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The impact of monetary policy on stock market bubbles and trading behavior: Evidence from the lab ☆

Urs Fischbacher [a,d], Thorsten Hens [b,c,*], Stefan Zeisberger [b]

[a] Department of Economics, University of Konstanz, Germany
[b] Department of Banking and Finance, University of Zurich, Switzerland
[c] School of Economics, NHH Bergen, Norway
[d] Thurgau Institute of Economics, Kreuzlingen, Switzerland

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ABSTRACT

We investigate the effect of monetary policy on stock market bubbles and trading behavior in experimental asset markets. We introduce the possibility of investing in interest bearing bonds to the widely used laboratory asset market design of Smith et al. (1988). Treatment groups face a variable interest rate policy which depends on asset prices, while control groups are subjected to a constant interest rate. We observe a strong impact of our interest rate policy on liquidity in the stock market but only a small impact on bubbles. However, we find that announcing the possibility of reserve requirements significantly reduces bubbles.

1. Introduction

Recently, financial markets have experienced the expansion and burst of major asset price bubbles, for example, the dot-com bubble around 2000 or the housing bubble around 2007. The appropriate response of monetary policy to these bubbles is an issue that is under hot debate among central bankers and monetary economists. The collapse of the dot-com bubble, as

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* Correspondence to: University of Zurich, Plattenstrasse 32, CH-8032 Zurich, Switzerland. Tel.: +41 44 634 37 06; fax: +41 44 634 49 70.
E-mail address: thorsten.hens@bf.uzh.ch (T. Hens).

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an example, led a number of authors to argue that the central banks' monetary policy should not only aim for inflation targets, but also incorporate asset price developments and other financial system stability indicators (Borio and Lowe, 2002; Renaud, 2003). Other authors are skeptical of enforcing such a monetary policy. Simply raising interest rates in the hope of containing a speculative asset price bubble might result in exactly the economic collapse one was trying to avoid (see, e.g., Assenmacher-Wesche and Gerlach, 2010 or Posen, 2006).[1]

The theoretical literature remains unclear on the feasibility of using an active interest rate policy to deflate asset market bubbles, in particular of stock markets. Much of this literature focuses on stochastic asset price bubbles (see, e.g., Bernanke and Gertler, 2001; Cecchetti et al., 2002 or Gruen et al., 2005). The bottom line of this literature seems to be that the results hinge on the particular stochastic assumptions regarding the asset price (as well as other shocks that might provide a fundamental explanation for the asset price movements) and, above all, on the information available to the policy maker.

The idea of our paper is to extract the essence of the mentioned arguments and test them in a controlled laboratory experiment setting. Advantageously in comparison with empirical research, the information content of monetary policy and investors' expectations can be to some extent controlled, and one can analyze with the use of control experiments how the bubble would have evolved without the policy intervention. We introduce a portfolio alternative to trading in stocks to the classical experimental design of Smith et al. (1988): an interest bearing bond. As a consequence, subjects have to decide how to split their capital between the stock and the bond market. Interest rate policy changes opportunity costs, thus possibly affecting prices. We raise the interest rate in treatment groups while control groups face a fixed interest rate. An alternative instrument of monetary policy is reserve requirements. In a separate experiment we thus reduce liquidity directly using reserve requirements.

We are interested in several questions: Is it possible to influence bubbles, in particular to reduce them based on one of the measures we propose? Which monetary instruments are best? Does interest rate policy affect portfolio choices of participants and thus liquidity in the stock market? Given that no one has yet studied this research question, we also want to examine how our results compare to those of earlier experiments. Of course, the flip side of being able to isolate certain effects in a laboratory experiment is that it is hard to model all possible consequences, such as, for example, the effects on the economy's real sector. However, our experiments give at the very least new insights into the effectiveness of monetary policy in taming speculative behavior in asset markets and additionally contribute to the research on experimental asset markets.

Our main findings are as follows. We observe a significant impact of our interest rate policy on liquidity in the stock market, however, the effect on trading prices is limited. Conversely, we find a strong impact of *announcing* the possibility of reserve requirements on prices. The actual fulfillment of such reserve requirements does not play a major role.

The rest of the paper is organized as follows. Section 2 gives a short overview of research on experimental asset markets and describes our study in relation to previous research. Section 3 describes our experiment in more detail. Section 4 presents the research questions and defines measures which we use in our analysis. Section 5 analyzes the data and Section 6 concludes.

2. Literature on experimental asset markets

Since Smith et al. (1988) first investigated asset market bubbles experimentally many studies have aimed at examining the stability of the observed phenomenon with regard to different treatment parameters. King et al. (1993) found none of the following having an impact on the occurrence or size of bubbles: the possibility of short selling stocks, buying on margin, identical endowments among investors, transaction costs ("brokerage-fees") or professional traders as experimental subjects. Bubbles are also stable with respect to differences in market organization (van Boening et al., 1993). Porter and Smith (1995) rule out risk aversion in early periods of the experiments as a major factor for bubble formation. Lei et al. (2001) demonstrated that the speculative motive is not the sole source of laboratory stock market bubbles.

There are some studies that show how bubbles can be moderated. Ackert et al. (2002) show that short selling possibilities considerably reduce bubbles. However, Haruvy and Noussair (2006) show that if there are few constraints on short selling, prices even fall below fundamental value. Futures markets mitigate bubbles (Porter and Smith, 1995), in particular, if futures contracts are available for every period (Noussair and Tucker, 2006). King et al. (1993) and Lei and Vesely (2009) find that familiarizing some participants with the results of the Smith et al. (1988) paper or explicitly demonstrating how the fundamental value develops over time is an effective means to reduce bubbles. Similar to the latter finding, experience seems to be a reliable way to prevent bubbles (Dufwenberg et al., 2005), although Hussam et al. (2008) show that experienced subjects again produce a bubble if experimental parameters are varied.[2] Noussair et al. (2001) were only able to moderate bubbles to some extent applying a design with a constant fundamental value. Kirchler et al. (2012)

[1] As one of those exponents, Bernanke (2002) stated: "Even if it [the Federal Reserve] could identify bubbles, monetary policy is far too blunt a tool for effective use against them." His predecessor as the chairman of the Federal Reserve Board, Greenspan, took a very similar view in 2002: "The notion that a well-timed incremental tightening could have been calibrated to prevent the late 1990s bubble is almost surely an illusion."

[2] Even though in real markets a large share of traders are experienced, usually no one is experienced with the particular situation when a bubble occurs. For instance, in the new economy bubble, it was not clear how the fundamental value of Dot-com companies should be determined. Bernanke (2002) states: "Thus, to declare that a bubble exists, the Fed must not only be able to accurately estimate the unobservable fundamentals underlying equity valuations, it must have confidence that it can do so better than the financial professionals whose collective information is reflected in asset-market prices".