Preventing the Bubble Effect

Junmin Wan

Faculty of Economics, Fukuoka University, Japan

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Abstract

The analysis presented in this paper offers solutions for preventing the "rational bubble" in asset trading. First, it demonstrates that a capital gains tax can induce "real demand," while excluding the rational bubble *ex ante* and *ex post*. This approach does not distort asset price based on fundamentals, even when information on fundamentals is renewed. Second, this analysis also demonstrates that transaction tax (as proposed by Tobin) can exclude the rational bubble but distorts fundamental price. Third, it shows that a dividend tax cannot exclude the bubble. Fourth, it shows that a rebate option without taxation can exclude the bubble. Finally, it demonstrates that fixed-period land-use rights, without taxation and option, can prevent the bubble in the land market.

1. Introduction

The global economy is unstable and faces uncertainty because major countries, such as the U.S., have undergone financial and economic crises. Stigilz (2009) and Rogoff (2010) have argued that the current economic system, especially the regulation of capital markets, "contributes" substantially to economic crises. The bubble and subsequent crash of the asset market, especially the housing market, was the major cause of these crises. There have been similar bubble-crash crises in different country at different times, but until now, we have had little idea of how to solve this problem. This prompted Wan (2006) to state that the bubble effect is the "cancer" of the market economy and that we need to develop some "medicine" to treat it. In this paper, we propose appropriate regulation and taxation on asset trading as preventative "medicine."

According to Torello (2011), "the EU commission has made a proposal for a tax on financial transactions globally. It would tax exchanges of shares and bonds at a rate of 0.1%, while the rate for derivative contracts would be 0.01%. Even though the U.S. and Canada have opposed the idea, all 27 EU countries would have to support the proposal." Our analysis found that even though this idea could prevent a bubble in asset trading, it would distort fundamental price.

If we do not find a solution to prevent the occurrence of bubbles, the result will be repeated instances of bubble and crash, and economies will face recession. This could result in significant damage if recession persists in the long run after a crash. Ogawa and Wan (2007) and Ogawa (2009) pointed out that a crash in the asset market, especially in the housing market, was the main cause of Japan's lost decade, even though the economy had

been booming from huge capital gains in the bubble era (Horioka, 1996). In the Japanese case, we tend to think of "*what should be done after a bubble crash, and why did the bubble occur in the 1980s?*" (Wan, 2004, p. 1). The answer to the former is that a reduction of debt among households, firms, and banks is necessary for economic recovery (Ogawa, 2009). Wan (2005, 2009a, b) noted that the most important reason for the bubble of the 1980s was that the Japanese government gave up the "real demand principle" in the asset market by accepting "financial freedom" and "global standards in the financial market" to permit "speculative transactions." Wan (2009a, b) further argued that the main difference in market-oriented economic thought between East and the West came from different views on the "speculative transaction." For example, it is considered common sense in China that speculative trading is not only a type of "unfair exchange" but also sometimes a criminal action, at least *ex post*.

There is abundant literature from China, dating back thousands of years, on the idea of anti-speculation. "*If there is speculation in goods by private traders, the prince's plans will fail and the people will lose their livelihood. Therefore, those who were skillful in ruling the empire also extended their control to things other than the two chief targets for speculation* (Guan, BC645, p. 405)." In present-day China, there are price bureaus in both centralized and local governments, and a central objective of these bureaus is the prevention of speculation. However, there has been only scant research on speculation in other countries. The concept of "fair exchange" was mentioned by Aristotle in ancient Greece (Trever, 1916; Monroe, 1924) and can also be found in ancient India (Joshi, 1928),[3]

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[3] "Fair exchange" is also the most important concept in Marx's (1867) wage labor analysis.

although no record could be found in ancient Egypt.[4]

Literature about speculation and overconfidence offers some insight for understanding the bubble issue (Shiller 1981; Scheinkman and Xiong 2003; Kamihigashi 2010; Xiong and Yu 2011). The rational bubble is caused by speculative trade and is mathematically equivalent to dissatisfaction with a transversality condition.[5] A speculative trade is defined as one having expectations of capital gains from asset trading. As pointed out by Wan (2009a, b), one result of the occurrence of a bubble and a crash is the redistribution of wealth among asset traders with *ex post* unfairness*;* the trade of bubble assets is a type of zero-sum game that has a negative externality and long-run recession problems after the bubble bursts (i.e., the current "Occupy Wall Street" movement). The government is responsible for stopping speculative transactions and at the same time for inducing private traders' expectations, not of capital gains, but of income gains from asset trading. This is because the income gain or dividend is the added value of the asset and thus components of Gross Domestic Product, whereas the zero-sum type of capital gains is not.

