

Executive Summary

There were a lot of speculative bubbles in the last few hundred years. While they often have negative associations, they were frequently the source of ground-breaking innovations such as the innovation of the railroad or of the computer. This thesis examines the welfare effects of speculative bubbles in a general equilibrium model with production and innovation. In particular, the conditions are analyzed under which speculative bubbles are able to rise the consumption and investment relative to the situation without speculation.

The speculative bubble is modelled by assuming that the representative consumer is overoptimistic regarding the production growth rate of the innovative firm, the probability of a good state or the risk appetite (taking too much risk). Innovation comes along with a positive externality of one firm on another, i.e. the other firm gets a higher productivity with zero costs. The externality stands for a gain in efficiency resulting from the production of the innovative firm. The effects of speculative bubbles are studied in a general equilibrium model with two periods under certainty with one representative consumer and two firms. Furthermore, the effects of speculative bubbles are examined under uncertainty in an Arrow-Debreu model with two periods and two states in the second period. A general equilibrium model has been chosen, because normative analysis is being done. Moreover, the link between investment and the positive externality of innovation and the resulting welfare effects can be best analyzed in a production economy with a financial market in a general equilibrium model.

The thesis is divided into seven chapters. After the introduction in Chapter 1, Chapter 2 covers the basic characteristics and properties of the assumed general utility and production function. In Chapter 3, the general equilibrium model with production and innovation under certainty is described, followed by a numerical example in Chapter 4. Chapter 5 extends the model from Chapter 3 to the case of uncertainty modelled in an Arrow-Debreu setting with Arrow securities. The numerical example belonging to the section with the model under uncertainty follows in Chapter 6. The conclusion follows in the last chapter, Chapter 7.

The findings show that the competitive equilibrium leads to an underinvestment in innovations from a central planner's point of view, because during the portfolio choice the positive externality of the innovative firm is not accounted for. As a result, the utility level is lower in the competitive equilibrium compared to the central planner solution. This underinvestment can be corrected during a speculative bubble under uncertainty to approximately achieve the social optimal investment in the innovation and thus a higher utility, whereas it cannot be corrected under certainty.

Adjustments in the model under certainty are analyzed with respect to consumer related parameters which can be subject to a bias in a speculative bubble, like the production growth rate of the innovative firm or the appetite to risk. Both parameters are not able to lead the consumer to invest more in the innovative firm. In particular, a consumer overestimating the production growth rate decreases

the investment in the first period, because he or she assumes more output in the next period and smooths consumption. Decreasing the risk aversion leads to more investment, but the effect is small. Under uncertainty the innovative firm is modelled as a risky company having in the good state a large payoff and in the poor state a small payoff. In this setting, the consumer can choose between a lottery (innovative firm) and a safe traditional firm. This section examines how the consumer reacts to an overestimation in the upside potential of the innovative firm, an overestimation of the probability of the good state and to changes in the risk appetite. The overestimation of the upside potential and the probability of the good state lead to smaller investment because the consumer expects more output in the next period and smooths consumption. However, under uncertainty lowering the risk aversion has a much larger effect on the investment choice. A consumer with increasing risk appetite leads the competitive equilibrium to a solution which is close to the allocations a central planner would choose. The increase of the investment in the innovative firm during such a speculative bubble also increases the welfare of the consumer measured in terms of a higher certainty equivalent consumption and a higher utility level.