)

Three factors intercept produced by the MKT, SMB and HML are exposed in panel A of table 4.5 and panel B illustrates the five factor intercept and slopes of HLMLL AND HWMLW and also T-statistics values for these slopes .

	SMALL												BIG											
Lev	Low	2	3	High	Low	2	3	High	Low	2	3	High	Low	2	3	High	Low	2	3	High	Low	2	3	High
Panel A: Three-Factor Intercept: Rm-Rf, SMB, HML																								
	(α)				*(T)*				*P(α)*				*(α)*				*(T)*				*P(α)*			
Low WACC	-0.007	-0.005	0.003	0.002	-1.50	-1.19	0.52	0.32	0.14	0.23	0.60	0.75	0.001	-0.008	-0.007	0.001	0.33	-2.19	-1.35	0.08	0.76	0.03	0.18	0.94

2	0.003	0.002	-0.007	-0.002	0.56	0.47	-1.49	-0.30	0.57	0.64	0.14	0.76	0.000	-0.007	-0.010	-0.006	0.04	-1.66	-1.87	-1.35	0.97	0.09	0.06	0.18
3	0.002	0.003	-0.002	-0.005	0.38	0.72	-0.27	-0.99	0.71	0.48	0.79	0.32	0.005	0.003	0.003	-0.007	0.88	0.67	0.69	-1.59	0.38	0.50	0.49	0.11
High WACC	0.011	0.005	0.005	0.008	1.99	1.05	1.12	1.17	0.05	0.30	0.26	0.24	0.004	0.004	0.007	0.006	0.90	0.97	1.77	1.02	0.37	0.33	0.08	0.31
Panel B: Five-Factor Intercept and Coefficients: Rm-Rf, SMB, HML, HLMLL, HWMLW																								
	(α)				*(T)*				*P(α)*				*(α)*				*(T)*				*P(α)*			
Low WACC	-0.006	-0.002	0.012	0.009	-1.23	-0.44	2.30	1.60	0.22	0.66	0.02	0.11	0.005	-0.005	-0.001	0.003	1.09	-1.25	-0.21	0.41	0.27	0.21	0.84	0.68
2	0.008	0.006	-0.006	-0.002	1.39	1.20	-1.25	-0.27	0.17	0.23	0.23	0.79	-0.010	-0.004	-0.009	-0.006	-1.94	-0.99	-1.72	-1.46	0.05	0.33	0.09	0.15
3	-0.002	0.005	0.005	0.001	-0.51	1.36	0.90	0.30	0.61	0.18	0.37	0.77	-0.005	-0.002	0.001	-0.007	-1.02	-0.56	0.10	-1.52	0.31	0.58	0.92	0.13
High WACC	0.005	0.000	0.002	0.013	0.92	-0.08	0.32	2.07	0.36	0.93	0.75	0.04	-0.003	0.003	0.005	-0.001	-0.84	0.74	1.29	-0.19	0.40	0.46	0.19	0.84
	(β)LEV				*T(β)*				*P(LEV)*				*(β)LEV*				*T(β)*				*P(LEV)*			
Low WACC	-0.31	-0.26	-0.06	0.91	-1.87	-1.59	-0.33	4.54	0.06	0.11	0.74	0.00	-0.16	-0.59	-0.16	1.38	-1.02	-4.43	-0.90	5.30	0.31	0.00	0.37	0.00
2	-0.37	-0.11	0.15	1.23	-1.85	-0.62	0.80	5.47	0.07	0.54	0.43	0.00	-0.29	-0.15	-0.65	0.32	-1.67	-1.02	-3.29	2.13	0.09	0.31	0.00	0.04
3	-0.53	-0.46	-0.14	0.75	-3.37	-3.43	-0.75	4.60	0.00	0.00	0.46	0.00	-0.63	-0.49	-0.70	0.11	-3.64	-3.86	-4.37	0.66	0.00	0.00	0.00	0.51
High WACC	-0.31	-0.11	0.36	1.35	-1.60	-0.71	2.13	5.90	0.11	0.48	0.04	0.00	-0.48	0.08	-0.24	-0.39	-3.92	0.59	-1.63	-2.07	0.00	0.55	0.11	0.04
	(β)WACC				*T(WACC)*				*P(WACC)*				*(β)WACC*				*T(WACC)*				*P(WACC)*			
Low WACC	-0.21	-0.50	-1.15	-0.70	-1.40	-3.37	-6.96	-3.87	0.16	0.00	0.00	0.00	-0.48	-0.62	-0.78	-0.01	-3.41	-5.16	-4.98	-0.03	0.00	0.00	0.00	0.98
2	-0.67	-0.49	-0.13	0.23	-3.73	-3.08	-0.75	1.11	0.00	0.00	0.46	0.27	1.21	-0.39	-0.24	0.15	7.55	-2.90	-1.34	1.07	0.00	0.00	0.18	0.29
3	0.40	-0.41	-0.84	-0.68	2.83	-3.39	-4.89	-4.62	0.01	0.00	0.00	0.00	1.18	0.49	0.21	0.01	7.54	4.28	1.42	0.06	0.00	0.00	0.16	0.96
High WACC	0.75	0.61	0.58	-0.35	4.32	4.52	3.74	-1.69	0.00	0.00	0.00	0.09	0.74	0.12	0.19	0.79	6.75	0.96	1.42	4.69	0.00	0.33	0.16	0.00