

Do Financially Constrained Firms Earn Higher Returns than the Unconstrained Firms? A Comprehensive Evidence from Pakistan Stock Exchange

Musarrat Karamat

Balochistan University of IT, Engineering and Management Sciences, Quetta

Muhammad Kashif

Shaheed Zulfikar Ali Bhutto Institute of Science and Technology, Karachi

Abstract

This paper examines the relationship between financial constraints and the stock returns explaining the pricing of stock through financially constrained and unconstrained firms in Pakistan. Three proxies; tangible to total assets and cash holding to total assets ratios have been used for financial constraints and the study tried to investigate that either the investors are compensated for taking the extra risk or not in Pakistan Stock Exchange (PSX). We find that the financially constrained firms don't earn higher returns when their capital structure is heavy with liquid assets and their cash flows are more than the unconstrained firms in PSX. Moreover, the time series results showed that the risk-adjusted returns of the most constrained firms give the mix and somewhat negative and significant and insignificant results for the Pakistani firms listed in PSX sorted based on tangible to total assets and Cash holding to total asset ratios.

Keywords: Asset Pricing, Financial constraints, risk-adjusted performance of portfolios

Modern finance theory suggests that investors demand higher returns for riskier assets in capital markets (Li and Luo, 2019). Financial constraint is one of the risk factors which has been thoroughly investigated in the literature to see the impact of financial constraints (FC) on firm value. In asset pricing, this question is openly debated on how the financial constraints affect risk and expected returns. The firms who have cash-flows and liquidity in the form of retained earnings don't need to go to capital markets for funding and ultimately they are not affected by the financial constraints in the capital markets. On the other hand, the firms can become constraint due to its size, structure, and liquidity of the assets and the liabilities of the balance sheet and the variability of the cash flows. Therefore, it is concluded in many pieces of research that financial constraints affect risk and expected returns (Livdan et.al. 2009).

Literature Review

Forgoing into the background of the FC concept, we need to study the literature written on the capital structure decisions of the firms. As the companies who want to grow in the economy, need finance to invest in the new projects and the firm's decisions of taking funds from the internal or external sources depend upon the firm's capital structure decisions by the managers who decide the optimal level of debt to equity ratio for their firms. The MM theory in 1958 about capital structure in its first proposition suggests "that the capital structure decisions do not affect the value of the firm in the frictionless market". But this theory did not hold any significant place in reality as the real capital markets are not perfect. Therefore, in the real world, market imperfectness, asymmetric information, agency problem, and transaction costs make it

impossible for firms to get external finance from the capital markets (Balafas, 2015) and these frictions are known as Financial constraints.

After them, the seminal studies of Jaffee and Russel in 1976, Jansen and Meckling 1976, Stiglitz and Weiss 1981 and Myers and Majluf in 1984 have documented that the firms face frictions to get credit from the market to invest in their projects and they are known as financially constrained (FC) firms. The frictions prevent the FC firms to fund all their desired projects or investments and also encompasses their inability to issue bonds or shares, taking loans from banks or illiquidity of assets (Lamont, Polk, and Requejo, 2001). Moreover, the studies of Fazzari, Hubbard, and Petersen in 1988 also emphasized that FC affects investment and it varies from firm to firm depending upon nature and capital structure decisions of the firm. On the other hand, the firms can become constraint due to its size, structure, and liquidity of the assets and the liabilities of the balance sheet and the variability of the cash flows. So the firms with low cash flows and liquidity faced more binding during tight monetary /recessionary periods and their inventory magnitude is also affected (Hubbard, 1988; Kashyap, Lamont and Stein, 1994). Due to the above argument built-in literature, we take the proxies of total assets, cash holdings to asset and debt capacity as measured by tangible to total assets (Bodnaruk, Loughran, & McDonald, 2015).

