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Should the Fed Increase the Interest Rate to Promote Financial Stability?

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Abstract

I study the question in the title in an economy that may have overvalued assets that can pop and lead to financial instability. Assets with no fundamentals are not easily detected and can be distinguished from assets with fundamentals only if someone buys information about the underlying project. When information is not private, there is a strictly positive probability that no one will buy it and the bubble-like asset will have value. When the government increases the interest rate, assets with no fundamentals have no value but welfare goes down. Thus an increase in the interest rate may promote financial stability but reduce welfare.

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SHOULD THE FED INCREASE THE INTEREST RATE TO PROMOTE FINANCIAL STABILITY?

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I study the question in the title in an economy that may have overvalued assets that can pop and lead to financial instability. Assets with no fundamentals are not easily detected and can be distinguished from assets with fundamentals only if someone buys information about the underlying project. When information is not private, there is a strictly positive probability that no one will buy it and the bubble-like asset will have value. When the government increases the interest rate, assets with no fundamentals have no value but welfare goes down. Thus an increase in the interest rate may promote financial stability but reduce welfare.

Key Words: Financial Stability, Bubbles, Monetary Policy, Informational Externalities.

JEL codes: E31, E32, E42, E52.

1. INTRODUCTION

It is sometimes argued that low interest rates may promote bubbles and may lead to a financial crisis of the type experienced in 2007-2008.

Here I examine this argument in an economy that suffers from informational externalities of the type analyzed by Grossman and Stiglitz (1980). As in Eden (1981), the market is not always informed even when the cost of information is relatively small and as a result assets with no fundamentals may have value. Overvalued assets may pop and may lead to a financial crisis as in the mortgage backed securities case.

The government sells bonds and finances the interest payments by lump sum taxes. When the interest is low, no one buys government bonds and in equilibrium there is a positive probability that some assets are overvalued. When the interest rate is in the intermediate level investors behave in a "responsible" way and there are no overvalued assets. When the interest rate is high, there is no private investment.

It is not surprising that a high interest that crowds out private investment reduces welfare. What maybe surprising is that even a moderate interest that make everyone behave in a "responsible" way, reduces welfare.

The argument thus supports a low interest rate policy. But a discretionary policy that allows the government to raise the interest whenever it identifies a bubble may actually improve matters.

The paper is related to the debate about the optimal policy response to asset prices. Bernanke and Gertler (2001, 1999) argue for the inflation targeting approach that allows monetary policy reaction to changes in asset prices that affect the central bank’s forecast of inflation. But once the predictive content for inflation has been accounted for, there should be no additional response of monetary policy to asset price fluctuations. Similarly, Gilchrist and Leahy (2002) do not find a strong case for including asset prices in monetary policy rules. Here I argue that information is a public good and therefore a government agency can improve matters by acquiring information and attempting to identify "bubbles". If a "bubble" is identified, an increase in the interest rate is the optimal response.

Gali (2014) asks the fundamental question of whether monetary policy can affect bubbles. His answer is in the negative because an increase in the interest rate will be matched by an increase in the rate of return on the bubble. My answer is in the positive. The reason for the difference in conclusions is in the bubble type. Using the terminology of Allen, Morris and Postlewaite (1993) we may say that Gali assumes “strong bubbles” in which the lack of fundamentals is common knowledge as in the classic models of Samuelson (1958) and Tirole (1985). Here information is symmetric but imperfect: Sometimes everyone is not informed because of the free rider problem.

2. THE MODEL

The economy lasts for two periods. There are n agents. Each gets an endowment of one unit of a storable good in the first period and consume in the second period. The utility function of the representative is: $c-L$, where c is (second period) consumption and L is labor. Here labor is not used for production but may be used in the first period for gathering information.

Agents can store the good at the gross rate of return of 1. Storage is thus costless. They can also invest in a risky project. The risky project yields $\tilde{\theta}$ units in the second period where $\tilde{\theta}$ can take two possible realizations with equal probability of occurrence: $\theta > 2$ and zero. Agents know the distribution of $\tilde{\theta}$.

