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ANOMALOUS RETURNS, RISK PREMIUMS AND DIVERSIFICATION: EVIDENCE FROM EMERGING MARKET

Abstract:

A simple size and volatility based zero-investment strategies yield 30% to 50% annual returns in Pakistan stock exchange (PSX), Pakistan. These returns are quite higher in comparison to comparable evidence for the most efficient market of the US. This study indicates that higher returns are not a vindication of market inefficiency rather, a compensation to investors for being exposed to market and illiquidity related local risks. Further, we find that PSX provides significant portfolio diversification opportunities to the international investors. These results are also manifested for other two relatively bigger emerging markets of India and Brazil with lesser diversification benefits.

Keywords:

Zero-Investment Strategy, Annual Returns, Market Risk, Illiquidity Risk, Diversification.

JEL Classification: G10, G12, G15

1. Introduction

The challenge for efficient market hypothesis is the existence of predictable anomalous returns, which can be generated by taking long and short positions on some stocks on the basis of their publically available characteristics. In the theory of efficient market, such predictable anomalous returns must be linked with the predictability of risk premium. So, that the notion of higher risk and higher gain is reconciled. This reconciliation is generally established through asset pricing models, like capital asset pricing model (CAPM) of Sharpe (1964), Linter (1965) and Mossin (1966), three factor model of Fama and French (1993) and four factor model of Carhart (1997).

The recent addition in this league of models is proposed by Hou, Xue and Zhang (2014) and Fama and French (2015) five factor model with the realization that the investment and operating profitability also constitute market wide risks. These aforesaid models are tested extensively to explain the anomalous returns for the US market in particular, and for other markets in general. There are two issues involved to implement such models for the most of emerging/frontier markets. Firstly, the data for firm related characteristics is not adequately available to construct well diversified market measures of risk, secondly the effect of illiquidity is not explicitly accounted for in these models. Therefore, to study the anomalous returns for the frontier market like Pakistan and for bigger emerging markets like India and Brazil, the liquidity adjusted capital asset pricing model (LCAMP) of Acharya and Pedersen (2005) is an appropriate choice. As within the framework of LCAPM one can capture the pricing effect of level of illiquidity, market and illiquidity risks.

The selection of Pakistan stock exchange (PSX), as emerging/frontier market is made to compare the magnitude of anomalous returns available in less researched market in comparison to the US market on the basis of commonly known strategies. Secondly to analyze if these returns can be rationalized within the risk and return framework offered by some model by implying effect of local illiquidity and market risk. We also test if the returns that are offered by PSX provide any diversification benefit to international investors. Lastly, as a robustness test we also replicated these analyses for the bigger sized emerging markets, which are India and Brazil.

We find that anomalies are of very high magnitude for the data of the period of May 1993-June 2015 (1993-2015 onwards), the excess return by being short on 20% highly capitalized stocks and long on 20% minimum capitalized stocks is 31.57% on annual basis. Similarly, portfolios based on monthly idiosyncratic volatility of returns (volatility) have the return dispersion of 50.43% on annual basis between the 20% the most volatile and 20% the least volatile portfolios. Whereas, for the same time period the zero-investment strategy for the US, yields annual excess return of 4.72% for ten equally weighted size portfolios, the same hold true of volatility related portfolios[1]. For India and Brazil, we have also gauged the size related annual premium as a difference between lowest quintile and highest quintile, these premiums are to an extent of 39.41% and 55.41%. Obviously, these premiums are very high.

Although the size and volatility related anomalies have high magnitude for PSX, however within the framework of Acharya and Pedersen (2005), LCAPM these higher returns are linked with premium associated with level of illiquidity, market and illiquidity risks. For instance, 85% of anomalous returns on size portfolios are linked with illiquidity level and market risk. Another extension of model that incorporate illiquidity level and illiquidity risk almost explain 73% of the excess returns. Similarly, for volatility related portfolios, the 100% of excess return on the most volatile and least volatile portfolios is explained by market and illiquidity risk. Whereas, the level of illiquidity is not important for the volatility related portfolios. This is quite understandable as level of illiquidity is linked with the returns on size related portfolios but the same does not hold for volatility related portfolios. These results are consistent with the previous studies of Bekaert et al. (2007) and Lee (2011), in which local illiquidity risk is found to be quite relevant for pricing in emerging markets. However, these studies are panel based, therefore the validity of the results cannot be generalized for all countries. For instance, in Lee (2011) the illiquidity premium for emerging markets is 5.58% on annual basis by implying local illiquidity risk in LCAPM[2]. In our study the premium associated with illiquidity risk are higher for all three emerging markets after controlling of level of illiquidity. The generalization based on panel analysis may also overstates the illiquidity premium, for instance in case of Poland, Lischewski and Voronkova (2012) showed that there is no illiquidity risk premium.

In our robustness test over national stock exchange (NSE) India and Sao Paolo stock exchange (SAO) Brazil for size related portfolios, we find results especially for India quite similar for PSX, Pakistan. For instance, out of 39.04% annual size related premium, the illiquidity level and market risk explain 82.19%. Whereas, one model

[1] The analysis is conducted by extracting the portfolio related information for the US market from Fama and French data library.

2 The illiquidity premiums are discussed in section 5.1 Empirical results for local liquidity risk of Lee (2011).

comprising of illiquidity level and illiquidity risk explain more than 100% of the realized size premium. Whereas, the illiquidity risk premium for NSE, India after controlling for level of illiquidity is 37.40% of the total premium explained. For SAO, Brazil the realized size based annual premium is 55.41%. This higher premium is also because of larger size related dispersion between 1st and 5th quintiles in SAO, Brazil. As regards model based predicted premiums, the level of stock illiquidity and market risk explain 40.46% of total realized premium. Whereas, level of stock illiquidity and illiquidity risk explain 56.10% of total premium. Lastly, illiquidity premium associated with illiquidity risk once controlled for level of stock illiquidity is 20.01%. Although there is a variation in market and illiquidity related premiums for the emerging markets tested in this paper, nevertheless one common observation is, that a sizeable premium is associated with the local stock related characteristics and risk factors. These variations also hint that country based analysis for impact of illiquidity over pricing in emerging markets are more illuminating than panel based analysis such as Bekaert et al. (2007) and Lee (2011).

Lastly, this study also addresses the question like, does the frontier/emerging market offer any diversification benefit to international investors. We find that for the US investor the diversification effect is economically quite significant. Once the risk of the US investor is gauged through three US specific, Fama and French (1993) factors, the annual anomalous returns of 29.16% and 43.20% on size and volatility strategy remain unexplained. Of course the underlying assumption of these results is that PSX is fully liberalized market, which is quite far-fetched. Once we implied the excess return on those firms listed on PSX (the most liquid and large firms) which are included in S&P's extended frontier 150 index. The yearly excess return of 19.68% is not explained by the three factors Fama and French (1993) model. These results indicate that PSX offers economically meaningful diversification opportunities to the foreign investors.

These diversification analyses are then again replicated for NSE, India and SAO, Brazil. The results indicate that these emerging markets are more exposed to US specific, FF (1993) factors in comparison to PSX, Pakistan. For instance, the three bigger size portfolios for the NSE, India have insignificant alphas associated with the US specific FF (1993) model, although these excess returns are positive. The significant and economically large alphas are basically for the least capitalized portfolio. The results for SAO, Brazil are more striking as the size based portfolio are even more exposed to

US specific FF (1993) factors than NSE, India. Now for three highly capitalized portfolios the model based alphas are not only insignificant, but for two portfolios they are negative.