The impact of FC on stock returns yields puzzling results in the literature. The Whited Wu study in 2006 suggested that the constrained firm's returns move together and the FC firms earn a positive but insignificant average return. Likewise, the study by Lamont, Polk, and Saa-Requejo (2001) produced the same results that FC firms move together and suggesting that FC firms are subject to common shocks and constrained firms have low average returns than the unconstrained ones. Gomes, Yaron, and Zhang in 2006 studied financial constraints for the cross-sections of the returns quantitatively and the result showed that the financial friction provides a common factor that improves the pricing of cross-sectional returns. The recent studies of Campello and Chen in 2010 and Balafas and Kotakis 2015 also showed that the financial constraint factor affects the fundamentals of the firms, as well as the stock returns and the firms with high FC, which goes long and the less constrained firms go short in the capital market. The recent study of Balafas and Kotakis 2015 used a rich dataset of LSE of all non-financial firms from 1988 to 2013 and concluded that investors didn't get premium for keeping FC firms stocks so they better don't keep them in their portfolio and sell them short is the better option for them. All these conflicting pieces of evidence in the developed markets are difficult to interpret in the emerging and frontier markets as the market and economic dynamics are different. Therefore, in Pakistan, which is also an emerging market where these factors have not been studied yet, we tried to study the FC factors' impact on risk and return estimations of the firms listed in the Pakistan Stock Exchange.

Dataset Issues and Research Methodology

The dataset consists of the share prices of all listed and non-listed firms of Pakistan Stock Exchange from 2000 to 2019 available on Thomson DataStream. The including criteria "all non-financial firms who are listed in the Pakistan Stock Exchange at any point in time". This is the common practice in

literature followed by many researchers (see Florackis et al., 2011 and Balafas et. al. 2015) to avoid any potential for survivorship bias¹.

Table 1. Net Number of Pakistan Stock Exchange Companies available for analysis

Summary of the companies before/ after excluding non-financial firms from 2000 to 2019	
The total number of companies available during 1949-2019	981(100%)
Total number of companies excluded from the sample using filters like (i) stocks of financial firms like banks, insurance companies, and investment companies	196(20%)
The net number of total firms available for the analysis	785(80%)

In the initial screening of the data, we exclude the financial firms and the insurance companies from the dataset as their capital structure is fundamentally different from other firms. we also exclude the firms with missing accounting data for a year as they will create problems in analysis. The monthly data of the prices is used and then from these prices, the monthly returns are calculated for further analysis. After that, the data is screened and filtered setting certain criteria. The firms who are delisted at any specific time or period have been checked at their specific dates of shutting down their businesses and then we put “-1” in the next month and put #/NAN for all the next entries. Given below are the definitions and the collection information of the proxies (total assets, tangible to total assets and Cash holdings to total assets) used in this research.

Total Assets (WC02999)

As per the Thomson Reuters DataStream, 2019, “Total Assets represent the sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment, and other assets”. Because of the fundamental difference in the definition and the capital structure of the financial companies, banks, and other insurance companies, only the data of the non-financial firms have been taken for the analysis. The code of total assets is WC02999 on the Thomson Reuters DataStream. The time-series data of total assets is available annually so the data of the Non-financial firms listed in the Pakistan Stock Exchange has been used from 2000 to July 2019. As the companies close their accounts mostly in December, so the data entries of total assets for 2019 are quite low.

Tangible Assets (Property, Plant, and Equipment) (WC02501)

The data has been taken from Thomson Reuters DataStream so as per their definition, “PROPERTY, PLANT, AND EQUIPMENT (NET) represents Gross Property, Plant and Equipment less accumulated reserves for depreciation,

¹ Survivorship bias arises due to exclusion of failed companies that do not exist currently. The consequences of survivorship bias are higher returns as only the high performing firms left in the sample. Nagel (2001) consider this as a serious problem while predicting the returns of the stock.

depletion, and amortization". The data is available annually so the time series data has been taken from 2000 to 2019.

Cash Holdings (WC02001)

Cash and Short Term Investment represents "the sum of cash and short term investments. It includes Cash on hand, Un-deposited cheques, Cash in banks, Cheques in transit, Credit card sales, Drafts, Money orders, Letters of credit, Demand deposits (non-interest bearing), Short-Term Investments, Time Certificates of Deposit, Treasury Bills, Commercial Paper, Money market mutual fund shares, Central Bank Deposits, Temporary Investments, etc. and it excludes Commercial Paper issued by unconsolidated subsidiaries to the Parent company (included in receivables), the amount due from the sale of debentures (included in receivables), Checks are written by the company but not yet deposited and charged to the company's bank account and Promissory Notes". In literature cash flows have been used as FC measure by Fazzari et. al. in 1988; Kaplan and Zingales (1997) Cash-flow sensitivity of cash (Almeida et al., 2004) and Angelini and Generale in 2008. The data on this code is available annually and the data from 2000 to 2019 has been used.

