



# Testing for predictability in emerging equity markets

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## Abstract

In this paper we test whether returns for emerging stock markets are predictable. We analyze predictability by means of multivariate variance ratios using heteroscedastic robust bootstrap procedures. Empirical results suggest that emerging equity indices do not resemble a random walk while for developed country indices (US and Japan) we are not able to reject this hypothesis. Furthermore, by employing variable moving average (VMA) and trading range break (TRB) technical trading rules we show that there is some evidence of forecasting power. However, when we take into account trading costs and a buy and hold strategy, only a few rules generate positive excess returns. We check for robustness by analyzing returns from 1559 different trading rules, testing different sub-samples, analyzing returns in bear and bull markets, and also comparing results found for emerging markets to the US and Japan. Furthermore, for the US the Variable Moving Average trading rules suggested in Brock et al. [J. Finance 47 (1992) 1731] do not seem to have forecasting power for the recent sample used, which could be due to the fact that these rules have been widely employed by market participants having the potential abnormal gains from them disappear.

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## 1. Introduction

Emerging markets have received massive inflows of capital in the past and have become interesting alternatives for investors seeking diversification. Indeed, [Harvey \(1995\)](#) shows that emerging markets provide investment opportunities for world

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investors. In general, emerging markets offer high expected returns with an associated high risk.

The aim of this paper is to assess whether emerging stock markets in Latin America and Asia exhibit predictability by testing the random walk hypothesis (RWH) using a multivariate version of the variance ratio (VR) test with a heteroscedastic robust bootstrap procedure and by testing technical trading rules such as the variable moving average (VMA) and trading range break (TRB) levels. We study Argentina, Brazil, Chile and Mexico in Latin America, and India, Indonesia, Korea, Malaysia, the Philippines, Thailand, and Taiwan in Asia. We also present results for Japan and the US for comparison purposes.<sup>1</sup>

Most papers use variable and fixed moving average trading rules to assess whether there are significant profits to be made by technical analysis, following the seminal paper of Brock et al. (1992). The current paper analyzes whether technical analysis possesses forecasting power for price changes by studying the forecast power of 1559 different trading rules using a bootstrap procedure. The VMA technical trading rules proposed by Brock et al. (1992) are used as a benchmark.<sup>2</sup> We also test trading rules using TRB levels. Furthermore, the analysis is performed on a very recent sample—the period from January 1991 through January 2004—in which most countries have liberalized their current accounts and received massive foreign portfolio inflows. We compare sub-samples (before and after the Asian crisis) and check whether the results are robust to the period used in the analysis. We also study the results of trading rules in bear and bull sub-samples.<sup>3</sup>

The remainder of the paper is organized as follows. Section 2 presents a brief literature review. The empirical methodology is discussed in Section 3. In Section 4 we describe the data and the sample used in this paper. Section 5 shows empirical results. Finally, Section 6 concludes the paper.

## 2. Brief literature review

If a stock price does satisfy the RWH, it follows that future equity prices are not predictable based on past prices. This has important implications for asset pricing modeling, especially for traders and practitioners that are searching for patterns in prices and betting on the markets using these patterns.

Lo and MacKinlay (1988), in a seminal paper, present evidence that the RWH is strongly rejected by using VR statistics for the sample period 1962–1985 and for different subperiods.<sup>4</sup> Since their seminal work, a variety of papers have found mixed evidence for a number of countries and sample periods.<sup>5</sup>

<sup>1</sup> International comparisons such as those presented in Harvey (1995) provide evidence that emerging markets returns are generally more predictable than the developed market returns.

<sup>2</sup> Brock et al. (1992) propose the use of 1\_50, 1\_150, 1\_200, 5\_150 and 2\_200 VMA. The first observation is the length of the short-term moving average while the second one is the length of the long-term moving average.

<sup>3</sup> Although these bull and bear markets are defined on an ex-post basis they are useful in understanding why even if trading rules do not perform well for the full sample, they still are widely employed around the world by investors and traders. There could be substantial differences in the excess returns in these periods, which could explain their relative success.

<sup>4</sup> Lo and MacKinlay (1989) show that these VR statistics are more reliable than traditional unit root tests.

<sup>5</sup> See Frennberg and Hansson (1993) and Ayadi and Pyun (1994) for applications of this methodology for the Swedish and Korean equity markets, respectively.

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