The rest of the paper is organized as, the section 2 discusses the PSX and illiquidity related issues, in section 3 we construct test portfolios and elaborate their characteristics, section 4 illustrates the methodology and empirical analysis. In section 5 we replicate the results of section 4 for India and Brazil, in section 6 the diversification benefits for international investor in PSX market, and then the comparative analysis with Indian and Brazilian markets are discussed. Section 7 concludes.

2. Pakistan Stock Market and Illiquidity

The data for the analysis is downloaded through DataStream for the period of 1993-2015. In the initial screening of the data all non-common stocks are deleted. However, the dead firms are retained to avoid survivorship problem. There are some other cleaning procedures that are adopted to clean the data of the recording errors for DataStream database which is indicated in previous research. For instance, following Griffin et al. (2010) and Ince and Porter (2006), daily returns are set to be missing if they increase and decrease significantly such that, $r_{(t-1)} > 100\%$ or $r_t > 100\%$ and $(1+r_t) * (1+ r_{t-1}) -1 \leq 50\%$. In addition to this criterion we show a daily return missing, if it is greater than 200%. For monthly returns as well, we set those monthly return to be zero, if they increase and then revert such that they satisfy this condition $r_{t-1} > 300\%$ or $r_t > 300\%$ and $(1+r_t) * (1+r_{t-1}) -1 \leq 50\%$. Lastly all monthly returns that are greater than 800% are set to be missing.

After all, cleaning the total coverage of firms including the dead firms is 421 for the period of 1993-2015. The average number of stocks in PSX is 229, however there is considerable number of the stocks which are traded for maximum of three days within a month. If such stocks are excluded, then the average number of stocks reduced to 139. The Figure 1, traces the percentage of such firms in the sample for the period of 1993-2015. It is quite visible that concentration of such firms has decreased substantially over the time. The portion of such firms is lesser than 15% for the last five years, which is significantly lower in comparison to initial years.

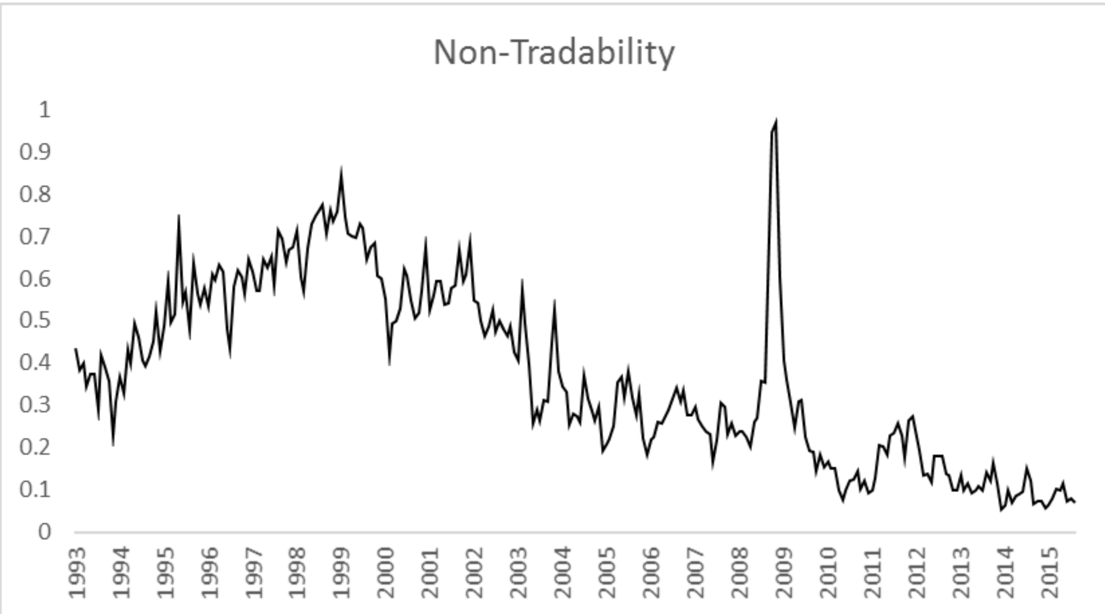
This indicates the increased liquidity of PSX market. To add to this evidence of increased liquidity, the liquidity measure for the stocks listed in PSX market is estimated as the ratio of monthly zero returns over total trading days in a month. This is expressed as under

$$ZR = ZRD_{i,t} / TD_{i,t} \qquad (1)$$

such that ZRi,t, is total zero returns in a month for a stock and, TDi,t shows the total trading days in any month. This liquidity measure is extensively being used in the literature such as by Bekaert et al. (2007) and Lee (2011) etc. The market illiquidity is simply the average of all firms ZR measure and it is shown in Figure 2, there is a straightforward exhibition of the effect that number of the firms that are traded are increased over the time. This increased trade can be attributed to decreasing transaction cost/illiquidity of the PSX market.

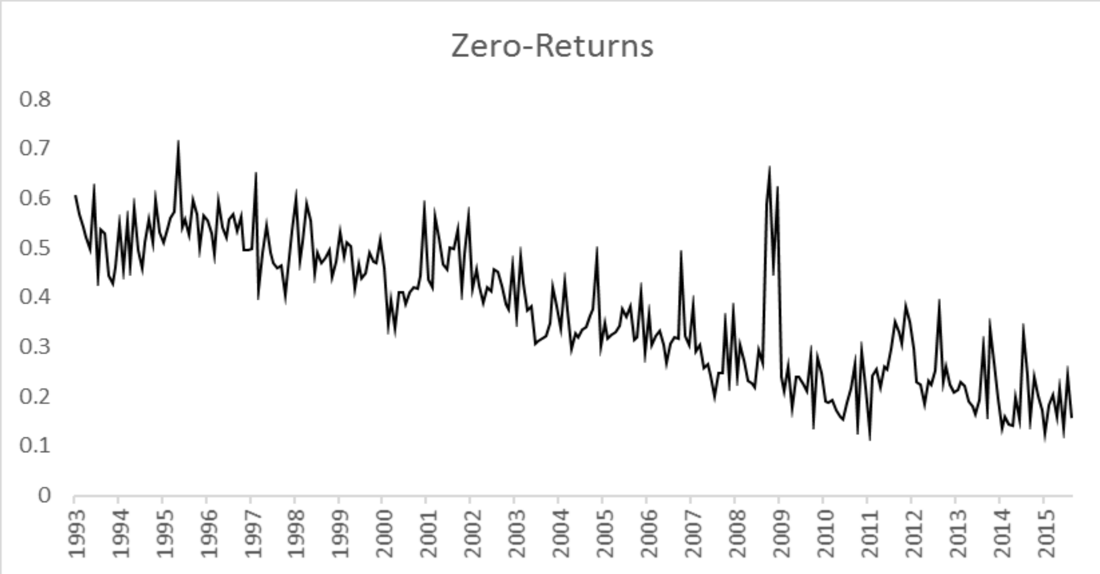
In Figure 2, there is a visible hump around December 2008, and that is owed to the imposition of “floor rule” in the context of financial crises. This results in practical shutdown of the PSX market, which led to exit of MCSI Pakistan index from MCSI emerging market index. However, condition improved in terms of tradability of firms afterwards which is also visible in Figure 2. Recently PSX is described as the best hidden frontier market3, with the 16% growth for last 12 months making it among the top ten the best performing markets. Resultantly the inclusion of PSX in emerging market index provided by MSCI is approved in the review agenda for the year 2016.