It is difficult for government to recognize speculators and to distinguish "real demand" based on fundamentals in the capital trading market. Traders themselves can know their own intent, but how can government distinguish speculative traders from fundamental ones? This is a typical example of information asymmetry between private traders and government.

For the purpose of examining anti-speculation, we considered that government

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[4] This is the reason barter systems were used. See Yoshimura (2005) for details.
[5] Ikeda and Shibata (1992) deal with the issue of fundamentals-dependent bubbles in stock prices.

uses capital gains tax, a form of taxation used in many countries, to identify speculation and to monitor it. Burman (1999) identified the popularity of capital gains tax in major countries. For example, the maximum tax rates of long-term capital gains in Australia, Canada, France, Italy, Japan, Sweden, the U.K., and the U.S. in 1998 were 48.5%, 23.5%, 26.0%, 12.5%, 20.0%, 30.0%, 40.0%, and 20.0%, respectively (Burman, 1999, p. 29).[6] Even with these tax rates, significant asset bubbles occurred and crashed in Japan and the U.S. Our analysis found that the reason for these occurrences was that capital gains tax rates were too low.[7]

When bubbles occur, what should be done to prevent a crash? Wan (2009a, b) suggested the following steps: first, government should control the asset price at some stable value for some time; second, government should gradually raise the consumer price index. If these policies succeed, a bubble economy can be soft-landed. However, even if this soft-landing policy succeeds, a huge redistribution of national wealth will have occurred because those agents with substantial bank holdings will have incurred significant losses as a result of the new consumer price index. Compensation for losses will therefore be necessary. The government must subsidize real wealth losses using tax revenue and the seigniorage. These related policies are difficult to enact but may be the only way to solve housing bubble issues in many big cities such as Beijing and Shanghai.[8] Dreger and Zhang (2010) and Ueda (2011) have argued that we can anticipate the extent of a housing market

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[6] We do not support the idea of an indirect taxation problem as proposed by Frank P. Ramsey in 1927 and Fujimoto and Wan (2009).

[7] Lei, Noussair and Plott (2001, 2002) report that neither no-resale constraints nor 53.4% of the capital gains tax rate could stop the occurrence of the bubble in the experiment.

[8] Also see Dreger and Zhang (2010), Ueda (2011) and Xiong and Yu (2011) for details on bubbles in present-day China.

bubble in urban China. If China fails to do this, a crisis similar to that experienced in Japan and the U.S. could occur in the near future.

The asset bubble might also cause excessive domestic saving and consumption issues. Wan (2011) was the first to propose that the speculative saving motive could be measured based on the degree of distortion in financial intermediate markets, human capital, the leverage ratio, and the limit of outstanding debt. Wan showed that these factors had a significant impact on saving and could provide an explanation for why China saves so much compared with the U.S. Wan's (2011) provincial panel data from 1995–2010 and individual data from China supported the speculative saving motive hypothesis. After controlling for life cycle and other related factors, Wan (2011) found that housing bubble prices and loan interest payments, especially those in urban sectors, significantly increased the saving rate in cities and the nation as a whole. Therefore, an anti-speculation policy could contribute to solving domestic excess saving and excess consumption issues as well as the problem of global imbalance.

