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History of share prices and market efficiency of the Madrid general stock index

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ABSTRACT

We apply Moving Average (MA), Relative Strength Indicator (RSI), Moving Average Convergence Divergence (MACD), and trading breakout (TBO) techniques to investigate the weak-form market efficiency of the Madrid General Stock Index, Índice General de la Bolsa de Madrid (IGBM), from 1/2/1975 to 12/31/2012. The empirical results not only strongly validate the predictive power of trading rules with robust statistical significance in all three sub-periods over the thirty-eight years, but also provide the possible strategies to outperform the buy-and-hold strategy with the consideration of transaction costs and risk. This supports the argument against weak-form market efficiency of the IGBM.

1. Introduction

Technical analysis is the art of forecasting future prices based on past prices and volumes. Technicians have become more sophisticated by applying computer models that are based on various technical indicators to predict future prices. Technicians believe in the idea that prices move in trends and are determined by the changing attitudes of traders toward various economic, political and psychological forces. As Pring (1991) points out "the art of technical analysis, for it is an art, is to identify a trend reversal at a relatively early stage and ride on that trend until the weight of evidence shows or proves that the trend has reversed."

The Efficient Market Hypothesis (EMH) asserts that stock prices already reflect all the available information, and technical analysis cannot be used to outperform a market buy-and-hold strategy. This assertion has been disputed among investors and researchers since Fama (1970). Empirically, in order to show the predictive power of technical analysis, researchers utilize historical stock price and volume information to confirm superior profitability of various trading rules over the buy-and-hold strategy.

For testing the weak form of EMH, the Spanish stock market provides an attractive target for our technical analysis. Founded in 1831, *Bolsa de Madrid* (Madrid Stock Exchange) provides an excellent setting of microstructures to test the profitability of trading rules. Since 1993, it has been one of the first stock markets to switch to all electric-trading. As noted by Yague and Gomez-Sala (2005), the Spanish stock market is a pure order-driven market with no market makers. Numerous types of orders can be executed electronically.

The reminder of this article is divided into four sections. Section 2 contains the literature review. Data and methodology are described in Section 3. Section 4 presents empirical results of various technical trading rules, followed by a comparison of strategies to beat the buy-and-hold strategy with transaction costs and risk. The final section provides concluding remarks.

2. Literature review

Numerous early studies primarily test the "random walk" hypothesis to argue that investors cannot drive profits above a buy-and-hold strategy by using technical analysis that depends on past market information including price and volume. Listing a few studies from the 1960s, Larson (1960), Osborne (1962), Alexander (1964), Granger and Morgenstern (1963), Mandelbrot (1963), Fama (1965), Fama and Blume (1966), Van Horn and Parker (1967), and Jensen and Benington (1970) suggest the futility of technical analysis. However, technical trading has been enjoying revitalization since the publication of three cornerstone-papers of Sweeney (1986), Lukac, Brorsen, and Irwin (1988), and Brock, Lakonishok, and LeBaron (1992). Sweeney (1986) applies various filter

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trading techniques for ten currencies in the period of 1973 to 1980 and concludes that at least one-third of the cases generate statistically significant profit. Lukac et al. (1988) employ four technical trading rules, including the renowned moving average crossover, and conclude that technical trading rules outperform the buy-and-hold strategy in the period of 1978 to 1984. Brock et al. (1992, BLL hereafter) apply moving averages and trading range breakouts on the Dow Jones industrial index from 1897 to 1985. BLL shows that buy signals consistently generate a higher return than sell signals in the 90 years studied. The predictive power of technical trading rules is confirmed by these studies.

After BLL, numerous studies use technical analysis to investigate weak form market efficiency using stock market data from around the world. For example, Bessembinder and Chan (1995) test BBL's trading rules in Japan, Hong Kong, South Korea, Malaysia, Thailand, and Taiwan and conclude that predictability exists in the last three markets. Analyzing 63 stocks in the Istanbul Stock Exchange, Ergul, Holmes, and Priestley (1997) conclude that technical analysis on volume can also enhance the prediction of returns. Pruitt and White (1998), using the University of Chicago's CRSP daily data of US individual stocks over the 1976–1985 period, conclude that technical trading rules are capable of outperforming the buy-and-hold strategy even adjusting by transaction costs. Bessembinder and Chan (1998) argue that the BLL results still support market efficiency if the transaction costs are counted. Gencay (1998) analyzes the predictive power of technical analysis for the DJIA and concludes that technical strategies provide significant profits when tested against the buy-and-hold strategy. Fernandez-Rodriguez, Gonzalez-Martel, and Sosvilla-Rivero (2000) investigate the profitability of a simple technical trading rule based on Artificial Neural Networks (ANNs) to the Madrid General Stock Index in three sub-periods from 1991 to 1997. They suggest that, in the absence of trading costs, the technical trading rule is superior to a buy-and-hold strategy for both "bear" market and "stable" market episodes. However, in a "bull" market sub-period, a buy-and-hold strategy outperforms. Kwon and Kish (2002), applying moving average and trading breakout (TBO) techniques to the NYSE index over the period 1962–1996, confirm the potential of technical trading rules in profitability in various models that outperform the buy-and-hold strategy. Metghalchi and Chang (2003) reach the same conclusion for the Italian stock index by applying similar moving average rules. Focusing on the newer stock indices such as the NASDAQ Composite or the Russell 2000, Hsu and Kuan (2005) illustrate the profitability of technical trading rules. Chang, Metghalchi, and Chan (2006) use moving average trading rules and identify profitable trading strategies for the Taiwan stock market over the time period of 1983 to 2002. Matilla-Garcıa (2006), without the consideration of transaction costs and risk, applies a simple trading rule based upon genetic algorithms to investigate the Spanish stock market index known as IBEX-35 in four different sample periods from 1990 to 1999. The results suggest that, in general, the profitability of the simple trading rule is superior to the buy-and-hold strategy in 'bull', 'bear' and 'volatile' market episodes. To summarize the many studies that explore the profitability of technical trading rules by 2005, Park and Irwin (2007) categorize early studies (1960–1987) and modern studies (1988–2004). They find that the early studies show little evidence of profitability of technical trading rules. However, 56 out of a total 95 modern studies support profitable trading rules.

