

EC371

Economic Analysis of Asset Prices

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“Examine the distinguishing characteristics of ‘bubbles’ in asset prices and discuss their implications. Illustrate your analysis with reference to the financial crisis beginning in 2007.”

1. Introduction.

Asset price 'bubbles' have played significant roles around many of history's periods of economic downturn and instability. This, combined with the difficulty of identifying a bubble and a general misunderstanding of bubbles, warrants further study into their workings and what implications for policy should be reached in dealing with bubbles. Section two explores the characteristics of bubbles with particular focus on what drives the over-optimism that can fuel a price surge, as this is the hardest feature to explain with standard economic reasoning and has resulting policy implications. Section three makes use of the recent financial crisis to highlight and reiterate the characteristics of bubbles, but also serves the purpose of demonstrating the ways in which the contemporary economic climate and system of regulation has shortcomings at minimising the presence and effect of bubbles. Section four then utilises what has been explored in sections two and three to propose how policy should be targeted at negating the effects of bubbles.

2. Characteristics of asset price 'bubbles'.

What is it that distinguishes the ballooning of an asset's price from a bubble? The former is often a sign of high demand, healthy growth prospects, and economic prosperity; the latter, as shall be explored, has the potential to be hugely damaging to the financial system resulting in a deadweight loss to welfare. The most common way to answer this is to propose that an asset price bubble is a period when prices deviate from 'fundamental' values, normally calculated using a Net Present Value approach of discounted future dividend streams, followed by a subsequent resounding crash in prices once burst. Asset price bubbles historically display usually most, if not all of the following characteristics: unfounded over-optimism, a crisis of confidence, fraud or deception, and pessimism accompanied by economic distress.

2.1 Over-Optimism.

From the South Sea and Mississippi bubbles of the 1720s to the Roaring 20s preceding the Wall Street Crash to the Dot Com Bubble of the 90s, events termed as bubbles have displayed flourishes of manic optimism. Alan Greenspan, chairman of the Federal Reserve Board, coined the term 'irrational exuberance' in 1996 and it has been adopted by economists such as Shiller (2005) to define this characteristic of asset price bubbles. The use

of the word irrational is to characterize the continued bidding up of prices significantly above what would rationally be explained as a fair price. In this sense the rational price is the one defined by market fundamentals, namely the sum of the sequence of discounted dividends:

$$P_t = \sum_{i=1}^{\infty} \delta_{t+i} d_{t+i}$$

Where δ_{t+i} is the discount factor $1/(1+r)^i$ and d_{t+i} is the respective period's dividend. Essentially, the price is the present value of future returns. The theory that investors behave rationally dictates that prices should not deviate largely from these values, for when it does it is unlikely that the returns required to make this a fair price will be achieved. Yet during a bubble investors are willing to pay prices far outstripping these fundamentals. Importantly however, one should note that this is not the only method of pricing an asset, nor is it necessarily the correct or even consensus method adopted. Even if it were the 'correct' model of asset pricing it relies upon investors correctly being able to calculate distant uncertain cash flows meaning there can be widely varied views of a 'true' fundamental value. In this regard it is harder to justify the behaviour as irrational or manic, however some sort of benchmark needs to be set to judge against. This highlights a difficulty in identifying a bubble; there is often no consensus of a fundamental value, making it difficult to identify if a price is excessive. The benefit of hindsight makes a bubble seem staggeringly apparent but at the time there is always uncertainty. But on occasion prices soar so rapidly that it seems baffling that investors would continue to bid up the price. For example in the five years preceding the bursting of the Millennium Bubble in 2000, the Dow Jones Industrial average had tripled whilst U.S GDP had only risen 40% and corporate profits were up less than 60%, and this being from a recession depressed base.¹ Similar environments are consistent across all historical bubbles; the willingness of investors to pay a premium for an asset despite all indications that it is overpriced.

If we continue with the net present value model, by including a bubble term $b_t > 0$ representing an arbitrary price rise that increases at rate r so that $b_{t+1} = (1+r)b_t$ we can see how this affects the price:

¹ Shiller (2005), "Irrational Exuberance." *Princeton University Press, Second edition*, p.2

$$P_{t+n} = \sum_{i=n}^{\infty} \delta_{t+i} d_{t+i} + b_t = P_{t+n}^* + b_{t+n}$$

Where P^* is the price obtained from the previous equation that under this model can be viewed as the fundamental or fair price as dictated by the future dividend stream, and b is the bubble term or the excess being paid for the asset. The price obtained, P , will diverge at a geometric rate from the fundamental price P^* as the bubble term grows with time.