Figure 1: Average number of firms trading for maximum of three days in a month from 1993-2015.



3 Bloomberg date June 30, 2015. Link:http://www.bloomberg.com/news/articles/2015-06-30/in-best-hidden-frontier-market-boom-signals-pakistan-revival.

Figure 2: Monthly average of zero-returns of the firms traded in PSE for the period of 1993-2015.



3. Test Portfolios for PSX

There are different characteristics reported in the literature that are linked with the returns around different markets. Of them size and volatility of stocks returns are chosen for their relevance for small sized emerging/frontier market. As illiquidity, which is usually related with size and volatility are the characteristics that matter the most for the investors in such markets. There is one additional benefit of choosing these characteristics such that, level of illiquidity is linked with size and same does not hold for volatility, this point is highlighted in coming paragraphs. Nevertheless, there is significant variation in returns of the stocks based upon their apparently dissimilar level of illiquidity.

As the average number of stocks in PSX is 139, therefore only 5 portfolios are generated using each characteristic. Using size based information of the month of January 1993[4], the returns for the month of March 1993 are allocated to five portfolios[5]. Such that portfolio S-1 is the collection of those stocks whose one month's preceding size is less than or equal to 20% percentile of the size of all available firms. Similarly, the portfolios S-2, S-3, S-4 and S-5 are the collection of those stocks whose preceding month's size are increasing monotonically by 20%. We adopt for monthly sorting procedure to incorporate the maximum possible information at firm level into the

4 Which is number of shares outstanding multiplied by the end of month prices of the firm.
5 One month is left-out to control for the short-term reversal effect.

returns6. The results for the size based portfolios are shown in Table 1, and as expected the smallest size portfolio S-1 is giving the highest annual excess returns7 amounting to (3.63% x 12) 43.56%, whereas the S-5 the biggest size portfolio is giving the minimum annual excess returns of (0.92% x 12) 11.04%. The column with the caption firms shows the average number of firms within each portfolio, in column ZR the average zero-returns of the firms in each portfolio is given. It is obvious that level of illiquidity is intrinsically linked with size of the firms and therefore with the returns as well. This can be ascertained by the column size in Table 1, which are monotonically increasing.

In Table 2, the characteristics of volatility related portfolios are shown. Volatility of each stocks in monthly variance of the stocks returns, which is estimated for preceding months and then on the basis of it, stock returns in succeeding months are predicted. The portfolio construction mechanism is same as for size based portfolios. Accordingly, V-1 is the collection of those stocks whose volatility is the minimum, whereas V-2, V-3, V-4 and V-5 are the portfolios of those stocks whose volatility is monotonically increasing. The results in Table 2 are quite expected, the most volatile portfolio is the one giving the maximum annual return of (4.16% x 12) 49.92%, whereas V-1, the least volatile portfolio is giving the annual returns of (-0.04% x 12) -0.48%. The column ZR and volatility shows that illiquidity is not monotonically linked, either with returns or with volatility. Therefore, the construction of volatility related portfolios is unlike size related portfolios is independent of level of illiquidity. Nevertheless, both of these portfolios may be exposed to market-wide illiquidity risk, which is a systematic dimension of illiquidity effect.

Table 1: Size Portfolios Related Characteristic

This Table summarizes the characteristics of size related portfolios. S-1 is the portfolio which is comprised of approximately 20% of least capitalized stocks in PSE, Pakistan. Portfolios like S-2, S-3, S-4 and S-5 are those firms whose market capitalization is increasing monotonically by 20% for each portfolio, such that S-5 is the portfolio composed of approximately 20% of highly capitalized stocks. The monthly returns of these portfolios for the period 1993-2015 are shown under the heading of returns, firms' shows average number of stocks in each portfolio. ZR is monthly average of zero returns of the firms whereas, size is the average market capitalization of these firms which is product of number of shares outstanding and end of month prices, size is shown in Pak Rupees (in billion). The market beta and illiquidity related betas for these portfolios are shown as β1, β2, β3 and β4 and estimated using equation (3), (4), (5) & (6).

Portfolios	Returns	Firms	ZR	Size	β_1	β_2	β_3	β_4
S-1	3.63%	23	49%	0.09	1.121	0.911	-0.340	-0.271
S-2	2.40%	24	41%	0.49	0.935	1.089	-0.325	-0.247
S-3	1.65%	25	35%	1.48	0.921	1.034	-0.291	-0.233

6 A rationale of such strategy is elucidated in foot note 21 of Sadka (2006).
7 The risk free rates for Pakistan is taken from State Bank of Pakistan.

S-4	1.57%	26	28%	4.14	0.831	0.967	-0.230	-0.138
S-5	0.92%	27	21%	38.76	0.814	1.251	-0.214	-0.107

Source: Author's calculations

Table 2: Idiosyncratic Volatility Portfolios Related Characteristic

This Table summarizes the characteristics of Volatility related portfolios. V-1 is the portfolio which is comprised of approximately 20% of those stocks whose volatility is the least in PSE, Pakistan. Portfolios such as V-2, V-3, V4 and V-5 are those firms whose market volatility is increasing monotonically each by 20%, such that V-5 is the portfolio composed of approximately 20% of highly volatile stocks. The monthly returns of these portfolios for the period 1993-2015 are shown under the heading of returns, firms' shows average number of stocks in each portfolio. ZR is monthly average of zero returns of the firms included in each portfolio whereas, Volatility is the average volatility of these firms. The market beta and illiquidity related betas for these portfolios are shown as β1, β2, β3 and β4 and estimated using equation (3), (4), (5) & (6).

Portfolios	Returns	Firms	ZR	Volatility	β1	β2	β3	β4
V-1	-0.04%	23	33%	2.01%	0.498	1.033	-0.141	-0.247
V-2	0.92%	25	31%	2.49%	0.698	1.088	-0.226	-0.206
V-3	1.69%	25	31%	2.90%	0.872	0.945	-0.247	-0.066
V-4	2.26%	25	33%	3.84%	1.121	1.193	-0.283	-0.175
V-5	4.16%	24	42%	6.85%	1.419	1.066	-0.342	-0.234