The individual agent can buy the information about the realization of $\tilde{\theta}$ in the first period, at the cost of $0 < \lambda < ½$ units of labor. If he buys the information he shares it with all other investors (there is no reason to keep the information secret). After talking to each other, investors make a portfolio choice. Figure 1 describes the sequence of events.

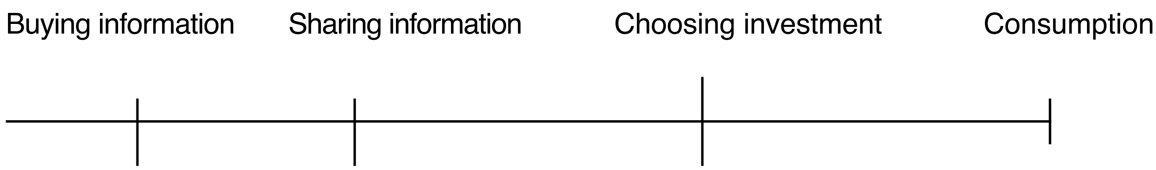

Figure 1: Sequence of events

An individual who buys the information, will invest in the risky project if $\tilde{\theta} = \theta$ and will store his endowment if $\tilde{\theta} = 0$. He will do the same if he does not buy the information but someone else buys it. When no one buys the information he will invest in the risky project. The payoff matrix is in Table 1.

Table 1: The payoff matrix

	$\tilde{\theta} = \theta$ and no one else buys the info	$\tilde{\theta} = \theta$ and someone else buys	$\tilde{\theta} = 0$ and no one else buys the info	$\tilde{\theta} = 0$ and someone else buys
Buy info	$\theta - \lambda$	$\theta - \lambda$	$1 - \lambda$	$1 - \lambda$
Do not buy	θ	θ	0	1

The expected utility when buying the information is:

(1) $$(½)(\theta - \lambda) + (½)(1 - \lambda) = (½)\theta + (½) - \lambda$$

The expected utility when not buying the information is:

(2) $$(½)\theta + (½)\Pr ob$$

where $\Pr ob$ denotes the probability that someone else buys the information.

When $\lambda < ½$ there exists a symmetric Nash equilibrium in which each investor buys the information with probability q. In this case the probability that no one else buys the information is: $1 - \Pr ob = (1-q)^{n-1}$. Since a mixed strategy requires an indifference between buying and not buying, we can solve for q by equating (1) with (2). This yields:

(3) $$1 - \Pr ob = (1-q)^{n-1} = 2\lambda$$

(4) $$q = 1 - (2\lambda)^{\frac{1}{n-1}}$$

The probability that no one will buy the information is therefore:

$$1-\mu = (1-q)^n = (2\lambda)^{\frac{n}{n-1}} \tag{5}$$

This probability is decreasing in n and in the limit it is:

$$\lim_{n\to\infty}(1-q)^n = 2\lambda \tag{6}$$

Thus regardless of n, the probability that no one will buy the information must be strictly positive.

Note that the price of the claim on the output of the project is: $\overline{\theta} = \frac{1}{2}\theta$ if no one buys the information and the realization of $\tilde{\theta}$ if someone buys it. The claim is "overvalued" when $\tilde{\theta} = 0$ and the price is $\overline{\theta}$. The above analysis shows that the probability that the claim will be overvalued must be positive to maintain incentives to buy information.

The probability (4) goes to zero when n goes to infinity. Therefore the expected amount that the representative agent spends on information gathering $(q\lambda)$ is small and we can judge welfare by expected consumption:

$$(1-\mu)\overline{\theta} + \mu(\tfrac{1}{2}\theta + \tfrac{1}{2}) = \tfrac{1}{2}\theta + \tfrac{1}{2}\mu = \tfrac{1}{2}\theta + \tfrac{1}{2} - \lambda \tag{7}$$

where the last equality uses (6).

Government bonds

I now add indexed government bonds that promise the gross real rate of return R. The government sells bonds for the consumption good and store the revenue. When $R = 1$ the amount in storage covers the debt payments. When $R > 1$ the amount in storage covers the principle and the government use lump sum taxes to cover the interest payment. When $R < 1$ the government distributes the surplus in a lump sum form.[1]

Case 1: $\overline{\theta} \le R < \theta$

[1] Alternatively, the government may subsidize storage by paying $R-1$ units per unit stored. This subsidy is financed by a lump sum tax.