So what is it that characterizes and drives this exuberance? Shiller (2005) defines irrational exuberance as a psychological contagion that spreads from person to person after news of a price increase occurs, amplifying stories that may justify the price, bringing in larger and larger classes of investors who despite concerns about true value of the asset, are drawn to it through envy of other's success and a gambler's excitement. Such a process has become known as a feedback loop. A large part of price movements during a bubble is caused by speculative purchases. If investors witness the price moving upwards and believe it will continue to do so they will invest in order to sell at a higher price and lock in a profit. Even if investors are aware they are in a market bubble – that the price is unsustainable - they may still want to invest with the aim of exiting before the collapse, capitalizing on the price rise. This speculation creates a feedback loop whereby a price increase promotes optimism, leading to higher demand, the result of which is the bidding up of the price. This in turn will be interpreted by others as optimism about earnings projections and growth potential, prompting further entry to the market. The process of 'self fulfilling expectations' continues until investors are no longer willing to enter at the high price, at which point there is an exodus from the market as confidence in the inflated price disappears. This is price-to-price feedback but other channels produce further feedback loops such as an increase in price increasing expenditure through the wealth effect which in turn boosts corporate earnings which results in higher demand of shares pushing up prices further. This strengthens a bubble and makes its collapse more unpredictable.

Why is it that optimism prevails during these periods? As mentioned it is problematic to decipher whether a price increase can be attributed to fundamentals or to the bubble term, investors often being able

to justify to their selves that the price increases are of fundamental nature. Indeed Gertrude Tumpel-Gugerell, a member of the Executive Board of the ECB, says in a 2011 speech “in 2005– with the information available at that time – it was hard to make an unambiguously agreeable case that high US housing prices would not be confirmed by good fundamentals in the future”². Often bubbles occur during times of change and widespread optimism whether it be technological, social, political or often all three. Investors, swept up in the optimistic climate believe - or are affected by mass movement - that fundamental changes have ushered in a new era and that preceding growth and current high prices are sustainable. The Dot Com Bubble of the late 1990s coincides with the introduction of internet technology that spawned a whole new online industry in which people put a huge amount of faith in continued earnings growth, and priced this in accordingly (in retrospect over-optimistically). It was also close to the millennium which heightened these feelings. These circumstances are very similar also those in 1901 after which markets took a similar beating. Optimism it seems is further driven by trend, as both of these bubbles followed five consecutive years of doubled earnings and in the case of the 1990s markets had been posting strong positive returns since 1989.

2.2 Crisis of Confidence.

When sentiment changes and demand for the asset can no longer sustain the high price, investors sell the asset. Now the feedback loops already mentioned operate in the opposite direction; as the price falls investors lose confidence causing them to sell which lowers the price further and results in more sells. The bursting of the bubble occurs much more rapidly than the growth as investors’ confidence is shattered. One should note that the Net Present Value Model explored does not offer any reason for bubbles to burst.

2.3 Blatant Fraud.

Kindleberger (1989) and more recently Shiller (2005) make the point that fraud is driven by demand. Typically, lax regulation or simply the astuteness of conmen facilitates the implementation of manipulative and deceiving accounting practices to benefit themselves or the company they work for. This is typical of the sort

² Speech by Gertrude Tumpel-Gugerell at alumni event of the Faculty of Economics at University of Vienna, Vienna, 3 May 2011. “Asset price bubbles: how they build up and how to prevent them?”

of fraudulent activity that occurs during a boom as it has little impact during prosperity and is able to go undetected until the economy deteriorates. After the millennium crash Enron's stock price fell from \$90 to pennies as scandal surrounding its accounting practices came to public attention

The alternative tactic is to promote a company in a way that appeals to the public's speculative attention during a boom. An example of this would be to play upon a company's technological and internet based aspects during the dot com bubble as these companies were proving hugely popular. This results in a higher price received for share offerings. After the founder or directors have sold off their stake it becomes apparent that the company was not all it was made out to be and the share price subsequently collapses.