Source: Author's calculations

4. Methodology

To price the return structure of the above constructed test assets, the unconditional version of LCAMP proposed by Acharya and Pedersen (2005) and also used in Lee (2011) is presented as under,

$$E(R_i - R_f) = E(C_i) + \lambda_1\beta_{i,1} + \lambda_2\beta_{i,2} - \lambda_3\beta_{i,3} - \lambda_4\beta_{i,4} \qquad (2)$$

in above model, E(Ci) is expected level of illiquidity of test assets, whereas other four indicated betas are estimated using following relationships,

$$\beta_{i,1} = Cov(R_{i,t}, R_{m,t}) / Var(R_{m,t} - C_{m,t}) \qquad (3)$$

$$\beta_{i,2} = Cov(C_{i,t}, C_{m,t}) / Var(R_{m,t} - C_{m,t}) \qquad (4)$$

$$\beta_{i,3} = Cov(R_{i,t}, C_{m,t}) / Var(R_{m,t} - C_{m,t}) \qquad (5)$$

$$\beta_{i,4} = Cov(C_{i,t}, R_{m,t}) / Var(R_{m,t} - C_{m,t}) \qquad (6)$$

The equation (3) represents the usual market beta. In equation (4) commonality in illiquidity (studied by Chordia et al. (2000)) related beta is shown, which sees the impact of covariance of asset illiquidity, shown as Ci, t and Cm, t market illiquidity, shown as over its returns, which is positive. As the asset that becomes illiquid when market is illiquid requires some compensation for investors to hold such assets which are not hedged against market-wide illiquidity risk. In equation (5), the illiquidity risk that capture flight to liquidity effect is shown, an asset whose return increases when market illiquidity increases provide the cushion to the investors when illiquidity at market level increases. Resultantly it is priced negatively as shown in equation (2), the studies like Amihud (2002), Pastor and Stambaugh (2003), Bekaert et al. (2007) and others analyzed the pricing implication of this dimension of illiquidity risk. Lastly, in equation (6), the impact of market-wide returns over asset's illiquidity is shown. When market returns are depressed and the illiquidity of the stock reduces then such characteristic of an asset provide an ease to trade in adverse times. Resultantly, this illiquidity beta is priced negatively, showing higher demand of such assets. Studies like Acharya and Pedersen (2005) and Lee (2011) find that this dimension of illiquidity risk is the most important for the US market and for global markets.

4.1 Estimation of Betas and their Characteristics

Illiquidity for market portfolio and for other five size and volatility related portfolios each, is estimated using equation (2). Following literature Acharya and Pedersen (2005), Lee (2011) and Sadka (2006), instead of working with monthly illiquidity series directly, innovation in illiquidity series are used. As the illiquidity series are generally highly auto correlated, for instance this autocorrelation is 0.84 for the aggregate zero returns series of market portfolio. Similarly, for size related five portfolios the auto correlation coefficient is from the 0.54 to .73, and for volatility related five portfolios the range is 0.67 to 0.81. To get the innovation in zero returns ARMA (1, 1) is used[8]. The innovations from this model are collected for monthly illiquidity of market and for other ten portfolios. Now the autocorrelations are significantly dropped, for market-wide illiquidity this correlation is now 0.02 and it is insignificant. Similarly, the innovation in illiquidity series for size related portfolio is now within the range of 0.002 to 0.08 and for volatility portfolio the innovation in illiquidity series lies in the range of 0.03 to 0.18.

Using these innovations in illiquidity series and excess return series for test portfolios and market portfolio the betas shown in equation (3), (4), (5) and (6) are calculated. The characteristics of these betas are shown in Table 1 and 2.

Table 1 summarizes the betas related relationship of size portfolios, the $\beta 1$ shows the market beta associated with each portfolio, the exposure of smaller size S-1 portfolios is higher (1.121) to market risk in comparison to bigger size portfolio S-5 (0.814). The commonality in liquidity $\beta 2$ is showing counterintuitive exposures. As it is generally

8 By using AR (2) model the innovation is illiquidity series the autocorrelation is higher, however the overall content of the results presented in coming section of empirical analysis remain the same.

expected that illiquidity of smaller portfolio increases more with the increase in market-wide illiquidity. However, its value for S-1 is 0.911 and for S-5 it is 1.251. Another form of illiquidity risk is β3, now there is significant dispersion, for instance β3 for S-1 is -0.340 and for S-5 it is -0.214, the higher time series negative relationship indicates as in Amihud (2002), that the returns of the smallest portfolio decreased the most when market's illiquidity increases. Lastly the β4 also varies monotonically in relation with size, such that S-1 has the highest negative exposure of -0.271, whereas S-5 has the minimum exposure of -0.107. Intuitively when returns on market portfolio decreases, then innovation in zero returns increases the most for S-1, that is, under depressed market conditions the smaller stocks becomes more illiquid.

Table 2 summarizes the betas related relationship with volatility portfolios, the market beta β1 shows significant variation with volatility related portfolios returns, the commonality in liquidity manifested through β2 is not directly linked, whereas with, β3 and β4 this linkage is visible, particularly the β3 is quite monotonically linked with the returns on volatility portfolios. These characteristics of betas indicate that market risk β1 and illiquidity related risk β3 for both, size and volatility related portfolios capture the variation in returns over the time.

4.2 Stock-Based Test Assets

As the number of stocks traded in PSX are not that high to construct larger number of portfolios for cross-sectional analysis. Therefore, we use stocks as our test assets, this procedure has multiple advantages. First, a lot of information of stock returns is wasted when analysis is conducted at portfolio's level as individual stock returns are averaged out. Especially for small underdeveloped markets when return variation is quite high the potential loss of information is higher. Second, the number of portfolios are usually small and when coefficient of interest is estimated the degree of freedom are reduced. To circumvent this, using the stocks for cross-sectional analysis significantly improves the estimation procedure. There is also a drawback associated with stock-based analysis, that is, the model related risk, the betas are estimated with large estimation errors. The usual procedure to handle error in variable problem is that betas are estimated at portfolios level.

For example, for the portfolio of smaller size stocks S-1, the respective betas are estimated using equation (2), (3), (4) & (5), afterwards each stock in S-1 is allocated the respective betas of the that portfolio. The same procedure is adopted for other portfolios. However, the level of illiquidity for each stock is its zero-returns in preceding months. This procedure of allocating the level of illiquidity of stock and its betas risk break the strong correlation among them which is, handful in disentangling the effect of level of illiquidity from beta risks. As level of illiquidity changes for each stock over the time whereas, betas remain same.

Table 3: Correlation Structure

This Table presents the correlation among model constituent variables for the size and volatility related portfolios. In Panel A, the correlation between level of illiquidity shown as ZR, and market beta β1 and other illiquidity related betas β2, β3 and β4 are shown. The ZR is estimated as previous month's number of zero returns for each stock whereas, each stock is allocated its portfolio related beta. In Panel B, the same correlation structure is shown for volatility related portfolios.

Panel A:	ZR	β_1	β_2	β_3	β_4
ZR	1				
β_1	0.3751	1			
β_2	-0.2699	-0.6338	1		
β_3	-0.3768	-0.8848	0.5383	1	
β_4	-0.3690	-0.8631	0.5872	0.9866	1
Panel B:	**ZR**	**β_1**	**β_2**	**β_3**	**β_4**
ZR	1				
β_1	0.1513	1			
β_2	0.0141	0.3127	1		
β_3	-0.1400	-0.9723	-0.2870	1	
β_4	-0.0641	0.0197	-0.4615	-0.1182	1

Source: Author's calculations

In Table 3, under the column of ZR, the correlation between level of illiquidity with betas risks is shown for size and volatility related portfolios. These correlations are significantly reduced at stock level in comparison to the correlations estimated at portfolio level9. Nevertheless, the betas related correlations are unaffected, as these are the same for stocks and portfolios. These correlations are quite high especially between β1 and β3 for both types of stocks, either size related or volatility. For size related stocks this correlation is -.885 and for volatility stocks it is -0.972.

