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Time varying size and liquidity effects in South Asian equity markets: A study of blue-chip industry stocks

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ABSTRACT

This paper contrasts the performance of the Capital Asset Pricing Model (CAPM) augmented by size and liquidity factors with its time varying coefficient counterpart, using a unique market universe compiled from constituent stocks of blue chip indices BSE-100 (India), KSE-30 (Pakistan), DSE-20 (Bangladesh) and Dow Jones Titans (Sri Lanka). The evidence suggests that substantial size and liquidity effects are present in all markets with the exception of Sri Lanka. Time varying liquidity beta profiles reveal that the financial sectors of all South Asian markets have been affected by the 2008 financial crisis with exception of Sri Lanka where the market is influenced by the prolonged civil war.

1. Introduction

The enhancement of standard pricing models such as the Capital Asset Pricing Model (CAPM) with the addition of factors offering improved explanatory power over the cross section of stock returns has received considerable attention in the literature. While pricing theory states that the cross section of expected stock returns are related to the returns' sensitivities to state variables, which themselves are linked to investor welfare, there is interest in the nature of the state variables themselves. Fama and French (1993) (henceforth FF) first proposed that variations in size, defined as the valuation differences between value and growth stocks, and variations in accounting book value and market value of stocks are two such candidates for state variables. Furthermore, supplementing the traditional CAPM with two additional returns-based factors representing these state variables provided improvements over the simple market-factor alone. More recently, liquidity has been proposed as a state variable with a range of methods cited for its measurement. Pastor and Stambaugh (2003) found evidence of increased support for a trading volume based liquidity factor augmenting the FF model, while Liu (2006) introduced a new trading speed measure designed to capture both traded turnover as well as frequency of trading as elements of liquidity. Furthermore, Liu (2006) found evidence that the addition of the single liquidity factor alone to the traditional CAPM generated increased explanatory power in excess of either the one factor CAPM or the FF model.

However, there is a lack of evidence concerning the benefits of including both the FF size and book-to-market value factors in modelling the cross section of stock returns in Pakistan (Iqbal & Brooks, 2007) and India (Ameer, 2007). The presence of size effects is especially likely in emerging South Asian markets given the considerable dispersion of listings that are commonly from either larger internationally focussed firms or indigenous small and medium enterprises (SMEs), which are often controlled by dominant family groups (Athey & Laumas, 1994; Manos, Murinde, & Green, 2007). There is evidence of major differences in trading activity and liquidity within markets across the South Asian region. Poshokwale and Theobald (2004) and Karmakar (2010) cite differences in liquidity across sectors within the large Indian equity market while this is a pervasive issue in Sri Lanka (Elyasiani, Perera, & Puri, 1998), Pakistan (Iqbal & Brooks, 2007) and Bangladesh (Akhtaruddin, 2005). Consequently this study investigates whether size and liquidity effects are priced in these markets. The issue is whether differences in cross sectional expected returns can be better explained by including factors accounting for the differences in aggregate market-wide size and liquidity effects than simply the market factor of the traditional CAPM.

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Liquidity as a concept is very hard to define largely because its characteristics transcend a number of transactional properties of markets including tightness, depth, resilience (Lesmond, 2005) and information (O'Hara, 2003). The literature has traditionally been limited in only using constructs that capture only one dimension of a multidimensional phenomenon. This typically centres on variants of the bid-ask spread (quoted or effective) in Amihud and Mendelson (1986), the turnover measure of Datar, Naik, and Radcliffe (1998), or measures relating to the price impact arising from traded volume such as Amihud (2002) and Pastor and Stambaugh (2003). However, there is very little published research concerning measures capturing the trading speed dimension of liquidity, defined as the ability to transact large quantities quickly with little price impact (Liu, 2006; Pastor & Stambaugh, 2003). Furthermore, there are serious concerns over the ability of existing one-dimensional constructs to fully capture liquidity risk and their inaccurate estimation of the dimension they are intended to model (Amihud, 2002; Pastor & Stambaugh, 2003). Equally deficiencies in the application of the bid-ask spread measure have been highlighted in Lee (1993) where evidence reveals that many large trades occur outside the bid-ask spread while many small trades are undertaken within it, leading to potential bias. Further concerns over the application of one-dimensional measures focus on the fact that they are undefined in the presence of extremes of illiquidity, as is frequent in smaller regional markets (Lesmond, 2005). A more recent measure developed by Liu (2006) captures the trading speed dimension of liquidity, defined as the standardized turnover-adjusted number of zero trading volumes over the past 12 months. It is multi-dimensional and captures effects relating to trading speed, trading quantity and trading cost, with an emphasis on trading speed, defined as the continuity of trading and the potential delay in executing an order (Liu, 2006). An additional benefit from this measure arises is its robustness in the presence of significant illiquidity (Liu, 2006), again as is often present in emerging markets (Hearn & Piesse, 2009).