2.4 Intense Pessimism and Economic Distress

After the collapse of a bubble there follows a period of pessimism associated with severe losses incurred by many investors and a general mistrust of the financial system and markets. This can result in prices falling below their long run average and fundamental values. After Japan's boom of the 1980s a huge amount of speculation led to a massive asset and real-estate bubble which collapsed in 1991, the effects of which Japan has arguably still not fully recovered from³. However a bursting bubble does not always end in recession. For example the Dot Com Bubble and the crash of 1987 were some of the most prominent rises and falls in asset prices and yet resulted in no immediate recession.

Severe economic distress is caused not by the bursting of asset prices, but by effects that often accompany this, namely as a result of a credit boom. A period of prosperity often facilitates a boom in credit and a laxness of lending standards. Acharya and Richardson (2009) concisely illustrate how this can have damaging effects to the economy: A fall in the value of an asset backed by high leverage results in margin calls causing the borrower to sell the bubble asset. Next the fall in asset value reduces collateral backing the initial credit leveraged boom. This results in further margin calls and forced fire-sale of assets to cover costs which drive the price down below the fundamental value, resulting in another downward spiralling feedback loop.

³ The Nikkei index still trades at approximately a quarter of its 1989 level.
[http://uk.finance.yahoo.com/echarts?s=%5EN225#symbol=%5En225;range=my;compare=;indicator=volume;charttype=area;crosshair=on;ohlcvvalues=0;logscale=off;source=;](http://uk.finance.yahoo.com/echarts?s=%5EN225#symbol=%5En225;range=my;compare=;indicator=volume;charttype=area;crosshair=on;ohlcvvalues=0;logscale=off;source=)

Credit booms preceded the Japanese Lost Decade(s) of the 90s and into 2000s, the Great Depression of the 30s and the recent financial crisis.

2.5 Ponzi Schemes.

Shiller (2005) draws parallels between Ponzi schemes and financial bubbles. Indeed the comparison reinforces the validity of the behavioural aspects that drive the growth of bubbles in a different (but similar) setting. These schemes operate by enticing larger and larger groups of investors through the success of original investors, using their new funds to pay the high returns advertised to the existing group of investors. Most interesting is that even when these schemes come under scrutiny and there is speculation of fraud, investors continue to join, illustrating the strength of optimism over rationality.

3. Reflection on the Financial Crisis Beginning in 2007.

The 2007 financial crisis is an example of a prosperous period leading to a credit boom which caused, and in part was caused by, a bubble in the housing market. Shiller (2005) explains this bubble by proposing the existence of a cross feedback loop between the stock market and the housing market. The wealth effect of strength in financial markets promotes increased spending on homes, and as housing decisions are of a medium term horizon there is a lag to this process. If the markets crash, as happened in 2002, investor confidence in the stock market evaporates and they turn to the housing market as a more stable and prosperous investment decision.⁴ This provides the trigger for the bubble to begin. Acharya and Richardson (2009) take the view that the Federal Funds rate was too low in 2004 and that this created the credit bubble which led to the housing bubble. I believe that this is not necessarily the case; in prosperous times credit facilities help promote economic expansion and raises welfare of the population, it may have been necessary but not sufficient to trigger the bubble. As demand for housing increases and prices follow, speculative purchases help boost this further through the existence of price-to-price feedback loops as previously explored.

⁴ This he supports with contemporary questionnaire survey answers. See Shiller (2005).

The financial crisis itself is rooted in the resulting expansion of credit facilities. As house prices increase this increases the collateral on mortgages and so enhances the credit available. If the loan is defaulted upon the asset passes to the hands of the originator of the loan meaning minimal losses are incurred by the lender; if the housing market is really booming, there is even potential to profit. As this upward trend in housing had persisted for several years, the public and financial institutions alike were caught up in a state of manic optimism. As the price continues upwards the collateral increases making the risk of default decrease, encouraging banks to make more credit available by increasing their leverage, providing borrowers with more funds to enter the housing market resulting in increased demand which thereby fuelling the bubble.