Table 2. Data obtained Through the Thomson Data Stream

FC measures	Definition	Data Items used
1. Total Assets	Book Value of Total Assets t	<u>Worldscope item:</u> WC02999
2. Tangible-to-Total Assets ratio	<u>Tangible Assets</u> t Total Assets t	Worldscope item: WC02501
3. Cash holdings-to-Total Assets ratio	<u>Cash Holdings</u> t Total Assets t	Worldscope item: WC02001 and WC02999

Source: (Balafas, 2013)

Empirical Results

Descriptive Analysis of the Portfolio

Table 3. FC1 Characteristics of Decile Portfolios Constructed based on Total Assets

	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p10-p1	t-value
	Least constrained					Most Constrained						
EW	0.37	0.30	0.23	0.21	0.27	0.26	0.23	0.25	0.22	0.14	-0.23	-2.63
VW	0.38	0.42	0.41	0.33	0.39	0.32	0.30	0.35	0.26	0.19	-0.19	-1.62
MV (Rs.)	11687.65	21438.34	47328.51	45470.09	67243.56	138744.09	194787.99	343134.56	417077.93	1111404.74	1099717.09	21.72
CAPM Beta	0.23	0.11	0.27	0.23	0.29	0.20	0.18	0.29	0.21	0.30	0.07	-1.20

Table 4. FC2 Characteristics of portfolios P1-P10 made based on second financial constraint i-e Tangible to total assets

	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p10-p1	t-value
	Least constrained					Most Constrained						
EW	0.34	0.26	0.22	0.24	0.25	0.22	0.25	0.17	0.24	0.26	-0.08	-0.98
VW	0.32	0.25	0.20	0.33	0.27	0.26	0.25	0.14	0.19	0.32	-0.01	-0.09
MV (Rs.)	226119.88	462344.24	386359.57	362922.40	275693.01	214870.42	227527.96	332006.09	170157.83	113569.10	-112550.7	-14.92
CAPM Beta	0.31	0.23	0.14	0.26	0.17	0.31	0.16	0.26	0.34	0.39	0.08	-1.58

Table 5. FC3 Characteristics of portfolios P1-P10 made based on 3rd financial constraint proxy i-e Cash Holdings to Total Asset Ratio

	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p10-p1	t-value
	Least constrained						Most Constrained					
EW	0.20	0.25	0.19	0.24	0.22	0.31	0.15	0.22	0.35	0.31	0.11	1.76
VW	0.29	0.26	0.22	0.28	0.26	0.28	0.18	0.20	0.29	0.31	0.02	0.27
MV	69839.61	153638.46	191164.81	191296.33	210643.69	179817.93	307305.35	500356.43	522470.67	432802.47	362962.86	15.18
CAPM Beta	0.29	0.23	0.26	0.32	0.25	0.36	0.26	0.25	0.24	0.20	-0.09	-3.40

Table 6. Alphas of value-weighted decile portfolios based on FC-1 Total Assets

Value Weighted												
	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p10-p1	Wald-test
CAPM Alpha	31.33	35.54	32.09	24.48	30.86	22.57	19.28	23.91	12.91	2.31	-29.02	155.55
	(2.89)***	(4.72)***	(4.46)***	(4.43)***	(4.45)***	(4.62)***	(4.14)***	(4.34)***	(2.83)***	(0.57)	(2.49)**	[0.00]
FF3 Alpha	29.10	32.65	24.97	26.82	30.40	20.54	18.23	16.37	10.78	-0.15	-29.26	82.11
	(2.29)**	(3.80)***	(2.83)***	(3.48)***	(3.56)***	(3.43)***	(3.10)***	(2.19)**	(1.86)*	(-0.03)	(2.15)**	[0.00]
FF3 Alpha	30.93	32.80	26.42	32.10	29.42	22.35	23.71	18.13	11.99	2.05	-29.63	78.95
	(2.15)**	(3.35)***	(2.71)***	(3.80)***	(2.98)***	(3.27)***	(3.59)***	(2.25)**	(1.91)*	(0.36)	(2.12)**	[0.00]

