



# On the predictive content of technical analysis

Stefan Reitz\*

*Department of Economics, University of Giessen, Licher Str. 66, D-35394 Giessen, Germany*

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## Abstract

Notwithstanding its widespread use in financial markets and well-documented profitability, technical analysis is still perceived to carry useless information. This paper provides a possible explanation for this puzzle that goes beyond the standard self-fulfilling prophecy argument. If at least some of the asset price fundamentals are not currently observable, the oscillator model is able to infer regime shifts in the process of these variables through past asset prices. From this point of view, technical analysis can be interpreted as a cheap proxy for Bayesian learning.

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## 1. Introduction

The term “technical analysis” generally contains a large variety of trading techniques, which are based on past movements of the asset price and a few other related variables. The use of trading rules to detect patterns in the time series of asset prices dates back to the 1800s, when traders were clearly not able to develop a fundamental analysis on the basis of extensive financial information. Persistent shifts in supply and demand had to be detected in past price movements using simple to quite elaborate techniques. Many of these techniques are still applied by practitioners, as documented in [Murphy \(1999\)](#). However, the attitude

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\* Tel.: +49 641 9922114; fax: +49 641 9922119.

*E-mail address:* [stefan.reitz@wirtschaft.uni-giessen.de](mailto:stefan.reitz@wirtschaft.uni-giessen.de).

of academia towards technical analysis is reserved at best, due to economists' persuasion that financial markets are well described by the efficient-market hypothesis. Under these circumstances, it is obvious that trading rules not derived from a mathematically well-defined econometric or economic model, are bound not be very informative.

Thus, the information content of trading signals concerning asset-price fundamentals is still viewed as largely worthless and often referred to as noise. This view was seriously challenged by a large body of empirical studies showing that, on the one hand, standard martingale models do not adequately describe short-run price movements (Lewis, 1995). On the other hand, the introduction of technical analysis into financial-market models seems to be justified by the results of micro survey data (Taylor & Allen, 1992), sustained ex post profits,<sup>1</sup> and the overall ability of heterogeneous-agent models to explain the stylized facts of financial time series (Hommes, 2001; Lux, 1998).

Existing explanations of the presence of chartists are generally based on sequential trading and asymmetric information.<sup>2</sup> If news is not commonly available on financial markets, uninformed traders may infer a signal from analyzing buy and sell decisions of informed traders or changes of the asset price itself. The resulting equilibrium can be described by models of herding behavior, as in Banerjee (1992) and Kirman (1993). Within such asymmetric information frameworks, technical trading might also be a suitable device for informed traders. Suppose that a trader receives what he believes to be private information, but that he cannot be sure if the information has already been incorporated into the asset price. Before changing positions, the trader applies technical analysis to check whether his information is indeed non-public (Treyner & Ferguson, 1985). As a general result of the models developed so far, it appears that the application of these techniques is rational from an individual trader's point of view, but leads to market inefficiencies such as misalignments and excess volatility. This is due to the self-fulfilling nature of technical trading, whether or not a given initial signal is useful to predict future asset prices. However, the existing literature has not yet explicitly addressed the question as to how technical analysis might infer information about the fundamental value of the asset price as well.

To provide an information-revealing explanation of technical analysis, it is assumed that information on at least some of the asset-price fundamentals is available only with a considerable lag. We will argue that if the market price was indeed driven by a fundamental that is not yet observable, useful information about a possible regime shift in the stochastic process of this variable can be inferred by analyzing asset prices themselves.<sup>3</sup> It is shown that within such a realistic informational set-up, the oscillator model, described as "Hold a long position when the difference between the short-term and the long-term average is

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<sup>1</sup> In particular, the profitability of moving-average rules is repeatedly reported in the literature. For exchange rates, this has been done recently by Levich and Thomas (1993), LeBaron (1999, 2000); for stocks, see Brock, Lakonishok, and LeBaron (1992) and Jegadeesh and Titman (1993, 2001).

<sup>2</sup> Exceptions are support and resistance levels, which may have predictive power because traders prefer round numbers for stop-loss and take-profit orders (Osler, 2003).

<sup>3</sup> Of course, there is also a related literature that derives estimates of unobservable components of an economic variable such as Friedman's 'permanent income' by means of recent observations of the variable itself (see Muth, 1960 or, more recently, Barsky & De Long, 1993). Thus, the derived estimates share some properties with our solution, but the relation to technical trading has not yet been addressed.

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