Journal of Banking & Finance 36 (2012) 193–208

Contents lists available at ScienceDirect

Journal of Banking & Finance

journal homepage: www.elsevier.com/locate/jbf

Performance of technical analysis in growth and small cap segments of the US equity market

Andrei Shynkevich *

Department of Finance, Kent State University, Kent, OH 44242, USA

ARTICLE INFO

Article history:
Received 18 December 2010
Accepted 10 July 2011
Available online 20 July 2011

JEL classification:
G17
G14
C58

Keywords:
Technical analysis
Data snooping
Momentum
Market efficiency

ABSTRACT

A large universe of technical trading rules applied to a set of technology industry and small cap sector portfolios over the 1995–2010 period yields superior predictability after adjusting for data snooping bias in the first half of the sample period and delivers statistically significant profits for a number of portfolios when the transaction cost is assumed to be of small to moderate size. Technical analysis is not able to outperform the buy-and-hold approach for any portfolio in the set in the second half of the sample period. The finding that the short-term return predictability becomes much weaker in the more recent period suggests that the underlying segments of the equity market have become more efficient over time. The fact that mechanical trading strategies have been futile after adjusting for data snooping bias for two samples of portfolios where technical analysis is most anticipated to succeed suggests that it is unlikely to have delivered abnormal returns in any other segment of the domestic equity market in the last decade.

1. Introduction

Technical analysis is omnipresent in financial markets and one can frequently hear or read in financial media about technical indicators such as support, resistance, moving average, convergence and "death cross," among others. For decades, technical trading rules have been an extremely popular application in a trader's toolkit in various financial markets. Taylor and Allen (1992) survey major Forex dealers based in London and report that at least 90% of the respondents place at least some weight on technical analysis in their trading decisions, particularly for short horizons. Almost two decades later, Menkhoff (2010) analyzes survey evidence from 692 fund managers in five countries including the US and finds that the share of fund managers that put at least some importance on technical analysis is 87%. The survey indicates that technical analysis is predominantly used as a complement to fundamental analysis; however, when the focus is shifted to forecasting horizons, technical analysis becomes the most important forecasting tool in decision making for shorter-term periods. Recently, the role of technical analysis has gone beyond the purpose of short-term trading as Zhu and Zhou (2009) provide a theoretical justification for an investor to use technical analysis in a standard asset allocation problem and show that technical analysis adds value to allocation rules that invest fixed proportions of wealth in equities.

The two last frontiers of the domestic equity market where the profitability of the technical analysis has been largely unexplored yet is believed to be more likely observed are young industries and sector portfolios comprised of companies with small market capitalization. Menkhoff (2010) mentions that the usefulness of technical analysis is more likely to be evident if financial market prices are influenced by non-fundamental factors, assuming that non-fundamental behavior has a systematic component. Such non-fundamental behavior can be driven by general market mood and investors' behavioral biases such as excessive optimism or panic and result in inflated asset bubbles and their subsequent crashes. Stocks and equity classes with higher market betas are commonly associated with a larger influence of non-fundamental factors and small cap stocks as well as technology stocks represent a natural example of such segments of the domestic equity market.

Since the mid to late 1990s, small cap and technology companies have been more actively featured in the domestic equity market and present in investors' portfolios. The increased liquidity of the shares of small cap and tech companies that has taken place over the last decade and a half fosters the implementation of an unbiased analysis of the performance of technical analysis applied to portfolios comprised of shares of such companies since such analysis is less likely to be subject to the presence of a nonsynchronous trading bias that has occasionally been attributed to the observed profitability of trading rules in the past.

The existing literature provides a number of results suggesting that the predictability of stock returns may differ between

* Tel.: +1 330 672 1226; fax: +1 330 672 9806.
E-mail address: ashynkev@kent.edu

0378-4266/$ - see front matter © 2011 Elsevier B.V. All rights reserved.
doi:10.1016/j.jbankfin.2011.07.001

companies of different sizes and markets of different maturities. Hansen et al. (2005) find significant calendar effects in small stock indices[1] while Siegel (2002) suggests that relatively young markets are more likely to reject the weak form of market efficiency. Hsu and Kuan (2005) find that significantly profitable trading rules exist in the data from relatively "young" markets proxied by NASDAQ Composite and Russell 2000 for the period from 1989 to 2002 but not in the data from relatively "mature" markets such as the DJIA and S&P 500 for the same time period. Hsu et al. (2010) use three popular indices to proxy for the small and growth segments of the US equity market: S&P SmallCap 600/Citigroup Growth, Russell 2000, and NASDAQ Composite, and the exchange-traded funds that track these indices for the period from 1989–1990 to 2005. They find that technical trading rules possess significant predictive power for these stock portfolios in pre-ETF periods but there is no such evidence in periods following the introduction of the respective exchange-traded funds.

The purpose of this paper is to test the predictive ability of technical trend-chasing trading rules when they are applied to equity portfolios that are more likely to experience sustained momentum in the universe of the US domestic equity market. Such portfolios are comprised of stocks of companies that either represent young, less matured industries that are more likely to experience the influx of "hot" capital as well as the sudden reversal of the fortune, or are predominantly firms with small market capitalization that are characterized by high market betas. In the latter case, the universe of the most liquid small sized stocks is split into sector portfolios since the momentum that technical trading intends to exploit has been shown to have a dominant presence in industries and sectors.

