



## Evidence on the contrarian trading in foreign exchange markets

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### ABSTRACT

This paper investigates the existence and price impacts of contrarian behavior in the foreign exchange markets. By utilizing a nonlinear behavioral model where the chartists and fundamentalists coexist, evidence obtained from two sample periods significantly supports the existence of contrarian trading in the British pound, the Japanese yen and the German mark markets. The contrarian trading can only partially offset the price impacts of trend-followers, therefore the price impact of the chartists as a whole is destabilizing. The ability that the contrarians can counterbalance the extrapolation of the trend-followers differs across markets. Traders in the BP market have the highest tendency to contrarian strategy, which in turn contributes to the least deviations of the BP exchange rates departing from its PPP fundamentals. The fundamentalists' confidence in trade fades during large misalignments, which make the mean reversion function of the fundamentalists weak under the circumstances. We find the magnitudes of interventions will be affected by the price impacts of contrarians and their abilities on market stabilization.

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### 1. Introduction

From the early 1980s onward, studies in the exchange rate economics have demonstrated that there are sometimes large movements in the nominal exchange rate which are unexplained by macroeconomic fundamentals.<sup>1</sup> To solve the problems that fundamental (macroeconomic) variables are poorly correlated with high-frequency exchange rate movements, researchers have delved into different approaches for modeling the exchange rate dynamics. One of these approaches introduces heterogeneous behaviors of market agents and their expectations. The exchange rate models are thus directed toward a nonlinear specification (DeGrauwe and Vansteenkiste, 2007), in which the 'fundamentalists' coexist with the 'chartists' (or 'technical analysts').

The chartists, purely behavioristic in nature, behave under the assumption that all relevant information about future price movements is contained in past movements (DeBondt and Thaler, 1985; Daniel et al., 1998). They attempt to identify signals of trends and reversals implied in the prices. Rather than gauging the fundamental changes in the economy, the chartists exclusively rely on past price behavior to direct trading decisions in the markets.

Economists have been interested in technical analysis for decades because of the noticeable influences the technical analysis has on asset price. Taylor and Allen (1992) note that there are more than 90% of foreign exchange dealers in London who adopt some form of technical analysis to inform their trading decision. Technical analysis predominates over fundamental analysis at short horizons, while the reverse is true at longer horizons. These two strategies are used in a complementary manner. Coherent results are reported in studies on Germany, Hong Kong, USA, Austria, Switzerland, Japan and Singapore markets.<sup>2</sup>

Frankel and Froot (1986) were the first to utilize a chartist–fundamentalist set-up in a foreign exchange model. They used a fundamentalist model for forecasting returns in the long horizons, and a chartist model for the short horizons to describe the demand for US dollar during the 1980s. Nowadays, an increasing number of studies is given to understanding how various strategies affect prices (e.g. Farmer and Joshi, 2002; Sansone and Garofalo, 2007; Bask, 2007; Westerhoff and Reitz, 2003; Reitz and Taylor, 2008). Most of the studies indicate that the technical analysis will amplify the noise in markets. The chartists are responsible for the irrational bubbles in asset price.

Among the studies assessing the price impacts of heterogeneous agents' behaviors, Westerhoff and Reitz's (2003) conclusions attracted our attention. Westerhoff and Reitz developed a model with chartist–fundamentalist set-up to study cyclical behavior in

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<sup>1</sup> See Meese and Rogoff (1983), Frankel and Froot (1990b), Obstfeld and Rogoff (2000), Sarno and Taylor (2002).

<sup>2</sup> Gehrig and Menkhoff (2006) provide a survey discussing the importance of technical analysis in the foreign exchange markets.

foreign exchange markets. According to the model, the market impact of fundamentalists depends on the strength of their belief in fundamental analysis which would unfortunately diminish as the exchange rate deviations become large. Markets in that situation will be left with no stabilizing forces. Central bank interventions are required to deflate irrational bubbles in markets.

The Westerhoff–Reitz result seems contradictory to the traditional views that arbitragers would be encouraged by large deviations for the rich profits implied. Considering that Westerhoff–Reitz result is derived from the assumption that the chartists only adopt the trend-following strategy in the markets, we would like to examine if the fundamentalists continue to leave when the assumption on chartist's behavior changes. In this paper, another technical trading rule – the contrarian strategy – is taken into account. The contrarian strategy, stemming from DeBondt and Thaler's (1985) seminal work, matters equally as the trend-following strategy in today's foreign exchange markets (Bilson, 1990; Neely, 1997; Sansone and Garofalo, 2007). The difference between these two trading strategies is clear: the trend-followers bet on the assertion that prices exhibit continuation (or momentum). They give orders positively correlated with the current trends. The contrarians, on the contrary, bet against trend-followers' naïve thinking. They believe price will reverse once it overshoots. The contrarians would take positions negative to previous price movements at that timescales (Farmer and Joshi, 2002).

