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When the market becomes inefficient: Comparing BRIC markets with markets in the USA☆

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ABSTRACT

A rational investor will believe that an efficient market today will remain efficient tomorrow. However, when emotions take over, markets are no longer efficient. Further, they may remain so for longer anyone can forecast. Evidence of such inefficiencies is prominent in large emerging markets in Brazil, Russia, India and China and also in developed markets in the USA. When a market is inefficient and sentiments play a dominant role in an investor's decision making, valuation by any existing asset pricing model would produce a suboptimal risk–return relationship. Standard pricing technology will guide a rational investor to wrong policies for his new investments or for reallocating his old investments. In an alternative approach, we have worked out a model which incorporates market sentiments in the domain of the standard rational model of asset pricing. Our model is applicable for a 'less than' efficient market and, therefore, may be a useful input in investors' toolkits.

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1. Introduction

In 2008–09, when the US economy was passing through the worst phase of its financial recession, some of the emerging markets, particularly markets in BRIC economies became the focus of attention of investors, the financial press and researchers. The term 'BRIC' refers to four countries namely Brazil, Russia, India and China which are larger and faster-growing emerging market economies in the world. Investors throughout the globe are continually discovering new avenues of investments in these markets. According to Goldman Sachs (2010) BRIC markets comprise 18% of the world market capitalization, and that share is steadily growing. Their researchers predicted that by 2030 market capitalization of each of these four emerging markets may exceed that of the USA. It is naturally a challenge for market researchers to develop a model for pricing of securities that could be applicable to these markets.

A natural question that might arise is: Do emerging BRIC markets need special study? The answer is inherent in the unique features of those markets. Before the 1990s, when these economies were relatively autarkic, the business in financial markets was confined to domestic players. Therefore, those markets were not developed enough. But, when these economies started to open up, financial markets grew faster than anyone had forecasted. The resulting effect was twofold: first, price volatility increased considerably and second, markets became hypersensitive to investors' sentiments. Investors in these markets overreact not only to local news but also to news originating in other markets. In particular, news of economic distress in USA since July 2007 spilled over to BRIC markets. Unlike a developed market, countervailing forces are less active in these markets and, therefore, any common information disclosure fuels herd behavior that leads to a significant upturn/or downturn in prices. Stock market crashes in India in May 2004 and May 2006 were the examples. The principal reason for the crash in May 2004 was political turbulence which had a short-term effect on financial markets (see Majumder, 2006). Conversely, the market crash in May 2006 was due to the rise in interest rates in the United States. The effect was a reduction in foreign institutional investments (FII) in the relatively riskier emerging markets. FII withdrew from Indian stock markets and markets crashed. The outcomes of both the incidents were independent of the fundamentals of Indian firms.

Over the last three decades, evidence of market inefficiencies has been widely documented by several scholars. BRIC markets are not exempt. The evidence is that on many occasions equity prices do adjust to new information, but the adjustment process is not instantaneous (see Barberis, Shleifer, & Vishny, 1998; Chopra, Lakonishok, & Ritter, 1992). In such circumstances, strong autocorrelations are induced in equity returns. Positive autocorrelations in the short-run (momentum behavior) and negative autocorrelations in the long-run (mean-reverting behavior) are commonly observed phenomena in developed as well as emerging markets. For developed markets, we can quote Blandon (2007), Jegadeesh and Titman (1993),

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Avramov, Chordia, and Goyal (2006), Pesaran and Timmermann (1995), Kramer (1998) who empirically established the existence of autocorrelation in equity returns for daily, weekly and monthly horizon. Chen, Su, and Huang (2008) observed positive autocorrelation in the US stock markets even in shorter horizon returns than daily returns. Similar results for various emerging markets were documented by many authors. Predictability in stock returns through time in 11 emerging stock markets in the African continent was systematically examined by Appiah-Kusi and Menyah (2003) who discovered inefficiencies in many of these markets. In a similar way, evidence of nonlinear serial dependence in market returns in 10 Asian emerging stock markets was reported by Lim, Brooks, and Hinich (2008). Their research further revealed that the degree of efficiency in these markets changes over time. Serial correlations in market returns in other emerging markets were documented by Chang, Lima, and Tabak (2004), Mollah (2007), Ma (2004), Squalli (2006) and many others. Empirical results by these authors established that in many occasions past returns contain additional information about expected stock returns. In addition to the above, even in a developed market like the USA, it can be observed that equity returns are more volatile than implied by equity fundamentals (e.g. Leroy & Porter, 1981; Shiller, 1981, 1987). The volatility in these returns further increases in periods of high inflation (Lee, Jiang, & Indro, 2002). These characteristics of equity returns are even common in BRIC markets and also the volatility in equity returns in these markets is higher as compared to developed markets (see Parametric Portfolio Associates, 2008). These are common evidence of inefficiencies in emerging as well as developed markets. There is a growing consensus that these inefficiencies have an impact on the macro economy because they could seriously limit the ability of the stock market to allocate funds to the most productive sectors and potentially hamper long-term growth (see Kavussanos & Dockery, 2001; Mookerjee & Yu, 1999).

