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# Behavioural Finance and Financial Economics with Heterogeneous Beliefs

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The literature about the dynamics of prices in speculative markets, based on the interaction of boundedly rational heterogeneous agents has become well developed in recent decades. Hommes CH [1] provides an excellent survey work on Heterogeneous Agent Models (HAMs) in economics and finance. In this strand of literature, one is able to generate sophisticated structures that capture some of the dynamics and stylized facts documented in financial time series at the macro level by aggregating the simple interactions of boundedly rational agents using various trading rules at the micro level. Such stylized facts include excess volatility, high trading volume, temporary bubbles and trend following, sudden crashes and mean reversion, clustered volatility and fat tails in the returns distribution. These models generally include nonlinear elements which may come from agents' or demand functions, evolutionary switching between available strategies, and contagion and consequent transition of speculators among optimistic and pessimistic groups.

This article aims to shed light on three potential future research directions in behavioural finance based on HAMs model. The first research direction is to introduce the concept of regime-dependent belief into a basic deterministic HAM proposed by Day and Huang [2] and test the model's capability to produce different types of financial crises within the same framework which cannot be fulfilled by Day and Huang [2]. In technical analysis, chartists always try to identify support price level (at which buying force is believed to be strong enough to prevent the price from dropping further and resistance price level (at which selling force is thought to be large enough to curb the price from rising further). If the price moves within a regime that covers current support and resistance price levels, chartists stick to their original beliefs that the price will not exceed the thresholds of the regime. However, when price breaks through the boundaries of the current regime, new support and resistance price levels will be established, and chartists will shift their beliefs accordingly. According to their trading experience and analysis, chartists form a series of psychological trading regimes with different support and resistance price levels, based on which they develop their beliefs of future price movements. In order to decide optimally whether to maintain their original beliefs or shift to others, it is important for chartists to continuously update the support and resistance price levels and to extrapolate the contemporaneous psychological trading regime from the latest market information. To formalize the different behaviour of chartists at distinct regimes, it is therefore valuable to account for the regime-dependent belief, with the price expectation depending on the corresponding psychological trading regime. Modelling belief as regime-dependent is supported by empirical evidence that price follows a complicated process with multiple regimes and that such non-linear process affects investment decisions [3,4]. Such concept is also supported by the literature of HAMs. HAMs that explicitly incorporate regime-dependent properties into price expectations exhibit better performance than those without [6-9]. Nonetheless, due to the complexity of these HAMs and the many factors that they account for, it is difficult to analyze concretely how regime-dependent belief contributes to the model performance. Can the regime-dependent belief alone improve a model's capability to capture the qualitative and statistical properties in the real financial time series? If so, what is the underlying mechanism? The answers to these questions remain unknown in current literature and hence warrant further investigation.

The second research direction is to explore the potential of deterministic HAM without stochastic elements to justify the use of technical analysis by practitioners in financial market. With different extensions in HAMs, one could simulate some phenomena commonly observed in financial market including fat tails, volatility clustering and unit root process. At the same time, an aspect of stock market that has intrigued investors is whether there exists any reliable trading rule based on chart pattern that allows them to make profit. Technical analysis is a kind of technique that has been widely used among practitioners for more than 200 years in financial market. Many traditional researchers, however, still hold negative attitudes toward such analysis, especially pattern analysis, which depends mostly by visual judgment without any theoretical support. For instance, Samuelson [10] proved that stock prices should follow a random walk. Fama [11] confirmed that return series is close to a random walk process if price includes all information leaving asset returns unpredictable. Until recently, many empirical data have been documented to question the validity of EMH. Many studies have recently shown that technical analysis, involving visual inspection of past prices without underlying economic or fundamental analysis, has some predictable power and is profitable in different markets [12,13]. In the theory of pattern analysis, there are two major categories of price patterns, one is reversal patterns and the other is continuation patterns. The role of technical analysts is to distinguish between the two patterns as early as possible so that they can make timely decision. Since the reversal patterns have greater implications for analysts, one should concentrate on these patterns. Some common characteristics of reversal patterns for price are the existence of a prior trend, the breaking of important trend lines, the larger the pattern, the greater the potential, and shorter and more volatile top patterns than bottom patterns. With what follows, we see potential in purely deterministic HAMs without stochastic elements but include demand and supply of traders with heterogeneous beliefs to explain and justify the use of technical analysis by practitioners. Such models should be purely deterministic in nature so that fundamental factors can be identified and the potential systematic pitfalls caused by random elements can be avoided.

The third research direction is perhaps to extend the model of Day and Huang [2] and explore the potential of deterministic HAM in explaining the prophecy of self-destroying phenomenon in financial market. The essential difference between socio-economic systems and physical systems is the involvement of human behaviours. Rational individuals form expectations when facing uncertainty, make best decisions based on their expectations, and constantly update their strategies when outcomes are observed. If there were only one individual in the world, the outcome would be consistent with the