The table 3 and 4 focus on Total Assets and Tangible to total assets of stocks listed on the Pakistan Stock Exchange (PSX) from 2000 to 2019 and it is assigned for t months to 10 portfolios. P1 is a decile portfolio that has stocks from the least constrained firms having the highest Total Assets to P10 that has the most constrained firms. The returns of the portfolios are calculated based on the risk-free rate for a month that is post- ranking returns. They are rebalanced monthly. EW is the annualized monthly average returns for all the equally weighted portfolios. VW is the value-weighted portfolio. MV is the market value average based in Rupees. T-statistics refers to the null-hypothesis showing no difference in all the means of the portfolios 10 to P1 based characteristics.

The table 5 reports the descriptive characteristics of the portfolios constructed on the 5th FC constraint Cash Holdings to Total Asset Ratio as being set the sorting criteria to make decile portfolios of the stocks listed in the Pakistan Stock exchange from 2000 to 2019 at month t . The P1 has stock returns of the firms listed in the Pakistan Stock Exchange having highest values of Cash Holdings to Total Assets Ratio as least Financially Constraint and P10 is the Portfolio of those firms listed in PSX having the lowest Cash Holdings to Total Assets Ratio and being treated as the most financial constraint. The post ranking returns ($t + 1$) are calculated for each portfolio in excess to their risk-free rate and then the spread P10-P1 was calculated taking the difference of the most FC firms to the least constraint firms. Equally weighted returns correspond to the annualized average monthly excess returns of equally-weighted portfolios. In the last line of the table, the CAPM beta values are reported which showed the systematic risk of the portfolio. And the t -values shows the t -test run on the Null Hypothesis that “there is no difference between the means of P10 and P1”.

The empirical result discussion starts with the descriptive analysis of the equally weighted and value-weighted portfolio results based on each of the three criteria taken for financial constraint for the following research. The descriptive tables from 3 to 5 contain the characteristics of equally weighted and value-weighted decile portfolios constructed based on financial constraint proxies for the sample period of nineteen years starting from January 2000 to June 2019. The table contains the values of Equally weighted and Value weighted average annualized post ranking returns of the decile portfolio sorted on the financial constraint proxies, their resultant average market value and the CAPM beta values for the full sample of value-weighted portfolio returns. In each of the three cases, the P1 stands for the portfolio of the least financially constraint firms and P10 stands for the portfolio of the financially most constrained firms as per each criterion employed (Balafas, 2013). The last two column reports the difference between P10 and P1 and their corresponding t -test values against the null-hypothesis that the characteristics of P10 are equal to characteristics of P1.

The first table 3 reports the descriptive results of the first sorting criteria that is Total Assets, the size of the firms. The Market Value (MV) of the P1 is

highest as compared to P10 as the firms with larger asset size are in Portfolio 1, the least constraint firms. The Equally weighted and Value weighted annualized returns show that the returns of the most constraint firms are lower than the returns of the financially least constraint firms i-e P10 returns are lower than the P1 returns. The spread between P10 and P1 is negative 23% and 19% simultaneously for EW and VW portfolio returns, and the spread is significant at 1%. The CAPM beta showed the highest beta for P10 (.30) than the P1 CAPM beta (0.23). Then table 4 reports the descriptive results of Tangible to Total Assets. The information is quite similar to table 1.3. The Market Value of P1 is greater than the P10 as the least constrained firms have high values of tangible to total assets ratio and vice versa. The EW and VW annualized returns of P10 are not greater than the annualized EW and VW returns of P1 and spread between P10-P1 is negative and not statistically significant. The CAPM beta values are higher at P10 i-e .39 as compare to at P1 i-e 0.31.