We employ a set of almost 13,000 trading rules comprising four families of such rules that have been extensively used in the existing literature and apply it to six technology industry indices and nine small cap sector indices over the period from 1995 to 2010. Two proper techniques, Reality Check and Superior Predictive Ability test, are employed to account for possible data snooping bias while evaluating the performance of trading rules. Two trading strategies, "double-or-out" and "double-or-short," are utilized for robustness purposes. It is shown that trading rules deliver superior performance for several tech industries and a number of small cap sector portfolios after adjusting for data snooping bias but before transaction costs in the first half of the sample period. The ability of technical analysis to outperform the buy-and-hold approach in the 1995–2002 period is tempered when transaction costs are taken into account; however, trading rules still yield statistically significant profits for a number of portfolios when the one-way transaction cost is assumed to be of small to moderate size. In general, trend-chasing trading rules would have been more successful if applied to small cap sector indices rather than to technology industry indices.

The ability of trend-chasing trading rules to deliver superior predictive ability for some portfolios in the sample but not for others is found to be associated with positive autocorrelation in the return series. The deviation of a portfolio's price time-series from random walk behavior does not necessarily imply the profitability of technical analysis unless such deviation is a consequence of positive autocorrelation. This result emphasizes the broadly accepted notion that momentum chasing strategies benefit largely from the positive autocorrelation in return series.

Technical analysis has not been able to outperform the buy-and-hold approach for any portfolio in the set in the second half of the sample period. The finding that the short-term return predictability becomes much weaker in the more recent period suggests that the underlying segments of the equity market have become more efficient over time. In reasonably efficient markets, excess returns generated by trading rules would eventually disappear as the growing number of traders adopts trading strategies that were profitable in the past in the attempt to yield positive abnormal returns. The improvement in the efficiency of the domestic equity market can be attributed to the introduction of the exchange-traded funds that track the performance of baskets of securities as seen from the lack of predictability in returns on a set of such tradable vehicles, the decimalization of quotes and the followed overall decrease in transaction costs since the late 1990s that resulted in better market liquidity, the increased computational powers that led to the proliferation of algorithmic trading, and the increased attention to investing and trading opportunities in specific segments of the equity market. A fresh point demonstrated in this paper complements findings in the extant literature on short-term predictability in equity returns in that market efficiency has improved not just on the aggregate level but also on separate segments of the market such as sectors and industries. The fact that trend chasing trading strategies proved to be futile after adjusting for data snooping bias for two samples of portfolios where technical analysis is most anticipated to succeed suggests that it is unlikely to have delivered abnormal returns in any other segment of the domestic equity market in the last decade.

The paper proceeds as follows. Section 2 offers a review of the existing literature on the application of technical analysis as well as momentum in growth and small markets and the phenomenon of industry momentum. Section 3 discusses the underlying portfolios whose data are used for the empirical analysis. Section 4 outlines the set of employed trading rules and strategies with technical details described in Appendix A. Section 5 presents data summary and examines properties of the underlying time series. Section 6 describes two techniques utilized to address a problem of data snooping bias that commonly plagues the evaluation of the performance of mechanical trading rules. Section 7 presents empirical findings of our analysis and Section 8 concludes.

2. Literature review

Technical analysis has been the most widely used trading technique in the foreign exchange market (Sweeney, 1986; Taylor and Allen, 1992; Levich and Thomas, 1993; Taylor, 1994; Kho, 1996; Lee and Mathur, 1996; Neely et al., 1997, 2009; Szakmary and Mathur, 1997; Neely and Weller, 1999, 2003; Cheung and Chinn, 2001; Okunev and White, 2003; Olson, 2004; Qi and Wu, 2006) and commodity futures market (Stevenson and Bear, 1970; Leuthold, 1972; Lukac and Brorsen, 1990; Silber, 1994; Roberts, 2005; Marshall et al., 2008a; Park and Irwin, 2010; Szakmary et al., 2010). The majority of studies on the performance of technical analysis strategies in the equity market base their analysis on the usage of a broad market index such as Dow Jones Industrial Average (Alexander, 1961, 1964; Brock et al., 1992; Bessembinder and Chan, 1998; Gencay, 1998; Sullivan et al., 1999, 2003; Taylor, 2000; Ready, 2002; Hsu and Kuan, 2005), NYSE and NASDAQ indices (Kwon and Kish, 2002; Hsu and Kuan, 2005; Hsu et al., 2010), S&P 500 (Alexander, 1961, 1964; Ready, 1997; Allen and Karjalainen, 1999; Sullivan et al., 1999; Taylor, 2000; Hsu and Kuan, 2005; Savin et al., 2007; Marshall et al., 2008b), and Russell 2000 (Hsu and Kuan, 2005; Savin et al., 2007; Hsu et al., 2010).[2]

The exclusive focus on broad market portfolios and asset classes rather than sector- or industry-based portfolios is a major limita-

[1] Atanasova and Hudson (2010) argue that while some technical trading rules exploit calendar effects, their performance is primarily driven by other factors.

[2] For an extensive review of literature on technical analysis see Park and Irwin (2007) and Menkhoff and Taylor (2007).