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expectations formed, assuming no random shocks. However, in reality, many individuals with no appreciable power are involved in the socio-economic systems. It is then their aggregate actions rather than individual action that determine the observed outcome, which may or may not be consistent with individuals' expectations. The concepts of self-fulfilling and self-destroying prophecies are then brought in. A general statement of self-fulfilling and self-destroying prophecy was first introduced by Merton [14] in sociology, if the aggregate outcome is consistent (inconsistent) with an individual's expectation, the individual's expectation is said to be self-fulfilling (self-destroying). One classical example for self-fulfilling expectation is bank run, where a large number of depositors feel that the best strategy is to withdraw their deposits because they believe the bank is, or may become insolvent. This expectation is self-fulfilled when there are increasing numbers of withdrawals. Besides, the belief that the bank is, or may become insolvent could be an originally false predication if there are no such public reactions to it. However, agents' public reactions make it true. In this sense, the bank run is a self-fulfilling phenomenon. On the contrary, the Cobweb cycles can be classified as self-destroying. In the Cobweb cycles model, farmers plan for the next season's production based on the current season's price. Suppose all farmers expect high price this season to prevail next season, all will produce high output. This will render the price in next season to be low, contradicting the original expectation. In these two cases, the aggregate realizations will always go against the individual's expectation. Although literally self-fulfilling and self-destroying prophecies are contradicting to each other, can they co-exist in the socio-economic systems? Financial market is such a complicated system, where people's expectations and market's realizations co-evolve with each other and hence lead us to suspect that these two phenomena may co-exist. Stock price will usually rise if many individuals bull the market and buy in accordingly. However, if one profitable trading strategy becomes prevailing, it will be exploited by more and more traders. The aggregate expectations and actions by all the traders will finally erode profits and yield losses, that is, public knowledge of predictions inherently self-defeated themselves. Both phenomena are especially noticeable during financial crisis, as described in Kindleberger and Aliber [15]. When people's expectations are incorporated into price, that is, the coordination of their expectations leads their wish to come true in advance, it becomes less profitable or even yields losses. This self-destroying event causes the bubble to burst and provokes panics. While various studies in literature focus on the qualitative analysis of self-fulfilling and self-destroying prophecies, quantitative analysis is rarely explored, especially for self-destroying prophecy. Gao and Li [16] is one of the few exceptions. Based on a multi-agent model with trend-following and trend-reversing expectation rules, they find the process in which one strategy goes from showing superior performance to being unprofitable as it is gradually exploited, realized, and taken advantage of. The result also holds when fundamentalist rule is added into the market. However, besides the stochastic model of Gao and Li [17], we see potential in explaining the self-destroying prophecy using a deterministic model. In fact, a few modifications can be considered on the model of Huang et al. [7]. First, the fundamentalists in Huang's model hold completely constant prediction about the price. It may be more realistic to drop this assumption because in real life the fundamental value of a stock price is not a constant when firms are expanding their business and innovative technologies are prevailing. Second, discounted realized profits for both groups of agents can be specified by assuming them to be the multiple of discount factor and actual absolute value of the difference between price and expected price.

Since the work of Day and Huang [2], there has been a large body of literature attempting to explore the potential of deterministic HAM in replicating some stylized facts in financial time series. However, many interesting areas remained unexplored. We propose three distinct and yet related research directions in this article so that one can attempt to (1) analyze how regime-dependent belief contributes to the performance of HAM in capturing the qualitative and statistical properties in the real financial time series and test the model's capability in replicating different types of financial crises simultaneously, (2) explain why technical analysis make sense to financial investors even though many traditional researchers still hold negative attitudes that such analysis without theoretical support is not useful, and (3) examine self-destroying expectation in financial crisis through the interactions of two groups of agents: fundamentalist and chartist.

## References

1. Hommes CH (2006) Heterogeneous Agent Models in Economics and Finance. In: Handbook of Computational Economics. Elsevier, Netherlands.
2. Day RH, Huang W (1990) Bulls, bears and market sheep. Journal of Economic Behavior & Organization 14: 299-329.
3. Ang A, Bekaert G (2002) International asset allocation with regime shifts. Rev. Financ. Stud 15: 1137-1187.
4. Guidolin M, Timmermann A (2007) Asset allocation under multivariate regime switching. Journal of Economic Dynamics and Control 31: 3503-3544.
5. Guidolin M, Timmermann A (2008) International asset allocation under regime switching, skew, and kurtosis preferences. Rev. Financ. Stud 21: 889-935.
6. Manzan S, Westerhoff FH (2007) Heterogeneous expectations, exchange rate dynamics and predictability. Journal of Economic Behavior & Organization 64: 111-128.
7. Huang W, Zheng H, Chia WM (2010a) Asymmetric returns, gradual bubbles and sudden crashes. European Journal of Finance.
8. Huang W, Zheng H, Chia WM (2010b) Financial crises and interacting heterogeneous agents. Journal of Economic Dynamics and Control 34: 1105-1122.
9. Tramontana F, Westerhoff F, Gardini L (2010) On the complicated price dynamics of a simple one-dimensional discontinuous financial market model with heterogeneous interacting traders. Journal of Economic Behavior & Organization 74: 187-205.
10. Samuelson PA (1965) Proof that Properly Anticipated Prices Fluctuate Randomly. Industrial Management Review 6: 2.
11. Fama EF (1970) Efficient capital markets: A review of theory and empirical work. Journal of Finance 25: 383-417.
12. Brock W, Lakonishok J, Lebaron B (1992) Simple technical trading rules and the stochastic properties of stock returns. Journal of Finance 47: 1731-1764.
13. Allen F, Risto K (1999) Using genetic algorithms to find technical trading rules. Journal of Financial Economics 51: 245-271.
14. Metron RK (1948) The self-fulfilling prophecy. Antioch Review 8: 193-210.
15. Kindleberger CP, Aliber RZ (2005) Manias, Panics, and Crashes: A History of Financial Crises. Wiley, Hoboken, NJ, USA.
16. Gao Y, Li H (2010) A consolidated model of self-fulfilling expectations and self-destroying expectations in financial markets. Journal of Economic Behavior & Organization 77: 368-381.
17. Black F (1986) Noise. Journal of Finance 41: 529-543.