The soft-landing policy is a method to address a bubble before a crash. However, "*the best solution is the prevention of bubbles arising in the first place*" (Wan, 2004, p. 2).[9] There are ways to prevent the occurrence of the rational bubble in asset trading, but this requires examining and refuting a number of existing assumptions. First, a strictly positive

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[9] Bernanke (2009) also mentioned the idea of bubble prevention. Recently, El-Agraa (2011, p. 89) offered the following description, "Preventing 'financial crises' from ever happening again is of course completely out of the question, they being inherent to the economic system as we understand it; rather that of those of the 'severest' kind. Fortunately, a vast literature has been accumulating on these issues, so the intention here is not to add to it and reinforce the perception that economists will offer more opinions on a single issue than the total membership of any assembled group thereof for the purpose."

capital gains tax can induce "real demand" to exclude the rational bubble *ex ante* and *ex post*. This does not distort the asset price based on fundamentals even in the case that the information on fundamentals is renewed. Second, a transaction tax (Tobin's proposal) is not a viable solution in a market-oriented economy because it distorts the fundamental value of assets. Third, a dividend tax cannot exclude a bubble. Fourth, a rebate option can exclude a bubble. Finally, fixed-period land-use rights without taxation and option can prevent a bubble in the land market.

This paper below is organized as follows: Section 2 presents the basic model of a bubble; Section 3 presents some ways to prevent a bubble within the framework of private ownership; Section 4 provides a solution in the context of public ownership; and Section 5 presents concluding remarks, discusses policy implications, and identifies issues for future research.

2. The Bubble

Blanchard and Watson (1982) outlined the basic framework of a bubble. There are two assets in an economy, one safe and the other risky. The market is assumed to be complete, with private ownership of the assets established. The investor or asset owner considers the following risky asset-trading problem:

r : the interest rate of a risk-free asset;

π : the risk premium of the risky asset;

d_t : the dividend of the risky asset at time t ;

p_t : the market price of the risky asset at time t .

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We further assume that r and π are consistently positive over the time horizon. The investor is assumed to freely choose to invest in a risk-free or risky asset. Under arbitrage conditions, the following equation should be satisfied in partial equilibrium,[10]

$$1 + r + \pi = \frac{E_t[p_{t+1} + d_{t+1}]}{p_t},$$ (1)

where E_t is the expectation operator at time t. The forward-looking solution of p_t in the equation (1) is,

$$p_t = E_t\left[\sum_{j=1}^{T} \frac{d_{t+j}}{(1 + r + \pi)^j}\right] + E_t\left[\frac{p_{t+T}}{(1 + r + \pi)^T}\right],$$ (2)

where $T \in [1, \infty)$, and when $T \to \infty$, the result is,

$$p_t = E_t\left[\sum_{j=1}^{\infty} \frac{d_{t+j}}{(1 + r + \pi)^j}\right] + \underset{T \to \infty}{E_t}\left[\frac{p_{t+T}}{(1 + r + \pi)^T}\right].$$ (3)

The first and second terms on the right-hand side of equation (3) are the fundamental values of income gain and the bubble term of the risky asset, respectively. The bubble term is also called a transversality condition, and a rational bubble occurs if and only if

$$\underset{T \to \infty}{E_t}\left[\frac{p_{t+T}}{(1 + r + \pi)^T}\right] > 0.$$ (4)

In Montrucchio (2004), the above condition was assumed to be satisfied to exclude the rational bubble,

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[10] If the investor has a limited life span and the maturity of the asset, such as land, is infinite, he or she must consider reselling the asset when he or she initiates the purchase. It can be considered one of the resources necessary for resale. It is equivalent to the bubble setting offered by Tirole (1985).

$$E_{\substack{t \\ T \to \infty}} \left[\frac{p_{t+T}}{(1 + r + \pi)^T} \right] = 0. \tag{5}$$

Equation (5) shows no rational bubble by assumption. For simplicity, if we assume that,

$E_t[d_{t+1}] = E_t[d_{t+j}]$ for any $j \in [1, \infty)$, then the equation (3) becomes,

$$p_t = E_t \left[\frac{d_{t+1}}{r + \pi} \right] + E_{\substack{t \\ T \to \infty}} \left[\frac{p_{t+T}}{(1 + r + \pi)^T} \right]. \tag{6}$$