Then table 5 repeats the same procedure, we use the Cash Holdings to total Assets ratio as sorting criteria as financial constraint proxy. The decile portfolios are made based on these criteria and their EW and VW annualized returns are reported in these tables along with their Market values and their corresponding CAPM beta values. the results show that the low cash holding firms give investors more returns than the firms with more cash holdings (Gomes, Yaron, and Zhang, 2006). The market values of the most constrained firms are also more than the market values of the least constrained firms which shows more trading in the stocks of those firms which have low cash and mostly constrained so people are not going long in most constrained firms in PSX (Ling, and Chen, 2012).

Till now, the proxies utilized overall show that the stocks of most financially constrained firms yield lower returns than the stocks of the financially least constrained firms. The portfolios of most constrained firms under-perform the portfolios of the least constrained firms in most of the cases.

Risk Adjusted Performance or The Time Series Tests Results

In the time series analysis, we analyze the performance of the FC-sorted portfolio adjusted or sorted for different risk factors using different series of financial constraint proxies. The abnormal performance of all the portfolios from P1 to P10 is estimated using Asset Pricing Models. We use CAPM, Fama-French3, and Fama-French5 to estimate alphas. First, we use CAPM to calculate Jansen Alpha through regression.

$$K_i - K_f = \alpha_i + \beta_{i,MKT} (K_{M,t} - K_{f,t}) + \epsilon_{i,t}, \quad (1.1)$$

In this equation, $K_{i,t}$ is the return of portfolio i in month t , $K_{f,t}$ is the risk-free rate for the month t , $\beta_{i,MKT}$ is the market beta of Portfolio i and $(K_{M,t} - K_{f,t})$ is the excess return in month t . For the second equation, the researcher calculates Fama-French (1993) 3 Model

$$K_i - K_f = \alpha_i + \beta_{i,MKT}(K_{M,t} - K_{f,t}) + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + \epsilon_{i,t}, \quad (1.2)$$

In the equation 1.2, the factor SMB_t is the size factor and HML_t is the value factor at time t . The $\beta_{i,SMB}$ and $\beta_{i,HML}$ are the corresponding factor loadings for the

portfolio i . Thirdly, we calculate Fama French5 (2013, 2015) alpha using the following equation

$$K_i - K_f = \alpha_i + \beta_{i,MKT}(K_{m,t} - K_{f,t}) + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + \beta_{i,RMW}RMW + \beta_{i,CMA}CMA + \varepsilon_{i,t} \quad (1.3)$$

Where two more factors RMW and CMA are added in the equation in the existent model of Fama-French 3. In the equation, RMW is known as the profitability factor and can be estimated by taking the difference between the high and low operating profitability. On the other hand, CMA stands for Investment factor and is the difference between the returns of the firms investing conservatively and aggressively.

For estimation, we use the GMM model so that it can be corrected for heteroscedasticity and autocorrelation. Wald test is used to test the joint significance of the 10 portfolios' alphas. The Null Hypothesis, in this case, was that all alphas of the 10 portfolios are zero. The researcher also reported the significance of the risk-adjusted differential spread from P10-P1.

Table 7. *Alphas of value-weighted decile portfolios based on FC-2 Tangible to Total Assets*

Value Weighted												
	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p10-p1	Wald-test
CAPM Alpha	19.26 (4.03)***	12.06 (2.63)***	10.06 (1.89)*	20.30 (2.96)***	16.32 (3.32)***	13.54 (3.03)***	11.13 (1.68)*	-0.83 (-1.17)	4.37 (0.70)	16.31 (2.52)**	-2.95 (0.40)	65.29 [0.00]
FF3 Alpha	12.81 (2.21)**	6.40 (1.12)	5.44 (0.84)	7.89 (0.77)	11.15 (1.84)*	14.16 (2.39)**	10.45 (1.22)	3.87 (0.63)	5.50 (0.69)	17.22 (2.09)**	4.41 (0.48)	23.27 [0.01]
FF5 Alpha	11.81 (1.86)*	7.34 (1.16)	2.65 (0.36)	6.88 (0.65)	12.81 (1.90)*	17.78 (2.82)***	12.93 (1.34)	9.48 (1.39)	14.30 (1.63)	27.64 (3.03)***	13.33 (1.28)	32.50 [0.00]