4.3 Empirical Analysis

The following testable version of LCAPM proposed by Acharya and Pedersen (2005) is estimated using Fama and Macbeth (1973) cross-sectional procedure, to analyze the explanatory power of local level of illiquidity, illiquidity risk and market risk,

$$E(R_i - R_f) = \alpha E(C_i) + \lambda_1 \beta_{i,1} + \lambda_2 \beta_{i,2} - \lambda_3 \beta_{i,3} - \lambda_4 \beta_{i,4} \qquad (7)$$

9 The correlations at portfolios level can be provided upon request.

to test the above model, owing to high correlation among betas as shown in Table 3, the betas are not included within any regression except for the last one, and that is to highlight the issues of muticollinearity. In Table 4, M1 is a model in which only the level of illiquidity is included to find its impact on the pricing of size related portfolios. In M2 level of illiquidity along with the market beta is tested to see the total impact of these two risk factors. In M3, M4 and M5, the level of illiquidity with illiquidity related betas are separately tested to see among three different illiquidity related risk candidates, which one is the most relevant. Lastly, in M5 the model is tested with the inclusion of level of illiquidity, market risk and constituent illiquidity related risks. In Panel-B, the same procedure is repeated for volatility related portfolios.

In Table 4, the coefficient on the level of illiquidity for the size related portfolio is positive with the value 0.034 and associated t-stat of 3.62. Using this coefficient and following relationship,

$$\alpha \times \{E(C_1) - E(C_5)\} \quad (8)$$

where E(C1) is expected illiquidity on the smallest portfolio S-1, and E (C5) is expected illiquidity on the S-5 portfolio, these values are given in Table 1. Using the coefficient of expected illiquidity 0.034 and the average illiquidity of the respective portfolios, the annual return differential 0.034x (0.49-0.21) x 12 =0.1142 is explained by the level of illiquidity. Whereas, the actual annual return dispersion between these two portfolios is 0.3252 as given in Table 1, resultantly the total of 35.13% variation is return is explained by the level of illiquidity. In M2 model, the total explanation of return through level of illiquidity and market risk can be gauged by the following relationship,

$$\alpha \times \{E(C_1) - E(C_5)\} + \lambda_1 \times (\beta_{i,1} - \beta_{i,5}) \quad (9)$$

the coefficient on level of illiquidity α is now 0.0197 and price of market risk λ1 is 0.0601, both are positive and statistically significant. Using the differential between expected illiquidity and market risk between the portfolio S-1 and S-5 given in Table 1, the relationship (9) predicts this differential {0.0197x (0.49-0.21) +0.0601x (1.121-0.814)} x 12 to be 0.2876. That is, M2 explains 88.44% of returns differential. Of this, level of illiquidity explains 20.35% and market risk explain 68.08%. The M3 model the price commonality is liquidity risk is counter intuitive, using M4 and relationship (9), with price of risk associated with flight to liquidity effect of -0.107, level of illiquidity coefficient of 0.0222 as shown in Table 4 and respective illiquidity risk given in Table 1 under β3, the predicted yearly premium is 0.2364. That is 73% of the returns differential is explained by level and risk associated with illiquidity effect. Of which, contribution of level of illiquidity premium is 23% and of illiquidity risk is 50%. Similarly, the premium explained by model M5, using the illiquidity risk β4 and associated price of risk and relationship (9) is 0.2266 per annum. As such the most economically meaningful illiquidity risk is β3 in the context of PSX, this result is different than the results in Acharya and Pedersen (2005) and Lee (2011), as in their studies β4 is the most significant illiquidity related risk.

Table 4: Stock based analysis for size/volatility based portfolios using Fama-MacBeth regressions

The following Table presents the estimation of the Acharya and Pedersen (2005) Liquidity Adjusted CAPM,

$$E(R_i - R_f) = \alpha E(C_i) + \lambda_1 \beta_{i,1} + \lambda_2 \beta_{i,2} - \lambda_3 \beta_{i,3} - \lambda_4 \beta_{i,4}$$

The tests assets are the stocks which are grouped into five portfolios based upon their previous month's size and volatility. Subsequently, each stock is assigned market and illiquidity related betas of the portfolio to which that stock belongs. These betas are calculated using equation (3), (4), (5) and (6). The expected illiquidity ZR is stock's previous month average zero returns. Panel A, represents the estimated coefficients of the test assets on expected illiquidity and model related risk, the t-stat are shown below the coefficients in parenthesis. Panel B, repeats the same procedure for volatility based portfolios. These results are based for the period of 1993-2015.

Panel A: Size Based Portfolios

	M1	M2	M3	M4	M5	M6
ZR	0.034	0.0197	0.0283	0.0222	0.0237	0.0228
	(3.62)	(2.10)	(3.13)	(2.30)	(2.43)	(2.41)
β_1		0.0601				0.0039
		(3.08)				(0.10)
β_2			-0.0368			-0.0476
			(-2.77)			(-1.76)
β_3				-0.107		-0.336
				(-2.85)		(-2.17)
β_4					-0.0747	0.199
					(-2.65)	(1.75)
Constant	0.0180	-0.0314	0.0589	-0.0066	0.0078	0.014
	(2.40)	(-1.89)	(3.36)	(-0.66)	(1.05)	(0.31)

Panel B: Volatility Based Portfolios

	M1	M2	M3	M4	M5	M6
ZR	-0.0502	-0.0635	-0.0487	-0.0621	-0.0497	-0.0621
	(-5.99)	(-7.02)	(-5.79)	(-6.85)	(-6.02)	(-6.95)
β_1		0.0524				0.0493
		(6.10)				(3.55)
β_2			0.0353			-0.0512
			(2.51)			(-2.74)
β_3				-0.246		-0.0357

				(-6.14)		(-0.69)
β_4					-0.0272	-0.0585
					(-1.44)	(-2.38)
Constant	0.0419	-0.00367	0.00395	-0.0170	0.0366	0.0331
	(5.45)	(-0.54)	(0.28)	(-2.17)	(4.21)	(2.32)

Source: Author's calculations

It seems that significance of indicated illiquidity risk is country specific. Lastly, in M6 all of the constituent risk factor of equation (7) are estimated, although only level of illiquidity and β3 have the theoretically tenable sings and significance but nevertheless, these results are affected by multicollineraity, for instance the magnitude of price of risk associated with flight to liquidity effect is increased but its statistical significance is reduced in comparison to model M4.

In Panel B, Table 4 the results for volatility related portfolios are summarized. Here we find the negative coefficient on the level of illiquidity, as the stocks related with their volatility show no monotonic relationship with the level of illiquidity as shown in Table 2, column ZR. Therefore, this result means, level of illiquidity for the volatility related stocks is not economically important. Using the output of the model M2 in Table 4, the corresponding variables given in Table 2 and equation (9), the predicted premium is 0.5105. Whereas, the actual return dispersion between V-5 and V-1, given in Table 2 is .5040 on annual basis. Similarly using the output of M4, this predicted premium is 0.5263. Generally, all of the excess return is predicted either by the market risk or by the illiquidity risk β3. The other two illiquidity risks are not important for the pricing of volatility related stocks. These results also hint, that even if level of illiquidity is not linked with the stock returns, the market-wide illiquidity risk is still significant part of the pricing of such stocks.