Some cases satisfy or violate this equation (5). We assume the growth rate of

expectation for p_{t+T} is g_b, where g_b expresses psychological aspects of the investor,

which are independent from dividend d. We then have,

$$p_{t+T} = (1 + g_b)^T, \tag{7}$$

where,

$$E_{\substack{t \\ T \to \infty}} \left[\frac{p_{t+T}}{(1 + r + \pi)^T} \right] \to 0 \text{, for } g_b < r + \pi, \tag{8}$$

$$E_{\substack{t \\ T \to \infty}} \left[\frac{p_{t+T}}{(1 + r + \pi)^T} \right] = 1 \text{, for } g_b = r + \pi, \tag{9}$$

$$E_{\substack{t \\ T \to \infty}} \left[\frac{p_{t+T}}{(1 + r + \pi)^T} \right] \to \infty \text{, for } g_b > r + \pi, \tag{10}$$

and equations (8), (9), and (10) show conditions of no bubble, concurrent or coexisting

bubbles, and explosive bubble, respectively.

3 Preventing a Bubble under Private Ownership

3.1 Taxation

3.1.1a Capital Gains Tax

We introduced a mechanism to satisfy the transversality condition at $T \to \infty$ without the assumption in equation (5). We first considered a capital gains tax with rate $\kappa \in [0,1]$ in equation (1), then found the tax rate that would exclude the bubble term. We then investigated the impact of this tax on the fundamental term. This created a new arbitrage condition, faced with a capital gains tax,[11]

$$1 + r + \pi = \frac{E_t[p_{t+1} + d_{t+1}] - \kappa E_t[p_{t+1} - p_t]}{p_t}. \tag{11}$$

By solving for p_t we obtain,

$$p_t = E_t \left[\sum_{j=1}^{\infty} \frac{(1-\kappa)^{j-1} d_{t+j}}{(1+r+\pi-\kappa)^j} \right] + \underset{T \to \infty}{E_t} \left[\frac{(1-\kappa)^T p_{t+T}}{(1+r+\pi-\kappa)^T} \right]. \tag{12}$$

Proposition 1:

A capital gains tax with rate $\kappa \in \left(\frac{g_b - (r+\pi)}{g_b}, 1 \right]$ excludes the rational bubble without the assumption of the transversality condition, and $\kappa \to 1$ for $g_b \gg r + \pi$.

Proof:

$$\underset{T \to \infty}{E_t} \left[\frac{(1-\kappa)^T p_{t+T}}{(1+r+\pi-\kappa)^T} \right] = \underset{T \to \infty}{E_t} \left[\frac{(1-\kappa)(1+g_b)}{(1+r+\pi-\kappa)} \right]^T \to 0,$$

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[11] We do not consider the negative bubble case.

for $\kappa \in \left(\dfrac{g_b - (r + \pi)}{g_b}, \ 1 \right]$, then $\dfrac{(1 - \kappa)\,(1 + g_b)}{1 + r + \pi - \kappa} < 1$.

Q.E.D.

*Proposition 2***:**

For the case $E_t[d_{t+1}] = E_t[d_{t+j}]$, for any $j \in [1, \infty)$, the capital gains tax does not

distort the fundamental value.

*Proof***:**

If $E_t[d_{t+1}] = E_t[d_{t+j}]$ for any $j \in [1, \infty)$, then the equation (12) becomes

$$p_t = E_t\left[\frac{d_{t+1}}{r + \pi} \right] + E_t \underset{T \to \infty}{\left[\frac{(1 - \kappa)^T \, p_{t+T}}{(1 + r + \pi - \kappa)^T} \right]}, \tag{13}$$

and the first term of the right-hand side of the equation (13) is the same as that of equation

(6). **Q.E.D.**

Therefore, without the assumption of the transversality condition, we can introduce

a strictly positive capital gains tax rate that excludes the rational bubble. Furthermore, this

strictly positive tax does not distort the fundamental value of a risky asset for the case

$E_t[d_{t+1}] = E_t[d_{t+j}]$ for any $j \in [1, \infty)$; the intuition of no distortion here is that the

discounted value for any $j \in [1, \infty)$ is constant.