Investors will invest in the risky project if someone has bought the information and in government bonds otherwise. Table 1' compute the payoff matrix for this case under the assumption that when someone buys the information it becomes public. When $\tilde{\theta}=\theta$ and no one else buys the information the representative agent will invest in government bonds and will get: $R-T=1$ because the lump sum tax that is used to finance the interest payment is: $T=R-1$. This is also his payoff when $\tilde{\theta}=0$ and he does not buy the information. Comparing Table 1' to Table 1 from the point of view of an individual who does not buy the information, the payoff is now higher when $\tilde{\theta}=0$ but lower when $\tilde{\theta}=\theta$.

Table 1': The payoff matrix when $\overline{\theta}\le R<\theta$

	$\tilde{\theta}=\theta$ and no one else buys the info	$\tilde{\theta}=\theta$ and someone else buys	$\tilde{\theta}=0$ and no one else buys the info	$\tilde{\theta}=0$ and someone else buys
Buy info	$\theta-\lambda$	$\theta-\lambda$	$1-\lambda$	$1-\lambda$
Do not buy	1	θ	1	1

The expected utility when buying the information is (1). The expected utility when not buying the information is:

(2') $$\tfrac{1}{2}(\mathrm{Pr}ob\theta+(1-\mathrm{Pr}ob))+\tfrac{1}{2}=\tfrac{1}{2}\mathrm{Pr}ob(\theta-1)+1$$

Equating (1) to (2') leads to:

(3') $$1-\mathrm{Pr}ob=(1-q)^{n-1}=\frac{2\lambda}{\theta-1}$$

(4') $$q=1-\left(\frac{2\lambda}{\theta-1}\right)^{\frac{1}{n-1}}$$

(5') $$1-\mu_1=(1-q)^n=\left(\frac{2\lambda}{\theta-1}\right)^{\frac{n}{n-1}}$$

(6') $$\lim_{n\to\infty}(1-q)^n=\frac{2\lambda}{\theta-1}$$

Since $\theta > 2$, $1-\mu_1 < 1-\mu$ and $\mu < \mu_1$. Thus, the probability that someone buys the information is higher than before.

When no one buys the information, everyone invests in government bonds and after paying the lump sum tax they get a unit of consumption. Expected consumption is therefore:

(8) $$(1-\mu_1)+\mu_1\left(\tfrac{1}{2}\theta+\tfrac{1}{2}\right)=\frac{2\lambda}{\theta-1}+\tfrac{1}{2}(\theta+1)-\frac{(\theta+1)\lambda}{\theta-1}$$

where the equality uses (6').

Claim 1: When n is large, (8) < (7).

Proof: When $\theta > 2$, $2-\theta^2+\theta < 0$ and (8) < (7). □

Thus, the introduction of government bonds eliminated the possibility of "bubbles" but reduced welfare.

Case 2: $R > \theta$

In this case investors will specialize in government bonds. After paying the lump sum tax, consumption per investor is 1 which is less than (8).

Case 3: R depends on the realization of $\tilde{\theta}$.

Since information is a public good there maybe a role for the government (central bank) in collecting it. Assuming that the government does collect the information, it can improve welfare if it transmits it directly to agents at no cost. Alternatively, if the government is not allowed to evaluate private projects or if the public does not believe the government's forecast, a policy of choosing $R > \overline{\theta}$ when $\tilde{\theta} = 0$ and $R < \overline{\theta}$ when $\tilde{\theta} = \theta$ will improve welfare.

Asymmetric Information and financial crises

In the recent financial crisis some critic of Wall Street complained about "reckless behavior" and some pointed out that they were aware of the bubble in the housing market and the problems with mortgage back securities.

To get equilibrium in which some of the agents are informed and some are not, we may assume that each generation consists of $N = mn$ agents that are divided into m information-sharing groups. The behavior of each group is the same as before. The fraction of informed groups (μ) is constant, when m is large. But when m is finite this fraction may fluctuate over time and a financial crisis may occur when $\tilde{\theta} = 0$ and μ is small. This maybe a rare event but so are financial crises.

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