Since the late 2000s, many trading rules have been studied for various countries. For example, Lento (2007) examines the effectiveness of nine technical trading rules, including filter rules (momentum strategies), in eight Asian-Pacific stock markets for the period from 1987 to 2005 and concludes that technical trading has predictive power; however, the results are sensitive to round trip transaction costs. McKenzie (2007) analyzes 16 emerging markets from 1986 to 2003 and concludes that some trading rules generate significant returns. Metghalchi, Chang, and Marcucci (2008) apply various trading rules for the Swedish stock market and generally find that moving average strategies can beat the buy-and-hold strategy when transaction costs and data snooping are considered. In studying asset allocation strategies, Zhou and Zhou (2009) found that moving average rules add value. Friesen, Weller, and Dunham (2009) provide a model that explains the success of certain trading rules in varied stock markets. Applying four popular technical trend indicators for the BRIC countries, Chong, Cheng, and Wong (2010) conclude that, with transaction costs, the predictive power of technical trading only exists in the Russian market. The weak-form of EMH holds in the other three markets. Milionis and Papanagiotou (2011) employ an alternative testing procedure for the moving average trading rules over the New York Stock Exchange (NYSE), the Athens Stock Exchange (ASE) and the Vienna Stock Exchange (VSE). They conclude that, for the period 1993 to 2005, weak-form market efficiency exhibits in the NYSE and two sub-periods in the VSE. However, it is rejected in the ASE and the VSE for the first sub-period (1993 to 1997). Metghalchi, Chang, and Marcucci (2012) apply various moving average trading rules with consideration of transaction cost and data snooping for 16 European countries and conclude that technical trading rules perform better in smaller-sized markets. Pätäri and Vilska (2014) apply moving average rules to the OMX Helsinki 25 index and individual stocks included in this index and conclude that the majority of moving average strategies applied to the index and individual stocks in that index outperform the buy-and-hold strategy.

On the other hand, there are several studies that do not support the profitability of technical trading strategies. Raj and Thurston (1996), using moving average rules for the Hang Seng Futures Index, conclude that the moving average strategy does not generate significant excess returns. Using the same BLL technical trading rules, Hudson, Dempsey, and Keasey (1996) test the United Kingdom stock market return over the period of 1935–1994 and conclude that technical trading rules do not generate excess returns after taking into consideration transaction costs at 1% per round trip. Szakmary, Davidson, and Schwarz (1999) find that trading rules perform poorly on individual stocks but outperform for the overall Nasdaq index. However, since high transaction costs are associated with Nasdaq trades, the abnormal returns are generally eliminated by them. Ratner and Leal (1999) apply moving average trading rules for emerging markets of Latin America and Asia and find that, after considering trading costs, technical rules do not possess widespread ability to profitability. Coutts and Cheung (2000) analyze the Hang Seng returns from 1985 to 1997 and conclude that both the moving average and trading breakout rules fail to earn positive returns that are net of transaction costs. Examining the U.K. and the U.S. stock indices and various individual stocks, Taylor (2000) concludes that the average break-even one-way transaction cost is about .35% across all data, which appears low for profitable technical trading. Ready (2002) indicates that the success of the BLL moving average rules is just a spurious result of data snooping and needs not persist in the future. Lesmond, Schill, and Zhou (2004) argue that the abnormal momentum returns only create an illusion of trading profit opportunities which do not exist. In volatile markets, Dunis and Chen (2005) point out that the use of technical trading rules such as MACD perform poorly. Chen, Huang, and Lai (2011) conclude that positive economical profits cannot be driven from technical analysis in the Taiwan stock market. Metchalchi et al. (2014) apply trading rules to Nairobi Stock Index and find that applying the conventional trading rule does not work; however the contrarian application of it does work.

3. Data and methodology

We use the DataStream's daily closing price index of the Índice General de la Bolsa de Madrid (IGMB) or Madrid General Stock Index from January 2nd of 1975 to December 31st of 2012. The entire period is divided into three sub-periods to test the robustness of our results. The sub-periods are pre-European Community (1975–1985), pre-Euro currency (1986–2000) and the Euro currency era (2001–2012). Daily returns are computed as changes in logarithms of the stock index level. This method of return estimation does not include daily dividend