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Do emerging markets become more efficient as they develop? Long memory persistence in equity indices



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ABSTRACT

It seems reasonable to expect financial market efficiency to be related to the economic development level. We study a 16 year sample, covering 22 countries. The Hurst–Mandelbrot–Wallis rescaled range is our efficiency measure, which we apply to returns and volatility. We find strong evidence of long memory persistence in volatility over time, which is unsurprising. However, unlike previous researchers, we could not find evidence of rescaled ranges trending down over time. However, we introduce an alternative measure of economic development, namely, whether FTSE (2011) classify an emerging market as ‘advanced’ or ‘secondary’. This measure shows greater efficiency in returns and volatility for ‘advanced’ emerging markets.

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1. Introduction

According to the weak form of the Efficient Market Hypothesis (EMH), asset prices should exhibit no pattern that could enable future prices to be forecast with any consistency. Consequently, asset returns are supposed to be normally distributed and sequentially independent. In other words, asset returns should exhibit no long-term memory of the price series that precedes it. In this paper, we measure long-term memory by means of the rescaled range methodology. If this measure shows either persistence or anti-persistence (i.e. mean reversion), then a trading strategy utilising that information could earn an abnormal profit. On the other hand, asset returns which are neither persistent nor anti-persistent are unpredictable, therefore cannot be exploited for profit and so would be an affirmation of the EMH.

One would expect that if market inefficiencies do exist, then they should be more prevalent in unsophisticated, under-researched markets rather than in highly developed markets. Moreover, as financial markets evolve from a primitive to a sophisticated state, one would expect to see a steady progression in their

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level of market efficiency. This idea is consistent with [Grossman and Stiglitz \(1980\)](#) who argued that some price inefficiency is necessary to incentivise arbitrageurs to find and trade mis-priced assets, thereby enforcing market efficiency. As trading volume and the number of research analysts and arbitrageurs increase, the inefficiencies that constitute the arbitrageurs' profit opportunities should be identified earlier and competed away more quickly. [Henry \(2002\)](#) suggests that long memory persistence in equity returns would imply that stock returns are forecastable. [Qian and Rasheed \(2007\)](#) found that markets with high measures of long memory persistence, generate superior forecasting estimates. However, [Barkoulas et al. \(2000\)](#) noted that empirical studies have devoted very little attention to the issue of serial dependence in emerging markets. A number of empirical papers on emerging markets have come out in the decade since. [Cajueiro and Tabak \(2004a, 2004b\)](#) find evidence of long memory persistence in emerging markets which they note is a contradiction of EMH. Furthermore, [Tolvi \(2003\)](#) found that smaller emerging markets are more likely to exhibit significant long memory.

Our aim in the present paper is to explicitly investigate the link between market development and market efficiency. In order to do this, we propose two proxies for development. Our first proxy is time: we employ 16 years of data (30/06/1995–30/06/2011), which is a much longer history than any previous paper in this literature. Our second proxy is a state of development classification. We use [FTSE \(2011\)](#) classification of 'advanced' and 'secondary' emerging markets which is based on a number of indicators of market development. We examine statistical measures of long memory for each sub-group. Our analysis builds upon the empirical work of previous researchers, most notably [Cajueiro and Tabak \(2004b\)](#).

It has long been known that volatility clustering is often observed in financial markets, i.e. price sequences typically show blocks of big price swings bunched together, flanked by calmer periods where the price swings are discernibly smaller. Although widely acknowledged, this phenomenon is actually inconsistent with weak-form market efficiency. Indeed, trading activity has the ability to dissipate these volatility clusters in a similar way to how they erode asset prices inefficiencies. Highly developed financial systems have derivative markets in which derivative traders are able to construct trading strategies (e.g. holding simultaneously put and call options with different strike prices) to exploit time-varying volatility, so long as the latter is forecastable. None of the markets we study has a liquid derivative market, which means that this mechanism for eroding long-memory persistence in volatility is not present. We use our rescaled range analysis to examine long memory in volatility, alongside our study of long memory affecting price levels.

The following section discusses the findings from established financial theory and empirical research which provide the theoretical framework from which the methodological approach of this paper is constructed. [Section 3](#) justifies the sample selection and describes the methods of data collection. In [Section 4](#), the key methodology is then defined and the benefits and limitations of using the methodology are analysed. [Section 5](#) presents the findings from this empirical research and illustrates these results with appropriate tables and graphs. [Section 6](#) concludes the paper.

2. Literature review

The idea that stock returns are unpredictable is deep-rooted and long-standing in the academic study of finance. The suggestion that stock returns follow a random walk was first proposed by [Regnault \(1863\)](#), who noted that "l'écart des cours est en raison directe de la racine carrée des temps" ("the deviation of prices is directly proportional to the square root of time"). The familiar notion that price contains all knowable relevant information can be traced back to [Gibson \(1889\)](#) who concluded that when "shares become publicly known in an open market, the value which they acquire may be regarded as the judgment of the best intelligence concerning them". However, it was [Fama \(1970\)](#) who bound these two concepts together and made them the central tenet of the EMH.

For several decades, the EMH dominated academic research into financial markets. Indeed [Jensen \(1978\)](#) stated that he "believe[d] there is no other proposition in economics which has more solid empirical evidence supporting it than the Efficient Market Hypothesis". However, in the years since, a number of cracks began to appear in the EMH's façade. [Grossman and Stiglitz \(1980\)](#) demonstrated that perfectly informationally efficient markets are impossible because some level of inefficiency needs to exist in order to incentivise and reward arbitrageurs to patrol prices and thereby maintain efficiency. [Shiller \(1984\)](#) argued that conflating stock-price predictability with stock-price-intrinsic-value equivalence, "represents one of the most remarkable errors in the history of economic thought".

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