



*Expectations and Bubbles in Asset Market Experiments*  
M. Hennequin

# Chapter 5

## Summary

Asset markets exhibit a positive feedback mechanism, where an increase in the expected price of an asset leads to an increase in the realized price through a rise in demand for the asset. When traders extrapolate trends in the asset price, a bubble may occur, eventually followed by a crash. Such bubble-and-crash dynamics can potentially have severely negative effects on the economy, as has been illustrated recently by the US housing bubble in 2003–2007. It is therefore important to understand the interaction between expectations and bubbles, and to look for policies that can improve individual and aggregate behavior in asset markets.

This thesis, titled “*Expectations and bubbles in asset market experiments*”, aims to shed light on expectation formation and bubble formation in asset markets by taking an experimental approach. Subjects participate in controlled laboratory experiments, where they repeatedly predict the price of an asset. The realized price depends on the average price forecast of all traders in the market, capturing the positive expectations feedback. These learning-to-forecast experiments allow for directly observing and studying individual expectations, group behavior and market outcomes. The three core chapters of this thesis present three experimental studies that examine how expectations are formed and when these expectations lead to stabilization or destabilization of asset markets.

In Chapter 2, we explore whether asset price bubbles occur in an asset market experiment with larger groups. Previous studies have shown that bubbles often occur in small groups, but it is unclear whether this coordination on trend-following expectations is robust to an increase in group size. We therefore test this by increasing the market size from 6 to 21–32 subjects, the size of a typical computer lab. The reduced influence of individual participants on the market price makes it less likely that a bubble is caused by a single “irrational” subject. The results of our large-group

experiment show that six out of seven markets exhibit large bubbles, caused by coordination on a trend-following prediction strategy. Individual forecast errors do not cancel out at the aggregate level, so that expectations cannot be called rational in the sense of Muth (1961). The observed price patterns can be captured with a behavioral heuristics switching model that incorporates heterogeneity in expectations and switching between simple forecasting strategies based on relative performance. Although bubbles form faster in our large-group experiment, the way in which expectations are formed is not substantially different from small-group experiments, and the results for both group sizes are largely comparable.

Chapter 3 investigates the effect of a “leaning against the wind” interest rate rule on asset price bubbles. There is an ongoing debate about the appropriate monetary policy response to bubbles, and different theoretical models reach conflicting conclusions. An experimental study does not rely on assumptions about expectation formation and therefore complements the theoretical literature. The Taylor-type policy rule in our experiment sets the interest rate in response to relative deviations from the steady state fundamental price. The success of the policy depends crucially on expectation formation: a rational bubble grows faster after an interest rate increase, but bubbles caused by boundedly rational expectations might be deflated. We find that a weak interest rate response is not successful in preventing large bubbles, since destabilizing trend-following expectations are too strong. By contrast, bubbles are absent or remain smaller in markets with a strong interest rate response. When subjects are not informed about the interest rate changes, price patterns are more erratic and coordination is less strong than when subjects know the current and past interest rates. Communicating the goal of the policy further improves coordination and decreases mispricing. However, the policy is less effective when the central bank does not know the steady state fundamental price and uses the sample average price as a proxy to set the interest rate. Nevertheless, our experimental results suggest that expectations-driven bubbles might be managed by a strong monetary policy rule, especially when the policy is clearly explained to market participants.

In Chapter 4, I study how past experiences with price patterns in asset markets affect expectations and future market dynamics. The experimental design provides control over experiences by letting subjects first enter into a market with robots, so that they experience either a stable or a bubbly asset market. Next, markets are formed with subjects who either have the same experience or an equal mix of experiences. The results indicate that experiencing price stability or bubbles has a large effect on the (de)stabilization of asset prices in the future. When all subjects in the markets experienced stability before, the price converges faster to the fundamental. By contrast,

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bubbles form faster in markets where all subjects experienced bubbles. Results are mixed in mixed-experience markets: prices either stabilize or destabilize. Heterogeneity in expectations is larger when more subjects have experienced bubbles before. The experimental evidence supports empirical studies reporting that experiences affect expectations. On the other hand, the results contrast with other experimental studies finding that experience eliminates bubbles in a more simple market setting. When the asset market is more complex, experiencing bubbles leads to expecting more bubbles and can thus lead to new bubble formation.

Altogether, the experiments in this thesis highlight the importance of bounded rationality and heterogeneity in expectations in asset markets. Theoretical studies should take this into account by using behavioral models with heterogeneous agents. Furthermore, policymakers should consider behavioral biases, such as the tendency to extrapolate trends, when designing policies to improve individual behavior and market outcomes.