3.1.1b Information on Dividends Renewed

Next, we considered the case where information on dividends was renewed. We

assumed that an investor bought a risky asset at the following price,

$E_t[d_{t+1}] = E_t[d_{t+j}]$. For any $j \in [1, \infty)$,

$$p_t = E_t\left[\frac{d_{t+1}}{r+\pi}\right], \text{ while } E_t\left[\frac{(1-\kappa)^T p_{t+T}}{(1+r+\pi-\kappa)^T}\right] = 0 \text{ for } \kappa = 1.$$

Where the information on dividends from this asset is renewed,

$E_t[d'_{t+1}] = E_t[d'_{t+j}] > E_t[d_{t+1}] = E_t[d_{t+j}]$. For any $j \in [1, \infty)$, the market price will be

$$p'_t = E_t\left[\frac{d'_{t+1}}{r+\pi}\right], \tag{14}$$

$$\text{where } p'_t = E_t\left[\frac{d'_{t+1}}{r+\pi}\right] > p_t = E_t\left[\frac{d_{t+1}}{r+\pi}\right]. \tag{15}$$

***Proposition 3*:**

Assume that the renewed information on dividends is perfectly realized and the realized dividends are equal to those observed *ex post* by the government; a 100% capital tax rate *ex ante* with payback *ex post*, the same amount as the capital gains from the government to the investor, excludes the bubble and does not distort the market price of the risky asset.

***Proof*:**

For a 100% capital tax rate, the amount of capital gains tax *ex ante* will be

$$p'_t - p_t = E_t\left[\frac{d'_{t+1} - d_{t+1}}{r+\pi}\right]. \tag{16}$$

For the investor, the value of the risky asset becomes,

$$p_t + (p_t' - p_t) = p_t' = E_t \left[\frac{d_{t+1}'}{r + \pi} \right], \tag{17}$$

which is exactly equal to equation (14). **Q.E.D.**

3.1.2 Transaction Tax (Tobin's Proposal)

As proposed by Tobin (1974), we considered a transaction tax with a rate $\tau \in [0, 1)$ [12] in equation (1) and obtained a new arbitrage condition,

$$1 + r + \pi = \frac{E_t[p_{t+1} + d_{t+1}] - \tau E_t[p_{t+1}]}{p_t}. \tag{18}$$

By solving for p_t we obtain,

$$p_t = E_t \left[\sum_{j=1}^{\infty} \frac{(1-\tau)^{j-1} d_{t+j}}{(1+r+\pi)^j} \right] + E_t \left[\frac{(1-\tau)^T p_{t+T}}{(1+r+\pi)^T} \right], \tag{19}$$

and for $E_t[d_{t+1}] = E_t[d_{t+j}]$ for any $j \in [1, \infty)$, the market price will be

$$p_t = E_t \left[\frac{d_{t+1}}{r + \pi + \tau} \right] + E_t \left[\frac{(1-\tau)^T p_{t+T}}{(1+r+\pi)^T} \right]. \tag{20}$$

Proposition 4:

To exclude the rational bubble, a transaction tax with the rate $\tau \in \left(\dfrac{g_b - (r+\pi)}{1 + g_b}, \ 1 \right)$

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[12] If a strict 100% transaction tax rate were levied on asset trading, there would not be any asset sellers. It means that a market economy would be excluded. Therefore, the transaction tax rate should be smaller than 100%.

is necessary, and any strictly positive transaction tax distorts the fundamental value of the asset price, even for the case $E_t[d_{t+1}] = E_t[d_{t+j}]$ for any $j \in [1, \infty)$.

Proof:

For the second term of the right-hand side of equation (20), if

$$E_t \lim_{T \to \infty} \left[\frac{(1 - \tau)^T p_{t+T}}{(1 + r + \pi)^T} \right] = E_t \lim_{T \to \infty} \left[\frac{(1 - \tau)(1 + g_b)}{(1 + r + \pi)} \right]^T \to 0,$$

for $\tau \in \left(\frac{g_b - (r + \pi)}{1 + g_b}, \ 1 \right)$, then $\frac{(1 - \tau)(1 + g_b)}{1 + r + \pi} < 1$.

For the first term of the right-hand side of equation (20),

$$E_t \left[\frac{d_{t+1}}{r + \pi + \tau} \right] < E_t \left[\frac{d_{t+1}}{r + \pi} \right] \quad \text{for} \quad \tau \in (0, 1). \tag{19}$$

Q.E.D.

If a strictly positive transaction tax rate is levied on asset trading, the fundamental value of assets will be distorted. Hence, Tobin's proposal is not the best instrument to eliminate a rational bubble.

