Time-varying return predictability in South Asian equity markets

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ABSTRACT

Time-varying return predictability in four South Asian stock markets is examined using the wild-bootstrapped automatic variance ratio test and price delay measures. Strong evidence of predictability is found in aggregate market and size-sorted portfolio returns. The cross-sectional variation in return predictability is inversely related to firm size and trading frequency, while the time variation in return predictability is related to market conditions—the level of equity market development, liquidity, volatility, automation of trading mechanism and financial crises. These results strongly corroborate Lo's (2004) adaptive market hypothesis, and are robust to controlling for thin trading, changes in data frequency, and use of alternative return predictability measures.

1. Introduction

The efficient market hypothesis (EMH) states that a market is informationally efficient when asset prices fully and instantly reflect available information (Fama, 1970). Proponents of the EMH argue that market participants update their expectations about an asset's intrinsic value in response to new information arriving in asset markets. Hence, any deviation of an asset's price from its intrinsic value is quickly exploited by arbitrageurs, and consequently mispricing cannot persist. This assertion may hold if there are no limits to arbitrage, all market participants have equal access to information, and they process information rationally. In practice, there are limits to arbitrage, and company insiders and institutional investors have more access to superior information than individual investors. Furthermore, investors do not always behave rationally (Shiller, 1983; Shleifer & Vishny, 1997). These attributes are more prevalent in emerging equity markets than in developed equity markets (see Lai, Ng, & Zhang, 2014; Morck, Yeung, & Yu, 2000). Thus, contrary to the EMH, there is *a priori* reason to believe that equity prices in emerging markets may not fully and instantly reflect available information. Even in the context of developed markets, many researchers have refuted the EMH (see Lo & MacKinlay, 2011). This study contributes to the ongoing debate over market efficiency in the context of emerging markets.

We examine stock return predictability in four South Asian countries – Bangladesh, India, Pakistan and Sri Lanka.[1] These countries have been selected for several reasons. In recent years, they have become attractive destinations for foreign portfolio investment (FPI). For example, in 2014, net FPI to these countries was US$13,683 million which was 66% of the net FPI to all lower middle income countries (World Bank, 2016).[2] However, very little is known regarding informational efficiency of these markets. Compared to developed markets, the South Asian markets have a much lower market capitalization-to-GDP ratio and liquidity, restrictive capital flows, and less efficient trading mechanisms. These markets also differ from each other in terms of the level of

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equity market development, institutional settings, information technology adoption, and corporate governance practices. Financial liberalisation of the South Asian markets over the last two decades has potentially exposed them to financial crisis. Thus, these markets are good candidates for studying the impact of diverse market characteristics on return predictability.[3] Also, findings of this paper may provide important policy directions in order to: firstly, promote informational efficiency; and secondly, help investors formulating investment strategies based on evidence of time-varying return predictability.

Although return predictability is extensively investigated in developed markets, those located in South Asia are underrepresented in the literature. More importantly, the literature on emerging market efficiency is limited in a number ways. First, return predictability is typically examined ignoring its variation over time. Second, return predictability evidence is based on conventional efficiency tests that exhibit size distortion and low power, particularly in a small sample. Third, while most studies examine autocorrelation in stock returns, there is lack of studies examining the speed of market-wide information incorporation into stock prices. Fourth, return predictability is examined without properly addressing emerging market features, for example, infrequent trading and the greater prevalence of micro-cap and small-cap stocks.[4] Fifth, most studies on emerging market efficiency are based on stocks that are listed until the end of the sample period, which may result in survivorship bias. This study overcomes all of these limitations.