5. Illiquidity Analysis for NSE, India and SAO Brazil

In this paper the detailed analysis is mainly conducted for PSX, Pakistan and our finding is that magnitude of anomalous returns are quite higher in comparison to the US market which is probably the most liquid market. Further these higher returns are linked with local pricing factors, such as level of illiquidity of the stocks, market risk and illiquidity risk. However, to show that, these results are not just confined to PSX, Pakistan. Instead the bigger emerging markets such as India and Brazil have somewhat same characteristics. To show that we have repeated the analysis in section 5, for size based portfolio for Indian and Brazilian markets.

In both the markets, we use only one major stock exchange on which majority of the stocks in that country are listed. For India, we use National Stock Exchange (NSE) and for Brazil, we use Sao Paulo Stock Exchange (SAO). We apply static screens provided by Ince & Porter (2006), Griffin et al (2010) and Schmidt et al (2015), to clean our data set. At first, we exclude the cross listed stocks, stocks which are not listed on the domestic stock market and stocks which are non-equity type. For Brazil, Lee (2011), retain a certain type of preference stocks with the symbol 'PN' as these are like common equity. We also retain these types of preference stocks in our sample. Secondly, we exclude all the financial firms from our sample. Hence, our final sample comprises of 1,475 stock for India and 475 stocks for Brazil. To address the survival ship bias, we retain all the dead firms in our sample. We also apply the dynamic screens on our samples to get rid of the errors in data obtained from DataStream and these cleaning procedures are also mentioned in section 2.

Using the data of market capitalization for these countries, we construct five size based portfolios following the same procedure that is described in section 3. The results are shown in Table 5, panel A for NSE, India. Under the column returns, the size premium (0.0412-0.0087) x 12 is 39% on the annual basis. The size premium is as high as is for PSX, Pakistan, although the number of firms in each quintile and average market capitalization (shown as firms and size in the Table 5, panel A) of these firms listed in NSE[10], India are quire higher than PSX, Pakistan. This indicates, that the high premiums are not just restricted for smaller size hybrid natured markets like PSX, Pakistan[11]. As expected the zero returns, ZR are higher for smaller sized portfolio and this points to their higher level of illiquidity. Lastly, the fours risks, one is market risk β1 and other three illiquidity related risks β2 β3 β4 are also shown, the gap of exposure between S-1 and S-5 with market risk β1 and illiquidity risk exhibited through β3 and β4 are well alighted with the theoretical notion of the pricing of size premium. For instance, the higher β1 for S-1 indicates, the returns for least capitalized portfolio co vary more with market returns. Similarly, the higher negative exposure for β3 and β4 indicates, in the case of later beta that the higher market illiquidity decreases the return of S-1 the

10 As the Indian currency is stronger than Pak Rupees, therefore the market capitalization of Indian firms is even higher once their currency denomination is changed to Pak Rupees.
11 Pakistan for the most of the time been an emerging market, then this status is changed to frontier market in 2008 and it is to come back to emerging market index in 2017.

most, and for the former beta, when the market returns decrease the most, the cost of trade for S-1 increases the most.

Table 5: Size Portfolios Related Characteristic for NSE, India and SAO Brazil

In this table panel A summarizes the characteristics of size related portfolios for NSE, India. S-1 is the portfolio which is comprised of approximately 20% of least capitalized stocks in NSE, India. Portfolios like S-2, S-3, S-4 and S-5 are those firms whose market capitalization is increasing monotonically by 20% for each portfolio, such that S-5 is the portfolio composed of approximately 20% of highly capitalized stocks. The monthly returns of these portfolios for the period 1994-2015 are shown under the heading of returns, firms' shows average number of stocks in each portfolio. In panel A, ZR is monthly average of zero returns of the firms included in each portfolio. The size is the average market capitalization of these firms which is product of number of shares outstanding and end of month prices, size is shown in local currency (in billion). The market beta and illiquidity related betas for these portfolios are shown as β1, β2, β3 and β4 and estimated using equation (3), (4), (5) & (6). In panel B, the same analysis is repeated for Brazil.

Panel A: India Size Portfolios

Portfolios	Returns	Firms	ZR	Size	β_1	β_2	β_3	β_4
S-1	4.12%	178	27.10%	0.13	1.134	0.978	-0.211	-0.120
S-2	2.31%	177	18.72%	0.53	1.098	1.017	-0.168	-0.074
S-3	1.72%	177	15.16%	1.49	1.031	1.007	-0.128	-0.052
S-4	1.20%	177	12.15%	4.83	0.950	0.993	-0.153	-0.020
S-5	0.87%	178	9.53%	77.25	0.768	0.986	-0.151	0.010

Panel B: Brazil Size Portfolios

Portfolios	Returns	Firms	ZR	Size	β_1	β_2	β_3	β_4
S-1	5.88%	29	53.99%	0.02	1.117	0.795	-0.146	-0.059
S-2	3.49%	28	40.08%	0.21	0.974	0.946	-0.107	0.000
S-3	2.77%	28	30.57%	0.68	1.033	1.126	-0.064	-0.028
S-4	1.86%	28	24.50%	1.99	0.901	1.034	-0.075	0.019
S-5	1.26%	29	22.58%	29.66	0.954	1.088	-0.040	0.000

Source: Author's calculations

In Table 5, panel B the information for five size related portfolios is summarized for the SAO, Brazil. Here the average annual size premium (0.0588-0.0126) x 12 is 55.44%, which is highest among the size related premiums calculated for the three markets. Although firms market capitalizations listed in SAO, Brazil is higher than the firms listed in NSE, India[12]. However, in comparison to India, the average zero returns for the firms noted under the column ZR are quite higher for Brazilian market[13], especially for S-1 portfolio the ZR is even higher in comparison to PSX, Pakistan. As regards, the market and illiquidity related risks captured by β1, β2, β3, and β4, the exposure and their signs reconcile with the returns patterns for size related portfolio, expect for the β2. These characteristics of size-related portfolios and their relationship with level of illiquidity, market and illiquidity related risks for PSX, Pakistan, NSE, India and SAO, Brazil have quite a many similar features.

12 It is because the Brazilian Real is stronger than Indian Rupee.

13 In Lee (2011), as well the average of zero returns for Brazil are quite higher in comparison

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5.1 Empirical Analysis for NSE, India and SAO Brazil

Following the procedure defined in section 4.2, our test assets are the stocks which provided us with huge degrees of freedom for testing the LCAPM presented as equation (2). In Table 6, panel A, the model based estimated premiums are indicated for the NSE, India. In M1, the estimated coefficient of level of illiquidity of stock is positively priced as per expectation.

As per relationship (8), the predicted premium associated with level of illiquidity14 {(.2710-.0953) x0.0538} x12 is 0.1134 yearly. This signify that 29% of total realized annual premium which is, 0.39 is explained by the level of illiquidity. In M2 the level of illiquidity and market risk predicted premium {(.2710-.0953) x0.036+ (1.134-0.768) x0.056} x12 is 0.3216 yearly, which is 82.46% of total realized premium of 0.39.

For brevity we next enunciate the best level of illiquidity and illiquidity risk related model, which is M5. The predicted annual premium {(.2710-.0953) x0.027+(-0.120-0.010) x-0.241}x12 is 0.4332, which is higher than the realized size related premium of 0.39 for NSE, India.