However, to exclude the same-sized bubble (g_b), the transaction tax rate must be strictly lower than the capital gains tax rate because $\frac{g_b - (r + \pi)}{1 + g_b} < \frac{g_b - (r + \pi)}{g_b}$. Therefore, for an economy with politically opposite taxpayer power, the transaction tax would be more easily distributed than would a capital gains tax.

3.1.3 Mixed Taxation

We introduced a capital gains tax with rate $\kappa \in [0,1]$ and a transaction tax with

rate $\tau \in [0, 1)$ in equation (1), and obtained a new arbitrage condition,

$$1 + r + \pi = \frac{E_t[p_{t+1} + d_{t+1}] - \kappa E_t[p_{t+1} - p_t] - \tau E_t[p_{t+1}]}{p_t}. \tag{20}$$

By solving for p_t we obtain,

$$p_t = E_t\left[\sum_{j=1}^{\infty} \frac{(1-\kappa-\tau)^{j-1} d_{t+j}}{(1+r+\pi-\kappa)^j}\right] + E_t\left[\frac{(1-\kappa-\tau)^T p_{t+T}}{(1+r+\pi-\kappa)^T}\right]. \tag{21}$$

For $E_t[d_{t+1}] = E_t[d_{t+j}]$ for any $j \in [1, \infty)$, the market price will be

$$p_t = E_t\left[\frac{d_{t+1}}{r+\pi+\tau}\right] + E_t\left[\frac{(1-\kappa-\tau)^T p_{t+T}}{(1+r+\pi-\kappa)^T}\right]. \tag{22}$$

***Proposition 5*:**

To exclude the rational bubble, the sum of a capital gains tax rate and a transaction

tax rate requires $\kappa + \tau \in \left(\frac{g_b - (r+\pi) + \kappa}{1+g_b}, 1\right]$. Any strictly positive transaction tax distorts the

fundamental term of the asset price even for the case $E_t[d_{t+1}] = E_t[d_{t+j}]$ for any $j \in [1, \infty)$.

***Proof*:**

The second term on the right-hand side of equation (22) is,

$$E_t\left[\frac{(1-\kappa-\tau)^T p_{t+T}}{(1+r+\pi-\kappa)^T}\right] = 0. \tag{23}$$

For $\kappa + \tau \in \left(\frac{g_b - (r+\pi) + \kappa}{1+g_b}, 1\right]$, and for the special case $\kappa + \tau = 1$, the first term on the

right-hand side of equation (22) is,

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$$E_t\left[\frac{d_{t+1}}{r+\pi+\tau}\right] < E_t\left[\frac{d_{t+1}}{r+\pi}\right] \quad \text{for} \quad \tau \in (0,\ 1). \tag{24}$$

Q.E.D.

The implication of *Proposition 5* is that a strictly positive capital gains tax rate and a 0% transaction tax rate are preferable.

3.1.4 Endogenous Interest Rate and Tax on Dividends

We introduced an endogenous interest rate $r = r(E_t(p_{t+1}))$, a dividend tax $\delta \in [0,1]$, and a capital gains tax with rate $\kappa \in [0,1]$ in equation (1) and obtained a new arbitrage condition,

$$1 + r(E_t(p_{t+1})) + \pi = \frac{E_t[p_{t+1} + d_{t+1}] - \delta E_t[d_{t+1}] - \kappa E_t[p_{t+1} - p_t]}{p_t}. \tag{25}$$

By solving for p_t we obtain,

$$p_t = E_t\left[\sum_{j=1}^{\infty}\frac{[(1-\kappa)(1-\delta)]^{j-1}d_{t+j}}{(1+r(E_{t+j-1}(p_{t+j}))+\pi-\kappa)^j}\right] + E_t\left[\lim_{T\to\infty}\frac{(1-\kappa)^T p_{t+T}}{(1+r(E_{t+T}(p_{t+T+1}))+\pi-\kappa)^T}\right]. \tag{26}$$

Proposition 6:

To exclude the rational bubble, if the bubble term is excluded by a 100% capital gains tax rate, the fundamental term of the asset price for the case $E_t[d_{t+1}] = E_t[d_{t+j}]$ for any $j \in [1, \infty)$ can have a solution, and any strictly positive dividend tax distorts the fundamental price.