This paper expands Westerhoff and Reitz's (2003) model by adding a third type of trading strategy – the contrarian strategy to understand how these various strategies affect price movements. Since the available literature provides little information on the existence of contrarian behavior in the foreign exchange markets,<sup>3</sup> this paper adds information in this respect. Further, by introducing a variable that can measure the degrees of contrarian activities, our model assesses the price impacts of contrarian behaviors. The abilities of the contrarians to counterbalance the impacts of trend-followers are also evaluated for grading the contributions of the contrarians to market stabilization.

Two sets of data are used in this study. The first set of data is copied from Westerhoff and Reitz's (2003) study in order to prevent the likelihood that our results are data-dependent. Daily spot exchange rates on German mark (DM), Japanese yen (YEN) and British pound (BP) over the period from 1980:1:1 to 1996:12:31 are included. Next, we employ data on BP and YEN currencies over the period from 1991:4:1 to 2004:12:31 to test the robustness of our results.<sup>4</sup> Since heavy interventions in the YEN market were conducted during this period, our result may provide policy implications for the central banks.

Estimation results from these two periods consistently report the existence of contrarian behaviors in the foreign exchange markets. The contrarian behaviors can offset the extrapolative price movements resulting from the trend-following strategy, and thus to some extent, contribute to market stabilization. However, since the contrarians' ability on offsetting the price impacts of trend-follower is limited, the aggregate price impacts from the behaviors of chartists as a whole (i.e. the net impacts from trend-followers and the contrarians) are extrapolative. This result confirms the opinions in the literature that the behaviors of chartists are destabilizing. Besides, the price impact offsetting ratios of the contrarians, which are related to traders' sensitivities on price change, vary across markets. The contrarians in different markets are graded by their contribution to market stabilization. Traders in the BP market have the most tendencies toward contrarian trading. They can offset a larger part

of the impacts of trend-followers; therefore, their contributions to market stabilization are graded higher than those in the YEN and DM markets. The tendency of BP traders towards a contrarian strategy seems related to less liquidity in the BP market. Markets with large turnovers, such as the DM and YEN markets tend to display less contrarian behaviors.

The behaviors of fundamentalists remain the same as reported in Westerhoff and Reitz (2003), even though the contrarian strategy is included in our exchange rate model. The fundamentalists will stop trading under large exchange rate deviations, and leave the markets with no stabilizing forces. Central bank interventions are needed, as suggested by Westerhoff and Reitz (2003) and Reitz and Taylor (2008), to correct the irrational anticipations among traders. However, since the extents of the exchange rate deviations (i.e. deviating from its fundamental values) are significantly affected by contrarians' price reversing abilities, the magnitudes of interventions will also be affected by the price impacts of contrarians and their abilities on market stabilization.

The remainder of this paper is organized as follows. Section 2 presents the econometric model describing the aggregate price impacts of heterogeneous agents. Literature regarding agents' behaviors is cited in relevant paragraphs. Section 3 introduces the data and describes model specification procedures. Section 4 reports the estimation results. Section 5 provides conclusions and relevant discussions.

## 2. Agent behaviors, price impacts and the econometric model

This section describes certain wildly used trading rules in more details and discusses their price effects. We classify these strategies on the basis of information inputs. Decision rules that depend only on price history are called technical strategies. These strategies can be further divided into two groups: the trend-following strategy and the contrarian strategy. Investors adopting each of the strategies are named trend-followers and the contrarians respectively. Traders based on external information to derive a subjective assessment of the long-term fundamental values are called fundamentalists. The objective of this paper is to investigate the price effects of each of the trading strategies, namely, the trend-following, contrarian, and fundamental strategies. We classify a trader's behavior according to the strategy he/she adopts on a certain timescale. The price effects of each behavior will depend on the fraction of that strategy adopted, and are therefore time-variant.

### 2.1. Trend-followers

Trend-followers, also sometimes called 'momentum traders', make their investments based on the belief that there is inertia in price changes. Chan et al. (1996) attribute this inertia to market under-reacting to fundamental-based news. Traders who believe past price movements will continue in the future will form their expectations in a backward looking way: they take a positive (long) position as prices have been recently going up, and a negative (short) position as prices have been recently going down.

The trend-following strategy may lead to the asset price moving with momentum. Positive correlations are present between recent price movements and trade directions (MacDonald and Torrance, 1988; Cavaglia et al., 1993; Farmer and Joshi, 2002; Dreger and Stadtmann, 2008). The market order of trend-followers in period  $t$  ( $D_t^T$ ) can be written as

$$D_t^T = a^T(S_t - S_{t-1}) \quad (1)$$

where  $a^T$  denotes a positive reaction coefficient and  $S_t$  stands for the log of the exchange rate at time  $t$ . When the log exchange rate rises

<sup>3</sup> Studies that have explicitly identified the existence of contrarian strategy in the foreign markets are relatively rare than those have been shown in the stock markets. The limited studies include: Bilson (1990), Neely (1997), Larson and Madura (2001), Eun and Sabherwal (2002), and Parikakis and Syriopoulos (2008).

<sup>4</sup> The DM has been replaced by the Euro since the beginning of 1999.

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