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Do investors trade too much? A laboratory experiment

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ABSTRACT

We run an experiment to investigate the emergence of excess and synchronised trading activity leading to market crashes. Although the environment clearly favours a buy-and-hold strategy, we observe that subjects trade too much, which is detrimental to their wealth given the implemented market impact (known to them). We find that preference for risk leads to higher activity rates and that price expectations are fully consistent with subjects' actions. In particular, trading subjects try to make profits by playing a *buy low, sell high* strategy. Finally, we do not detect crashes driven by collective panic, but rather a weak but significant synchronisation of buy activity.

1. Introduction

Financial bubbles and crises are potent reminders of how far investors' behaviour may deviate from perfect rationality. Many behavioural biases of individual investors are now well documented, such as the propensity for trend following or extrapolative expectations (Greenwood and Shleifer, 2014), herding behavior (Cipriani and Guarino, 2014), the disposition effect (Grinblatt and Keloharju, 2001), home bias (Solnik and Zuo, 2012), and over and underreaction to news (Barber and Odean, 2008); see Barberis and Thaler (2003) and Barber and Odean (2013) for comprehensive overviews.

A well established fact about individual trading behaviour which is in stark contrast with the predictions of rational models is the tendency of individual investors to trade too much (Odean, 1999). Many investors trade actively, speculatively, and to their detriment. Odean (1999), Barber and Odean (2000), Odean and Barber (2011) and Barber et al. (2009) among others show that the average return of individual investors is well below the return of standard benchmarks and that the

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more active traders usually perform worse on average. In other words, these investors would do a lot better if they traded less. Moreover, as noted in Barber and Odean (2013), individual investors make systematic, not random, buying and selling decisions.

Based on the empirical evidence mentioned above, the goal of this paper is to study the emergence of excess trading in an experimental financial market where trading is clearly detrimental for investors' wealth. One advantage of using a controlled laboratory environment is that it allows us to directly measure individual characteristics and relate them in a systematic way to trading activity. We measure individual risk attitudes and elicit asset price forecasts, and link them to observed trading activity. Moreover, we aim to gain a deeper understanding not only of why agents trade, but also of how correlated is their activity. In particular, we want to study whether synchronisation of trading activity leads to unstable market behaviour, such as crashes driven by panic, herding and cascade effects.

Market laboratory experiments now have a rather long history. The most influential paradigm for multi-period laboratory asset markets was developed in Smith et al. (1988). The asset traded in their experiment has a known finite life span and pays a stochastic dividend at the end of each period. The fundamental value of the asset falls deterministically over time, and lacking a terminal value the asset expires worthless. A salient result is that asset prices in the experimental markets follow a "bubble and crash" pattern which is similar to speculative bubbles observed in real world markets.[1] This seminal work has spawned a large number of replications and follow-ups, see Palan (2013) for an extensive overview.

The present study belongs to the above tradition of experimental markets but implements a different market mechanism. Instead of trading in a continuous double auction, subjects can submit buying and selling orders, executed by a market maker, for a fictitious asset that increases in value at a known average rate and has an indefinite horizon. One particularly interesting feature of our laboratory market is that we model and implement price impact, namely the fact that the very action of agents modifies the price trajectory. This is now believed to be a crucial aspect of real financial markets, which may lead to feedback loops and market instabilities (Bouchaud et al., 2009; Bouchaud, 2011; Cont and Wagalath, 2014; Caccioli et al., 2014). What is of particular interest in our experiment is that excess trading significantly impacts the price trajectory and is strongly detrimental to the wealth of our economic agents. In other words, unwarranted individual decisions can lead to a substantial loss of collective welfare, when mediated by the mechanics of financial markets.

Our work relates to the literature on experimental asset markets that investigates how excess trading and mispricing is affected by the characteristics of market participants. In particular, we relate our results on trading activity to market experience, individual risk preferences and price forecasts.[2] Previous experimental studies show that repeated participation in identical markets plays an important role in eliminating bubbles and crashes (Smith et al., 1988; King, 1991; Haruvy et al., 2007). Moreover, it is often argued that non-zero trade volumes are observed in experimental asset markets due to the heterogeneity in risk preferences. Previous empirical studies show that individual risk attitude could have an impact on trading in asset markets. For example, Robin et al. (2012) and Fellner and Maciejovsky (2007) find that risk-aversion leads to smaller bubbles and less trade in asset markets. Moreover, Keller and Siegrist (2006) did a mail survey and found that financial risk tolerance is a predictor for the willingness to engage in asset markets. In the light of the aforementioned empirical evidence, we measure subjects' risk aversion using a standard Holt and Laury (2002) procedure and link it to individuals' trading activity. Finally, Palan (2013) highlights the importance of investigating the dynamics of expectations regarding future prices in multi-period asset markets. We also elicit individual price expectations in order to better understand what leads to investors' decision of engaging actively in trading activity as well as being inactive in the market. Since we collect data on both individual trading decisions and price expectations, we are able to give a consistent picture of activity and inactivity as a consequence of price return expectations. See also Smith et al. (1988), Hommes et al. (2005, 2008) and Haruvy et al. (2007) among others for studies on the role of expectations in generating bubbles and crashes in experimental asset markets. Another personality trait often linked to individual investment choices is overconfidence. Theoretical models predict that overconfident investors trade too much and to their detriment (Gervais and Odean, 2001). Odean (1999) links high turnover rates and poor performance of individual investors to overconfidence, while Odean and Barber (2011) show that men, who are more prone to overconfidence than women, trade more than women. Finally, Michailova and Schmidt (2016) present experimental evidence of the positive association between overconfidence and individual engagement in trading activity.

Our findings can be summarised as follows. Although the market environment clearly favours a buy-and-hold strategy (see below), we observe that our subjects engage in excessive trading activity, which is both individually and collectively detrimental, since the negative impact of sellers reduces the price of our artificial asset. When the experiment is immediately repeated with the same subjects, we see a significant improvement of the collective performance, which is however still substantially lower than the (optimal) buy-and-hold strategy.

[1] In fact, Smith (2010) blames a failure of backward induction for the existence of bubbles in these simple experimental markets and he suggests that *"price bubbles were a consequence of . . . homegrown expectations of prices rising"*. Oechssler (2010) shares this view and argues that *"backward induction is only useful when there is a finite number of periods which most asset markets do not have. Subjects are told that they trade assets on a market so they probably expect to see something similar to what they see on real markets: stochastic processes with increasing or at least constant trend in most cases."* See Noussair and Powell (2010), Giusti et al. (2012), Breaban and Noussair (2014) and Stöckl et al. (2015) for previous experimental studies on markets with (partly) increasing fundamental values.

[2] See Powell and Shestakova (2016) for a recent overview of the literature on experimental asset markets connecting market outcomes to the structure of experimental markets, properties of the traded asset and trader characteristics.