Proof:

The second term on the right-hand side of equation (26) is,

$$E_t \atop T\to\infty \left[\frac{(1-\kappa)^T p_{t+T}}{(1+r(E_{t+T}(p_{t+T+1}))+\pi-\kappa)^T} \right] = 0 \tag{27}$$

for $\kappa=1$, when $E_t \atop T\to\infty \left[1+r(E_t(p_{t+T+1})+\pi-k\right]>0$ is assumed. The first term on the

right-hand side of equation (26) is,

$$E_t \left[\frac{(1-\delta)d_{t+1}}{r+\pi} \right] < E_t \left[\frac{d_{t+1}}{r+\pi} \right] \quad \text{for} \quad \tau \in (0,\ 1), \tag{28}$$

if $r=r(E_t(p_{t+1}))=r(E_{t+j-1}(p_{t+j}))$ under $E_t(p_{t+1})=E_{t+j-1}(p_{t+j})$ for any $j\in[1,\infty)$.

Q.E.D.

3.1.5 The Speculative Trading Price and the Degree of Liability

We next analyzed the effect of the degree of liability on the speculative spot

trading price without any tax. Assuming that a speculative trader knows the fundamental

asset value of an asset is p_f and has an expectation on price $E_t[p_{t+1}]$, the price that

trader is willing to pay is p_t. The speculative trader has the following object function,

$$\sigma_{p_t} = E_t(p_{t+1}) - p_t + l(p_f - p_t) \geq 0 \tag{29}$$

$$\text{s.t.} \quad p_t \leq c_t, \tag{30}$$

$$l \in [0,1], \tag{31}$$

when the expected profit is denoted by σ, the amount of cash holdings is expressed by c_t,

and the degree of liability is expressed by l (redemption of loss, $l=1$ represents

unlimited liability).

Proposition 7:

A higher degree of liability lowers the price that a speculative trader is willing to pay, and the price that trader is willing to pay will be higher than the fundamental price even under conditions of unlimited liability.

Proof:

Assuming $p_t = np_f$ where $n \in [1, \infty)$, we obtain a solution for p_t,

$$p_t = \frac{n}{n+(n-1)l} E_t(p_{t+1}) \text{ for } \frac{n}{n+(n-1)l} E_t(p_{t+1}) < c_t, \tag{32}$$

$$= c_t \text{ for } \frac{n}{n+(n-1)l} E_t(p_{t+1}) \geq c_t. \tag{33}$$

And for $l = 1$,

$$p_t = \frac{n}{2n-1} E_t(p_{t+1}) \text{ for } \frac{n}{2n-1} E_t(p_{t+1}) < c_t, \tag{34}$$

$$= c_t \text{ for } \frac{n}{2n-1} E_t(p_{t+1}) \geq c_t. \tag{35}$$

Q.E.D.

Figure 1 shows that a different degree of liability results at a different ceiling price, and the curves OAC and OBC kink under the same expectation $E_t[p_{t+1}]$. Thus, the capital gains tax proposed in the preceding subsection is needed to exclude the type of bubble caused by speculative trading.

3.2 Rebate Option

We also considered the possible effect of a rebate option on the rational bubble. Assume that the seller knows asset price p_t has two components, one the fundamental term, p_f, and the other the bubble term, b. Then the asking price is,

$$p_t = p_f + b. \tag{36}$$

Assume also that the seller must provide a rebate option to the buyer where the buyer may rebate the asset at price p_t when the asset price bubble bursts.

Proposition 8:

The rebate option excludes the bubble if a seller's loss is strictly larger than the option value.