Table 8. *Alphas of value-weighted decile portfolios based on FC3; Cash Holdings (CH) to Total Asset (TA) Ratio*

Value Weighted												
	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p10-p1	Wald-test
CAPM Alpha	18.97 (2.78)***	14.95 (2.43)**	9.31 (1.66)*	15.37 (2.80)***	12.21 (1.98)**	13.22 (2.58)***	4.38 (1.01)	6.16 (1.41)	16.86 (4.06)***	18.22 (3.79)***	-0.75 (0.09)	68.59 [0.00]
FF3 Alpha	17.97 (2.15)**	12.66 (1.64)*	9.98 (1.39)	14.59 (2.09)**	13.03 (1.66)*	12.26 (1.94)*	3.19 (0.57)	6.47 (1.17)	12.84 (2.47)***	9.81 (1.60)	-8.17 (-0.83)	30.50 [0.00]
FF3 Alpha	25.66 (2.79)***	17.48 (2.06)**	13.72 (1.67)*	19.54 (2.52)**	19.51 (2.28)**	16.15 (2.36)**	5.18 (0.85)	9.39 (1.55)	12.39 (2.11)**	7.22 (1.06)	-22.96 (-2.00)**	40.60 [0.00]

The table 6 reports the alphas of CAPM, FF3, and FF5 for the ten value-weighted stock portfolios made based on the sorting criteria of first and second financial constraint i-e Total assets and tangible to total assets for the firms listed in Pakistan stock exchange for the period of 2000 to 2019. Alphas are the abnormal rate of return or the excess returns which are also known as the abnormal performance of the portfolios. P1 is the decile portfolio of the firms containing the highest values of Total Assets and is considered as least constraint and P10 represents the most constraint portfolio of the firms having the lowest values of Total Assets. P10-P1 represents the spread between P1 and P10, also called Zero-cost strategy where the P10 firms go long as they are the most constrained firms as compared to P1; the least FC firms sell short. CAPM, Fama-French 3 and Fama-French 5 alphas are annualized estimates of abnormal returns, calculated through asset pricing models using Eviews. The t-values against each alpha has given in the second line in the parenthesis. The Null Hypothesis, in this case, is that the Alphas of ten portfolios is jointly equal to zero in each case. Probability or P-values are given under each Chi-square value in parenthesis.

The table reports the alphas of CAPM, FF3, and FF5 for the ten value-weighted stock portfolios made based on the sorting criteria of fifth financial constraint i-e Cash Holdings to Total Asset Ratio for the firms listed in Pakistan stock exchange for the period of 2000 to 2019. Alphas are the abnormal rate of return or the excess returns which are also known as the abnormal performance of the portfolios. P1 is the decile portfolio of the firms containing the highest values of Cash Holdings to Total Asset Ratio and is considered as least constraint and P10 represents the most constraint portfolio of the firms having the lowest values of Cash Holdings to Total Asset Ratio. P10-P1 reports the difference or spread between P1 and P10, also called Zero-cost strategy where the P10 firms go long as they are the most constrained firms as compared to P1; the least constrained firms sell short. CAPM, Fama-French 3 and Fama-French 5 alphas are annualized estimates of abnormal returns, calculated through asset pricing models using Eviews. The t-values against each alpha has given in the second line in the parenthesis. The last column of the table contains the Chi-Square statistics of the Wald Test with their P values in the parenthesis for the joint significance. The Null Hypothesis in this case is that the Alphas of ten portfolios is jointly equal to zero in each case. Probability or P-values given under each Chi-square value in parenthesis.