In this context, it is interesting to examine whether BRIC markets confirm the risk-expected return relationship worked out in well-known asset pricing models of yesteryear. Such models are applicable when equity prices are not driven by any sentiments or stocks are not systematically overvalued or undervalued by market players. In such circumstances, markets act like efficient markets (Fama, 1970, 1991, 1998). However, an anomaly arises when those assumptions do not apply. Particularly for BRIC markets or for other emerging markets or when stock returns are predictable through time, it is imperative to explore the answer to the question: what are the additional factors that determine an investor's expectation of stock returns? Paradoxically, no such factors are identified yet which can be a proxy for investors' sentiments. Therefore, unsurprisingly, common models do not include investors' sentiments and hence valuations by them often lead to mispricing (see Bird, Menzies, Dixon, & Rimmer, 2011). For the purpose of avoiding this mispricing, several scholars advocate an unconventional approach to asset pricing. One of these approaches might be an unconditional or conditional autoregressive processes which are expected to perform better compared to a standard arbitrage pricing model, particularly when stock returns are predictable through time. This might be the motivation of Conrad and Kaul (1988), LeBaron (1992), Koutmos (1997), Shin (2005) and many others to model stock returns as a suitable autoregressive process. However, their models are commonly criticized on two grounds: one, they are based on empirical properties of the data and hence they are sample/situation-specific and two, on some occasions, lagged returns cannot explain a major portion of the variation in equity returns. We can quote from Conrad and Kaul (1988) that variation through time in short-horizon expected returns is 26% of the return variance for the smaller portfolios and 1% for the larger portfolios. Alternatively, the researcher can select a combination of the market return and lagged returns to develop an empirical model providing a better fit to the equity data. However, critics may question the theoretical justifications of these models.

In an equity market where investors' sentiments are prominent, equity returns become predictable, at least partially, by past observations. Conventional asset pricing models cannot explain such predictability in stock returns (Ferson & Korajczyk, 1995). Consequently, it would be misleading to work with these models using input data which have significant predictability. In contrast, we may propose that the domain of the standard rational model for asset pricing may be widened by incorporating collective sentiments of investors. In the line of the methodology adopted by Majumder (2011a), we suggest that equity price changes due to investors' sentiments (collective) can be modeled and isolated from original equity price movements (or returns). The residual part is the portion of the equity price (or return) that is governed by factors which caused a systematic change in it. Therefore, if a hypothetical stock market is constructed using prices (or returns) as that of the residual part, and all other parameters are identical to the original equity market, then such a market must be an efficient market. In that market, investors' sentiments cannot induce investors to systematically overvalue or undervalue a stock and, therefore, apart from the noise, the equity price (or return) is governed only by its fundamental value. It is, therefore, expected that hypothetical market returns are, in general, not serially dependent and so meet the prerequisites of applying a standard asset-pricing model. Any bond or stock pricing model could be well applicable for this market. Our above hypothesis can be justified empirically by exploring following issues for an emerging market: i) are stock returns predictable over time? ii) if so, are hypothetical market returns unpredictable? Empirical investigation in the above line provides a kind of validation of our model. This approach, however, requires a suitable statistical tool which can measure the degree of dependence in asset returns. The 'Hurst exponent' as recommended in many recent papers may serve this purpose (Assif, 2012; Davidsson, 2011 and Grech & Mazur, 2004).

In finance literature, the Hurst exponent is often referred to as the "index of dependence" of a time series (Hurst, 1951 and Peters, 1994). This measure allows us to track the evolution of the efficiency through the time or compare the degree of efficiency across markets (Cajueiro & Tabak, 2004a, b; Grech & Mazur, 2004; Lim, Brooks, & Kim, 2008). In this perspective, the traditional focus of absolute market efficiency has been shifted to relative market efficiency referring to multiple periods or more than one market. The magnitude of the Hurst exponent (H) varies in the range 0 to 1. Based on this value a time series can be classified into three categories: (1) $H=0.5$ indicates a random series; (2) $0<H<0.5$ indicates an anti-persistent series and (3) $0.5<H<1$ indicates a persistent series. An anti-persistent series has the characteristic of "mean-reverting", which means an up value is more likely followed by a down value, and vice versa. The strength of "mean reverting" increases as H approaches 0. A persistent series is trend reinforcing, which means the direction (up or down compared to the last value) of the next value is more likely the same as current value. The strength of the trend increases as H approaches 1. Therefore, if the Hurst exponent departs from 0.5, we may infer the existence of nonlinear serial dependence in asset returns. The magnitude of this measure reflects the degree of efficiency which is compared across BRIC markets and markets in the USA in different time periods. The degree of efficiency in original and hypothetical markets in each country is compared which is prerequisite before manipulating the asset pricing model designed in this paper. Our model will widen the scope of familiar asset pricing models ranging from an efficient to an inefficient market. The rest of the paper is organized as follows: Section 2 explores empirical regularities in BRIC market returns. A comparison of these markets with markets in USA is also included in this section. Section 3 describes the asset pricing model for BRIC markets. Section 4 provides empirical findings. Conclusions are given in Section 5.

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