Proof:

If the bubble bursts, and the asset price drops to fundamental term p_f, then the buyer will exercise the option. The option value o will be,

$$o = p_t - p_f = (p_f + b) - p_f = b. \tag{37}$$

The seller's expected pure profit σ will be,

$$\max_{p_t} \sigma = (p_t - p_f) - \mu o \tag{38}$$

$$= (p_f + b - p_f) - \mu b$$

$$= b - \mu b$$

$$= (1 - \mu)b \tag{39}$$

$$\leq 0, \quad for \quad \mu > 1. \tag{40}$$

For the seller, if and only if p_t is set to p_f, the option value o decreases to zero and the seller obtains maximum expected pure profit. In this case, the assumption $\mu > 1$ would be plausible because the bubble occurrence and its collapse is not a pure zero-sum but a strictly negative social gain. This social loss resulting from a bubble should be borne by both seller and buyer. **Q.E.D.**

4 Preventing a Bubble under Public Ownership

In this subsection we consider whether public ownership of an asset such as land, without the use of taxation and the options present in a framework of private ownership, can exclude a bubble. Assume that the government initially owns all land and then divides the land into T parts, where T is some fixed value ($0 < T < \infty$). The square measure of each part is equal to $1/T$. For each period, the government puts one part of land on the market with T period of land-use rights. We then obtain the following proposition:

Proposition 8:

The fixed period of land-use rights prevents a bubble in the land market.

Proof:

The price of the fixed period of land-use is,

$$p_t = E_t \left[\sum_{j=1}^{T} \frac{d_{t+j}}{(1 + r + \pi)^j} \right]. \tag{41}$$

The bubble term in equation (3) converges to zero because the land at the time T no longer has any right of use. **Q.E.D.**

This idea not only excludes the bubble effect but also reduces the social cost of tax evasion and supports the sustainability of a fiscal budget. This idea is also consistent with those of Walras (1860), George (1879), and Sun (1922).[13] Chao and Chen (2006) argue that the history of land institution in China has been characterized by the evolution of a trend toward "division," which includes the division of land and the division of property rights. This idea is practiced in China. The government owns all lands, and private firms and households must purchase use rights for a fixed period, such as 40 or 70 years, from the government. From the viewpoint of preventing a land price bubble, this institution is expected to continue.

5 Conclusions

This paper has presented several mechanisms for preventing the occurrence of a rational bubble in asset trading. First, this research found that a strictly positive capital gains tax can exclude the rational bubble *ex ante* and *ex post*. This approach does not distort the asset price based on fundamentals, even when information on fundamentals is renewed. Second, we have shown that a transaction tax for the capital market, as proposed by Tobin, can exclude "speculative demand" and therefore exclude a rational bubble, but that it distorts asset price based on fundamentals, making this type of taxation solution inappropriate for a market-oriented economy. Third, we found that a dividend tax cannot

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[13] See Bürgenmeier (1994) and Trescott (1994) for details.

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exclude a bubble but that, fourth, a rebate option can exclude the bubble. Finally, we have shown that a fixed period of land-use rights can prevent the rational bubble in the land market.

The results presented here carry policy implications for the current global economy, especially for solutions that would assure fair exchange among economic agents *ex ante* and *ex post* and could help avoid economic crises caused by cycles of bubble and crash. This, in turn, would contribute to the stability and efficiency of the social economy. Real world markets have many imperfections. Thus, government must provide appropriate intervention to foster complementary functionality. For example, because of limited liability, bankers can be incentivized to engage in speculative trading through the promise of huge capital gains. It would therefore be appropriate for government to use the proposals presented herein to curtail this type of morally hazardous behavior.

This research also raised some issues for future research. It would be useful to test the present proposal via an experimental approach. Such an experiment could be easily implemented and would provide very important information for governments considering real applications in the capital market. A second research effort should investigate how investors establish the fundamental value of different currency assets with flexible exchange rates. This would be a more challenging task because determining the fundamental exchange value of currency is difficult. The third issue raised by the proposed model is that a heavy capital gains tax could incentivize investors to conduct underground trading and evade taxation. This is an example of a problem that would need to be addressed simultaneously with implementation of the proposed model. The fourth issue

raised is that the proposed solutions would incur some new costs. A cost–benefit analysis of the proposed model will be necessary before application. Finally, it is important to note that the proposed tools should be in not a partial but a general equilibrium framework.

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Figure 1: The price speculative traders are willing to pay and limited liability

p_t

$E_t(p_{t+1})$ $for\ l = 0$

ceiling price

A   C

$\dfrac{n}{2n-1} E_t(p_{t+1})$ $for\ l = 1$

ceiling price

B   D

$45°$

c_t

O

Source: Drawn by the author