Time Series Results

Table 6 reports the alphas using the first and second sorting criteria, proxies for financial constraint i-e Total Assets and Tangible to Total Assets. We observe that the alphas of all three time- series models are higher for the

portfolio of the least financially constrained firms i-e for P1 as compare to the alphas of the portfolio of the financially most constrained firms; P10. The spread between P10-P1 is -29.02, -29.06 and -29.63 for CAPM, FF3 and FF5 respectively with all three highly statistically significant. Consequently, the Wald Test strongly rejects the null hypothesis of all ten alphas being equal to zero regardless of the asset model employed. In the same way, table 7 of the second sorting criteria Tangible to total assets report similar observations for CAPM Jansen's alpha. The portfolio of the most contained firms slightly underperforms the portfolio of the least constraint firms and the spread is also not statistically significant. But in the case of the other two time series models; FF3 and FF5, the alphas of the most constrained firms are better than the alphas of the least constraint firms and the spread is also statistically significant in the latter case. The value of the Wald test also suggests rejecting the null-hypothesis that the alphas of all ten portfolios are equal to zero.

Table 8 reports the time series risk-adjusted performance of portfolios sorted based on the firm's Cash Holdings to total assets ratio. Concerning cash Holdings to Total asset ratio, except for alphas of P3, P7, P8, and P10 others are significant. The estimated alphas for the least constrained firms perform better than the most constrained firms. The spread between P10-P1 is not significant except for FF5, where the value is -23% p.a.

Conclusion

This is the first study that examines the reaction of the return of the most and the least financially constrained firms listed in Pakistan stock exchange taking three financial constraint proxies and using a period of 19 years from 2000 to 2019. The key finding of this study is that investors are not being compensated in Pakistan Stock Exchange if they are investing in financially constraint firms. The results are consistent in literature with Lamont et al. (2001), Compello and Chen in 2010 and Balafas in 2013, Bottazzi, Secchi, & Tamagni, 2014 and Balafas and Kostakis in 2015.

The criteria or proxies of financial constraints have been used to measure the degree of financial constraints for each firm listed in the Pakistan Stock exchange. These proxies used information embedded into the assets and liabilities side of the firm's balance sheets as well as in their cash flows. Specifically, the following measures have been used: Firm size proxied by the book value of its assets, debt capacity of the firms by Tangible to total assets and cash holdings to total assets (Balafas and Kostakis, 2015).

Based on descriptive results, the measures we have utilized overall show that the shares of most financially constrained firms do not yield higher returns relative to the shares of the least constrained firms. The portfolios of most constrained firms under-perform the portfolios of the least constrained firms in most of the cases. So the overall descriptive results are aligned with one another. All other sorting criteria show that the firms listed in PSX which are financially constrained are giving returns relative to the firms with the least financial constraint.

The time-series results using asset pricing models, referring to the proxies taken for financial constraints suggest and confirms that the risk-adjusted returns of the financially most constrained firms give no premium to

the investors in Pakistan Stock exchange if we take tangible to total assets and Cash holding to total asset ratio as proxies of financial constraints and the results are somewhat mixed, negative with statistically significant and insignificant values.