In table 6, panel B the results for testing the equation (7) are shown for Brazil. As expected level of illiquidity of stocks is positively priced, and using the relationship (8), it predicts 0.1583 yearly premium for the realized difference between S-1 and S-5 which is, 0.5544. That is 28.55% of illiquidity premium is associated with the level of illiquidity. In model M2, level of illiquidity and marker risk predicts the annual premium to be 0.2258, which is 40.73% of total realized premium. Lastly, the best model for level of illiquidity and illiquidity risk M4, and it predicts yearly premium of 0.3116, which amounts to 56.20% explanation of the total premium. In nutshell our results remain consistent as we find that the high premiums for investing in emerging markets like PSX, Pakistan, NSE, India and SAO, Brazil are linked with local risk factors.

Table 6: Stock based analysis for size based portfolios using Fama-MacBeth regressions

The following Table presents the estimation of the Acharya and Pedersen (2005) Liquidity Adjusted CAPM,

$$E(R_i - R_f) = \alpha E(C_i) + \lambda_1 \beta_{i,1} + \lambda_2 \beta_{i,2} - \lambda_3 \beta_{i,3} - \lambda_4 \beta_{i,4}$$

The tests assets are the stocks which are grouped into five portfolios based upon their previous month's size. Subsequently, each stock is assigned market and illiquidity related betas of the portfolio to which that stock belongs. These betas are calculated using equation (3), (4), (5) and (6). The expected illiquidity ZR is monthly average of zero returns of the firms included in each portfolio. The estimated coefficients on expected illiquidity as measured by ZR and model related risk are shown in the table, the t-stat are shown below the coefficients in parenthesis. These results are based for the period of 1994-2015. In panel A, the results are for NSE, India and in panel B, the results are for SAO, Brazil.

14 Level of illiquidity are taken from the table 5, panel A for India under the column ZR.

Panel A: India Size Portfolios

	M1	M2	M3	M4	M5	M6
ZR	0.054	0.036	0.049	0.040	0.027	0.025
	(4.01)	(2.97)	(3.82)	(3.28)	(2.32)	(2.15)
β_1		0.056				0.002
		(5.29)				(0.03)
β_2			0.336			-0.261
			(3.70)			(-2.06)
β_3				-0.120		-0.001
				(-4.89)		(-0.01)
β_4					-0.241	-0.293
					(-6.36)	(-3.72)
Constant	0.013	-0.040	-0.321	-0.025	-0.008	0.244
	(1.99)	(-4.66)	(-3.69)	(-3.63)	(-1.44)	(2.31)

Panel B: Brazil Size Portfolios

	M1	M2	M3	M4	M5	M6
ZR	0.042	0.035	0.032	0.029	0.036	0.028
	(4.62)	(4.01)	(3.55)	(3.22)	(4.13)	(3.10)
β_1		0.048				0.119
		(2.84)				(0.69)
β_2			-0.037			0.068
			(-3.11)			(2.54)
β_3				-0.159		-0.357
				(-4.24)		(-3.86)
β_4					-0.113	0.315
					(-2.50)	(0.69)
Constant	0.011	-0.034	0.051	0.001	0.011	-0.197
	(1.73)	(-1.97)	(3.49)	(0.16)	(1.81)	(-1.25)

Source: Author's calculations

6. Diversification

There is a series of papers (Bekaert (1995), Bekaert, Geert, and Campbell R. Harvey (1995), (1997), (2000) and others), in which diversification of portfolio risk by the inclusion of the stocks traded in emerging markets is discussed. The volatility of higher returns and higher illiquidity in such markets is compensated at local level, as is the case with PSX analyzed in previous sections. However, for international investors this volatility and illiquidity, is not translated into risk till the time it results into higher correlation with the risk factors against which they aspire to hedge their portfolios returns, or demand the compensation for being exposed to. To elaborate this, we take the example of the US investor and assume that the three factors, market, size and value of Fama and French (1993) are the true source of risk. Now if the size and volatility related portfolios in PSX are equally exposed to such factors as are the returns on comparable portfolios in the US market, then no hedging benefits can be achieved by the US investor. Naturally, we concentrate on alphas of three factor model15 (constructed for the US market) for five size and volatility related portfolios (test assets based on PSX stocks). The returns in PSX market are converted in US dollars and to get excess returns the risk free rates given in Fama and French website are used.

In Table 7, the estimated out-put of the three factor model of Fama and French (1993) is given. There is statistically significant exposure of the returns of these PSX size and volatility related portfolios on risk factors for the US market. Nevertheless, the annual excess dollar return on the portfolio S-1 and S-5 are 44.16% and 12.6% in the PSX. Whereas, 34.44% and 5.28% annual returns of these portfolios are not explained as shown in Table 7. Similarly, for portfolio V-5, the excess returns are 51.24%, whereas 39% are not explained, whereas for the least volatile portfolio V-1, the alpha is insignificant. On the other hand, the excess returns on size related ten portfolios for the US market are well explained by the three factor model16. For instance, the yearly alpha on S-1 and S-10, for the US based sized related portfolios are -2.04% and -1.44%, that is after accounting for the risks there is no excess returns on these portfolios remain available.

The above analysis indicates that an international investor by investing in stocks traded in PSX can get higher returns and at the same time reduce the risk. As returns on PSX are not that correlated with the risk factors that are quite pertinent for international investor.

Nevertheless, these results are based on the extreme assumption of total liberalization. However, as indicated in previous research that markets like PSX are neither fully integrated nor segmented. Although the official liberalization date for Pakistan is February 1991 17, nevertheless all stocks still remain practically inaccessible to

15 The three factors for the US market are taken from the Fama and French data library.
16 The ten equal weighted size related portfolios and respective three risk factors are downloaded by Fama and French data library, the detail results on the estimation of this model are available upon request.
17 These liberalization dates for different markets are given in Bekaert and Harvey (2000).

foreigners. To proxy for the investable stocks we downloaded from DataStream, S&P/IFCG Extended Frontier 150 Index for Pakistan, which include the most liquid and larger capitalized firms traded in PSX. The index is available from November 2008 onwards, the average number of stocks from PSX are 17. If this portfolio is held by the US investor, then the alpha from three factor Fama and French (1993) model is 19.68% annually. On the other hand, the annual alpha is -0.0492%, that is, practically non-existent when the CAPM implying local market risk is used. Therefore, even for the most investable stocks in PSX the local risk matters the most, the risks for instance for the US investor do not count. These results indicate the diversification opportunities are available for foreign investors by holding the stocks from emerging/frontier markets in their portfolios.

Table 7: Relationship between local returns with international risk factors

This Tables presents the results of Fama and French (1993) three factor model, by using the risk factors for the US market which are excess market return MR, size factor SMB, value factor HML.

$$E(R_i - R_f)_t = \alpha_{i,t} + \lambda_{i,m}(MR - R_F)_t + \lambda_{i,smb}(SMB)_t + \lambda_{i,hml}(HML)_t$$

The test assets are excess return on the size and volatility based five portfolios for the PSE, Pakistan. The returns are denominated in US$, the time period of the analysis is 1993-2015. The t-stats for each coefficient is presented below in prentices, the last column shows the R2 of each model and adjusted R2 is presented below in prentices.