The literature concerning the inclusion of liquidity as a priced state variable in a valuation framework is very recent. Pastor and Stambaugh (2003) find strong evidence from US stock data that market-wide liquidity is a priced state variable and that it should be positive. The study applied the innovations of a price impact measure of liquidity to sort stocks within a universe into decile portfolios with the market aggregate premium formed by the difference between returns of the highest and lowest liquidity deciles. The explanatory power from including this fourth fact was established by comparison with the Fama and French (1993) three factor model and the traditional CAPM. Stocks with higher sensitivity to aggregate liquidity stocks compensate investors with higher expected returns. Evidence is also found that small stocks have greater sensitivity to liquidity innovations than large stocks. Pastor and Stambaugh (2003) note that intuitively it could be expected that small and illiquid stocks are those most affected by market aggregate drops in liquidity and this causes investors to flee to assets with higher liquidity. However, their findings also show that size and liquidity are not the sole determinants of liquidity betas. This is reinforced by the argument that stocks with a high liquidity beta are not necessarily illiquid. Investor preferences when there are market aggregate falls in liquidity are also likely to focus on rival bond markets. In order to increase portfolio holdings in bonds investors may seek to sell liquid stocks in order to save on transactions costs. Consequently in this scenario the price reaction to aggregate liquidity changes is stronger for more liquid stocks. Equally, prices of liquid stocks could have greater sensitivity to aggregate liquidity shocks if such stocks are held in greater proportions within the portfolios of liquidity-conscious investors. Thus, Pastor and Stambaugh (2003) find little basis for liquidity betas to bear a simple relation to stock size and liquidity. Liu (2006) builds on this first using a new liquidity construct to estimate stock liquidity and then including this factor within a two factor augmented CAPM. While the additional liquidity factor offers strong performance in explaining the cross section of US stock returns the results contradict earlier findings of Pastor and Stambaugh as the liquidity premium alone incorporates anomalies such as size and the book-to-market effects in Fama and French (1993).

The literature relating to South Asian stock exchanges typically focuses on the Indian equity market with some peripheral studies on Pakistan, Bangladesh and Sri Lanka. Research on the Indian market has evolved extensively over the last 15 years with studies relating to market microstructure and information transmission between large and small stocks (see Poshokwale and Theobald (2004); Karmakar (2010)) as well as a larger volume of studies focussing on the roles of family groups and control in Indian listed firms. The latter investigates capital structure decisions of Indian firms (see Chakraborty, 2010; Manos et al., 2007) as well as the contrast between sourcing funds internally as opposed to banks or the stock market (see Athey & Laumas, 1994). The scant literature that focuses on the wider sub-continent is concerned with the dynamic linkages between the Sri Lankan equity market and other South East Asian nations (Elyasiani et al., 1998), corporate disclosure and informational content of stock prices in Bangladesh (Akhtaruddin, 2005) and the application of the CAPM in Pakistan (Iqbal & Brooks, 2007). However, any extension of the CAPM to include liquidity measurement or an application of this to industry portfolios across the wider South Asian regional markets is new. Consequently, the motivation here is to focus on the wider South Asian sub-region. A unique perspective on individual industry sectors is provided that justify the consideration of stocks that are constituent members of blue chip indices as these are most likely to satisfy the asset market integration and informational assumptions inherent in the CAPM and are of most interest to overseas investors. Consequently I make a contribution to the literature in extending the scope of the CAPM (see Sharpe, 1964; Lintner, 1965 for detailed overview) to include additional size and liquidity effects while broadening the application to a regional level across South Asia.

The majority of the valuation literature on pricing models assumes a time invariant relationship in the systemic risk of an asset. However, a separate literature addressing the time varying nature of systemic risk has evolved because of an increasing concern about the violation of assumptions inherent in the linear model, such as normality, identity and independence of stock returns (Grout & Zalewska, 2006). Pettengill, Sundaram, and Mathur (1995) and Ho, Strange, and Piesse (2006) studied the relationship between risk and return in “up” and “down” markets while Bekaert and Harvey (1995) undertook a similar study using Markov-switching regressions across a sample of emerging markets to examine differences between periods of integration with world markets and segmentation. More recently Watanabe and Watanabe (2008) incorporate a Markov-switching regime model to account for a time varying liquidity premium across a universe of US stocks. However Brooks, Faff, and McKenzie (1998) used time varying techniques based on the Kalman-filter approach applied Australian industry portfolios and found that these techniques produced improved in and out of sample performances than other econometric techniques. Grout and Zalewska (2006) find that the use of Kalman filter methods is preferable to Markov-switching regressions as it was not necessary to define the exact point of the switch (Grout & Zalewska, 2006). Instead any changes in the time path of betas can be assessed using regression results, which is particularly relevant in modelling liquidity effects in the presence of the fluctuation within emerging markets. Thus, following Brooks et al. (1998), this paper uses time varying techniques and the Kalman filter.

The results show that aggregate size and liquidity effects are significant in all these South Asian markets with the exception of Sri Lanka. Similar results are found using the time varying techniques. The more illiquid smaller and less developed markets, namely Bangladesh and Sri Lanka, are reflected in the reduced levels of both significance of factors and overall explanatory power from both the one and three factor CAPM. Evidence from the in-sample profiles of the time varying liquidity betas reveals that while liquidity betas are largely centred on zero and insignificant for blue chip Indian stocks they have decreased considerably since 2002 for top tier Pakistan stocks. The liquidity beta