References

- Almeida, H., Campello, M., & Weisbach, M. S. (2004). The cash flow sensitivity of cash. *Journal of Finance*, 59, 1777–1804.
- Angelini, P., & Generale, A. (2008). On the evolution of firm size distributions. *American Economic Review*, 98, 426–438.
- Balafas, N. (2013). Essays on Corporate Finance, Monetary Policy and Asset Pricing on London Stock Exchange. Ph. D thesis submitted in University of Liverpool, UK
- Balafas, N., & Kostakis, A. (2015). Financial constraints and asset pricing: comprehensive evidence from London Stock Exchange. *The European Journal of Finance*, 23(1), 80–110.
- Bodnaruk, A., Loughran, T., & McDonald, B. (2015). Using 10-k text to gauge financial constraints. *Journal of Financial and Quantitative Analysis*, 50(4), 623–646.
- Bottazzi, G., Secchi, A., & Tamagni, F. (2014). Financial constraints and firm dynamics. *Small Business Economics*, 42(1), 99–116.
- Campello, M., and L. Chen. (2010). "Are Financial Constraints Priced? Evidence from Firm Fundamentals and Stock Returns." *Journal of Money, Credit and Banking* 42: 1185–1198.
- Fazzari SM, Hubbard RG and Petersen BC (1988) Financing constraints and corporate investment. *Brookings Papers on Economic Activity* 2: 141–195.
- Florackis, Chris & Gregoriou, Andros & Kostakis, Alexandros. (2011). Trading Frequency and Asset Pricing on the London Stock Exchange: Evidence from a New Price Impact Ratio. *Journal of Banking & Finance*. 35. 10.2139/ssrn.1628108.
- Gomes, J. F., A. Yaron, and L. Zhang. (2006). "Asset Pricing Implications of Firms' Financing Constraints." *Review of Financial Studies* 19: 1321–1356.
- Hahn, J., and H. Lee. 2009. "Financial Constraints, Debt Capacity, and the Cross-Section of Stock Returns." *Journal of Finance* 64: 891–921.
- Jaffee, D. M., and T. Russell.(1976). "Imperfect Information, Uncertainty, and Credit Rationing." *Quarterly Journal of Economics* 90: 651–666.
- Jensen, M.C. and W. Meckling (1976), 'Theory of the Firm: Managerial Behaviour, Agency Costs, and Capital Structure', *Journal of Financial Economics*, Vol. 3, No. 4 (October), pp. 305–60.
- Kaplan, S. N., & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints? *The Quarterly Journal of Economics*, 112, 169–215.
- Kashyap, A., Lamont, O.A. and Stein, J. C., (1994), Credit Conditions and the Cyclical Behavior of Inventories, *The Quarterly Journal of Economics*, 109, issue 3, p. 565–592.
- Kumar, S., & Ranjani, K. S. (2018). Financial Constraints and Cash Flow Sensitivity to Investment in Indian Listed Manufacturing Firms. In *Contemporary Trends in Accounting, Finance and Financial Institutions* (pp. 57–69). Springer, Cham.
- Kumar, Sanjeev & Ranjani, Ks. (2018). Financial constraints and investment decisions of listed Indian manufacturing firms. *Financial Innovation*. 4. 10.1186/s40854-018-0090-4.
- Lamont, O., C. Polk, and J. Saa-Requejo. (2001). Financial Constraint and Stock Returns. *Review of Financial Studies*.14, 529–554.
- Lashitew, A. A. (2017). The Uneven Effect of Financial Constraints: Size, Public Ownership, and Firm Investment in Ethiopia. *World Development*, 97, 178–198.
- Li, Xiafei and Luo, Di, (2019), Financial Constraints, Stock Liquidity, and Stock Returns. Nottingham University Business School Research Paper No. 2014-01. Available at SSRN: <https://ssrn.com/abstract=2395267>
- Ling, Z., and S. Chen. (2012). Financial Constraints and Stock Returns: Evidence from Stock Market in China. *International Conference on Management Science & Engineering*: 1422–1428.
- Livdan, D., H. Sapriza, and L. Zhang. (2009). "Financially Constrained Stock Returns." *Journal of Finance* 64: 1827–1862
- Majluf, Nicholas S. and Stewart C. Myers. (1984) "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have," *Journal of Financial Economics*, Vol. 13, No. 2, pp. 187–221.

- Modigliani, F., and H. M. Miller. (1958). "The Cost of Capital, Corporate Finance, and the Theory of Investment." *American Economic Review* 48: 261–297.
- Myers, S. C. (1984). "The Capital Structure Puzzle." *Journal of Finance* 39: 575–592.
- Myers, S. C. (2001). "Capital Structure." *Journal of Economic Perspectives* 15: 81–102.
- Seo, K., Soh, J., & Sharma, A. (2018). Do financial constraints affect the sensitivity of investment to cash flow? New evidence from franchised restaurant firms. *Tourism Economics*, 1354816618768315.
- Statman, M. (2010). What is behavioral finance? *Research Foundation Publications*, 2(2), 1–12.
- Stiglitz, J. E. and Andrew Weiss (1981), Credit Rationing in Markets with Imperfect information, *The American Economic Review*, Vol. 71, No. 3 (Jun., 1981), pp. 393-410
- Whited, T. M., and G. Wu. (2006). "Financial Constraints Risk." *Review of Financial Studies* 19: 531–559.
- William H. Meckling, (1976). "Values and the Choice of the Model of the Individual in the Social Sciences," *Swiss Journal of Economics and Statistics (SJES)*, *Swiss Society of Economics and Statistics (SSES)*, vol. 112(IV), pages 545-560, December.