Panel A: Size Portfolios

Portfolios	Constant	MR	SMB	HML	R^2
S-1	0.0287	0.415	0.929	0.557	0.084
	(3.56)	(2.56)	(3.59)	(2.12)	(0.074)
S-2	0.0182	0.454	0.557	0.216	0.086
	(2.73)	(3.40)	(2.51)	(1.00)	(0.076)
S-3	0.0114	0.407	0.283	0.174	0.056
	(1.80)	(3.19)	(1.39)	(0.84)	(0.045)
S-4	0.0127	0.334	0.308	0.100	0.059
	(2.11)	(2.75)	(1.59)	(0.05)	(0.049)
S-5	0.0044	0.446	0.333	0.167	0.075
	(0.72)	(3.63)	(1.70)	(0.84)	(0.065)

Panel B: Volatility Portfolios

Portfolios	Constant	MR	SMB	HML	R^2
V-1	-0.0035	0.286	0.187	0.082	0.070
	(-0.90)	(3.49)	(1.51)	(0.65)	(0.059)
V-2	0.0059	0.294	0.289	0.029	0.060
	(1.15)	(2.71)	(1.76)	(0.17)	(0.049)
V-3	0.012	0.417	0.289	0.074	0.060
	(1.86)	(3.06)	(1.41)	(0.35)	(0.049)
V-4	0.0177	0.446	0.497	0.087	0.069

	(2.34)	(2.94)	(2.05)	(0.35)	(0.059)
V-5	0.0325	0.622	0.725	0.594	0.066
	(3.28)	(3.13)	(2.28)	(1.84)	(0.055)

Source: Author's calculations

Table 8: Relationship between local returns for India and Brazil with international risk factors.

This Tables presents the results of Fama and French (1993) three factor model, by using the risk factors for the US market which are excess market return MR, size factor SMB, value factor HML.

$$E(R_i - R_f)_t = \alpha_{i,t} + \lambda_{i,m}(MR - R_F)_t + \lambda_{i,smb}(SMB)_t + \lambda_{i,hml}(HML)_t$$

The test assets are excess return on the size and volatility based five portfolios for the NSE, India and SAO, Brazil. The returns are denominated in US$, the time period of the analysis is 1993-2015. The t-stats for each coefficient is presented below in prentices, the last column shows the R2 of each model and adjusted R2 is presented below in prentices.

Panel A: Size Portfolios India

Portfolios	Constant	MR	SMB	HML	R^2
S1	0.0337	0.674	0.295	0.182	0.067
	(4.39)	(3.77)	(1.21)	(0.74)	(0.056)
S2	0.0144	0.765	0.338	0.235	0.100
	(2.07)	(4.70)	(1.53)	(1.05)	(0.089)
S3	0.0091	0.774	0.324	0.239	0.114
	(1.39)	(5.09)	(1.57)	(1.14)	(0.103)
S4	0.0038	0.786	0.378	0.233	0.139
	(0.63)	(5.59)	(1.98)	(1.20)	(0.129)
S5	0.0012	0.751	0.38	0.106	0.182
	(0.23)	(6.42)	(2.39)	(0.66)	(0.172)

Panel B: Size Portfolios Brazil

Portfolios	Constant	MR	SMB	HML	R^2
S1	0.04	0.951	0.411	0.133	0.128
	(4.89)	(5.12)	(1.63)	(0.52)	(0.117)
S2	0.0127	1.185	0.419	0.153	0.261
	(1.95)	(8.13)	(2.11)	(0.77)	(0.252)
S3	0.0056	1.305	0.298	0.184	0.298
	(0.90)	(9.24)	(1.55)	(0.95)	(0.289)
S4	-0.0031	1.209	0.456	0.188	0.33
	(-0.56)	(9.55)	(2.65)	(1.08)	(0.321)
S5	-0.0099	1.465	0.251	0.152	0.348
	(-1.60)	(10.46)	(1.32)	(0.79)	(0.34)

Source: Author's calculations

In the Table 8, panel A and B the result is repeated for NSE, India and SAO, Brazil for 5 size related portfolios. Here the results are different from PSX, Pakistan, although local risk factors are important for all three emerging markets. But the international risk factors are more important for NSE, India than PSX, Pakistan and for SAO, Brazil these are even more important than NSE, India. Especially, for the highly capitalized portfolios. For instance, for India S-5 the annual alpha is (0.0012x12) 0.0144 with a t-stat of 0.23, further the extent of exposure of S-5 towards US market returns and adjusted R2 of the model is more than the twice for comparable level the most capitalized portfolio for PSX, Pakistan. Although, the least capitalized portfolio S-1 still has the yearly alpha of (0.033x12) 0.4044 with the t-statistics of 4.39. These stocks are generally too small to attract any attention of foreign investors. The results for SAO, Brazil indicates that it is more integrated market and the variation in market returns of the US market have economically significant bearing for the returns in SAO. For instance, the market beta of the 3-factor model and adjusted R2 is more than the twice in comparison to NSE, India for highly capitalized portfolio. For instance, S-5 and S-4 portfolio which carry more than 80% of market capitalization of SAO, have negative alphas and exposure to US market return for portfolios S-2, S-3, S4 and S-5 are more than 1. Like India though only the least capitalized portfolio S-1 has significant positive alphas, but probably due to their smaller size and high illiquidity they remain out of reach of foreign investors.

7. Conclusion

The anomalous returns using the publically available information are reported extensively across different markets as a challenge to efficient market hypothesis. Although these returns in terms of magnitude are not that high in the developed markets, but still managed to attract a lot of empirical inquisition. For instance, for the US market the return differential between the least and the largest capitalized equally weighted portfolio is 4.69% on annual basis for the period of 1993-2015, same holds true for volatility, book-to-market, operating profits and investment etc. related firm’s characteristics. On the other hand, for the emerging/frontier markets like PSX, the annual returns based on size and volatility based strategy are 31.57% and 50.43% on annual basis. The lesser focus is given in literature to rationalize these higher returns within the framework of efficient market hypothesis. This study fulfils this gap and analyzed that higher returns is emerging/frontier markets is not a manifestation of inefficiency of the market. As within the pricing model of LCAPM proposed by Acharya and Pedersen (2005), almost all of the extra-ordinary returns are linked with the local risk premiums that investors demand in terms of effect of illiquidity and market risk to which investors are exposed. Further, the high magnitude of anomalous returns is not just confined to relatively smaller sized market like PSX, in fact the bigger emerging markets like India and Brazil have this tendency of yielding enormous premiums. Nevertheless, even in these markets these higher premiums can be rationalized through local asset pricing factors.

Although these local risks are very important for pricing of the stocks in PSX, but their return structure remain isolated to international risk factors proxy by the market, size and value factors for the US market. Such that for size and volatility based PSX portfolios the return differential of 2.43% and 3.60% between the extreme portfolios is not explained. These results just do not confine for such stocks which are least capitalized and illiquid and therefore inaccessible to foreign investors. Even for highly capitalized and liquid stocks in PSX that constitute a part of S&P/IFCG extended 150 index, the annual returns of 19.68% is not explained. Whereas, the returns on these stocks are totally rationalized within the simple CAPM using the local market risk factor. This indicates that the opportunities for portfolio diversification for international investors are quite real. However, these results are not repeated with the same vigor for India and Brazil. This could due to larger size of NSE, India and geographical proximity of SAO, Brazil market to the US, market.

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