More specifically, this paper contributes to the existing literature in a number of ways. First, the wild bootstrapped automatic variance ratio (WBAVR) (Kim, 2009) test is used as a measure of market efficiency. This test statistic provides robust measure of market efficiency by removing the problem of arbitrary lag-order selection, and exhibits superior size and power properties relative to conventional efficiency tests that are commonly used in the literature (see Griffin et al. 2010). Second, in emerging markets, common information is typically incorporated into stock prices with delay due to infrequent trading (see Harvey, 1995). We address this issue by using price delay (Hou & Moskowitz, 2005) as our second efficiency measure, and examining the sensitivity of the price delay measure to trading frequency. The price delay measure focuses on the delay to which stock price incorporates market-wide information. Third, we apply return predictability measures on overlapping subsamples of stock returns, allowing an examination of time variation in return predictability. This analysis is relevant with reference to the fast-changing South Asian emerging markets (see Romero-Torres, Wells, & Selwyn-Khan, 2013). Fourth, variation in market characteristics in the South Asian countries provides an appropriate context to verify Lo's (2004) assertion that time variation in return predictability depends on market conditions. To this end, we run a regression of the return predictability measure on market condition variables such as the level of equity market development, liquidity, the extent of information technology adoption, stock market cycle and financial crises, among others. These potential determinants have not been considered by earlier studies in explaining return predictability in emerging markets. Finally, we use a sample that is free of survivorship bias and filtered for infrequent trading, outliers and IPO-related anomalies.

Overall, we find strong evidence of inefficiency in aggregate market and size-sorted portfolio returns for daily data even after controlling for thin trading. The level of market efficiency is found to be inversely related to firm size and trading frequency. The degree of return predictability is less prevalent in India and Pakistan compared to that in Bangladesh and Sri Lanka. Overlapping subsample analysis suggests that the level of market efficiency varies over time in an oscillatory fashion, which is analogous to observations for the US and other developed stock markets (Lo, 2004; Kim, Shamsuddin, & Lim, 2011; Urquhart & Hudson, 2013; Kim & Shamsuddin, 2015). We find that time-varying return predictability is related to market conditions and institutional settings, which supports Lo's (2004) adaptive market hypothesis.

The rest of the paper proceeds as follows. Section 2 presents a review of the relevant literature. Section 3 describes data and computational details. In Section 4, we focus on measures of return predictability and methodology associated with examining time-varying predictability. Empirical results are discussed in Section 5. We present robustness checks in Section 6, and finally, Section 7 concludes the paper with a summary of the main themes covered here.

2. Literature review

The EMH receives strong support until the 1970s as the literature finds that stock price changes are essentially random (Fama, 1970). However, in the 1980s, researchers provide convincing evidence of return predictability particularly in the short-horizon, which cannot be solely attributed to market microstructure biases (for example, non-trading and bid-ask bounce) or time-varying expected returns (Conrad & Kaul, 1989; Lo & MacKinlay, 1988). Behaviourists argue that psychological biases prevent investors from reacting rationally to new information that leads to significant return autocorrelation over the short-horizon (Barberis, Shleifer, & Vishny, 1998; Hong & Stein, 1999).

Lo (2004) makes an attempt to reconcile the EMH with the behavioural arguments and proposes a new paradigm, known as the adaptive market hypothesis (AMH). The basic tenet of the AMH is that market efficiency is time-varying. The AMH is based on Simon's (1955) concept of bounded rationality which indicates that individual investors, due to their lack of computational abilities, tend to follow a *satisficing* rather than an optimising approach to decision-making. Market participants compete, learn from their

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[3] Although it is claimed that factors such as level of equity market development (Shamsuddin & Kim, 2010), efficient trading mechanism (Martens, 1998), high liquidity (Chordia, Roll, & Subrahmanyam, 2008), short-selling facility (Chang, Luo, & Ren, 2014), improved corporate governance (Lagoarde-Segot & Lucey, 2008) and openness to foreign investors (Bae, Ozoguz, Tan, & Wirjanto, 2012) do have an impact on the degree of return predictability, the empirical evidence is mixed and conflicting. Furthermore, there is a lack of consensus regarding time-variation in return predictability and its determinants.

[4] Firm size is important in investigating return predictability because there are many examples of the inverse relationship between return predictability and firm size (Fama, 1991). This anomaly is explained in terms of infrequent trading (Lo & MacKinlay, 1988), less coverage by financial analysts (Hong, Lim, & Stein, 2000) and high transaction costs (Griffin, Kelly, & Nardari, 2010) which are commonly associated with small stocks.