This process was exacerbated by the creation and growth of many new asset-backed-securities such as asset-backed-commercial-papers and collateralized-debt-obligations for which the loans are grouped and the rights to the payments are sold on to investors. This had two effects that meant the bubble posed even greater systemic risk. Firstly, Eastern countries – in particular China – invested heavily in these assets and this demand resulted in unnaturally high liquidity, low volatility and low spreads; also driving up house prices further worsening the bubble. Secondly, the way in which these were packaged in what is known as the originate-to-sell model had several consequences. The asset passed through many hands being repackaged in many complicated different ways so that when it reached the final holder it was incredibly difficult to assess the risk attached to it and to price it accordingly. This process also meant that the originator of the loan had almost no 'skin' in it as they transfer the risk to other parties, and earned a fee by the volume processed. This resulted in a huge number of sub-prime loans being issued with inherent risk if the market failed. Indeed Acharya and Richardson (2009) show that the average number of loans of quality B- or lower over the 11 years preceding 2004 was 27.8% whereas the four years after averaged 43.8%. As these were all based on a bubble asset, the collapse of the bubble had global effects.

When the housing bubble burst and asset housing prices collapsed homeowners began to default and the value of the asset backed securities began to fall. This resulted in the process of deleveraging and fire sale of assets to meet payments. As the books of large financial firms deteriorated so did the trust between firms as another feature of these securities was that it was not known who held them, so suspicions of insolvency led to the drying up of the lending markets. Poor accounting practices, excessive risk taking, and irresponsible issuing of loans was brought to public attention.

Therefore the financial crisis demonstrates the key characteristics of bubbles: manic optimism fuelling the price surge in housing; a crisis of confidence resulting in the precipitous crash of asset prices; the emergence of fraud, misrepresentation and dubious accounting; and finally pessimism and economic distress that is characterised by recession.

4. Implications for Policy.

Much debate has been focused on what the effects of bubbles are, whether they should be 'pricked' and what policies should be implemented to negate the possible negative ramifications of a bursting bubble. On the subject of addressing whether bubbles should be pricked, in a 2008 speech Frederick Mishkin (at the time a member of the Board of Governors of the Federal Reserve) makes the point that a bubble is hard to identify "If a central bank were able to identify bubbles in the stock market, wouldn't market participants be able to do so as well? If so, then a bubble would be unlikely to develop, because market participants would know that prices were getting out of line with fundamentals."⁵ This is consistent with the identification problems mentioned in section 2.1. The second issue with pricking a bubble is that the tools a central bank has at its disposal have large macro effects and so targeting an asset bubble may have broader economic consequences, as Bernanke highlights in a 2002 speech "My suspicion is that bubbles can normally be arrested only by an increase in interest rates sharp enough to materially slow the whole economy. In short, we cannot practice "safe popping," at least not with the blunt tool of monetary policy."⁶ A study by Gruen et al. (2005) that uses a simple macroeconomic model including a role for asset-price bubbles to forecast activist policy effects on asset prices finds that it may be optimal to "lean against" some bubbles but not others and that judgement needs to be made about process driving the bubble and effects of monetary policy. This is all very circumstantial and inconclusive.

So if the pricking of bubbles is unfeasible, one turns to micro-level policy. Two factors stand out – particularly from the recent financial crisis- at amplifying bubbles and posing systemic risk. Firstly a credit

⁵ Governor Frederic S. Mishkin. At the Wharton Financial Institutions Center and Oliver Wyman Institute's Annual Financial Risk Roundtable, Philadelphia, Pennsylvania, May 15, 2008. How Should We Respond to Asset Price Bubbles?

⁶ Remarks by Governor Ben S. Bernanke Before the New York Chapter of the National Association for Business Economics, New York, New York, October 15, 2002, Asset-Price "Bubbles" and Monetary Policy

boom and subsequent extreme leveraging and slipping of credit standards of financial firms promoting the growth of a bubble but more importantly having a large externality on the economy when the bubble bursts. As Mishkin states “regulations should be designed so as not to exacerbate the interaction between asset price bubbles and credit provision” by which he means limiting processes that increase asset prices resulting in higher capital buffers leading to further lending. The Basel III agreement and more recently the Independent Commission on Banking have raised these standards to an absolute minimum of 8% capital to risk weighted assets and a leverage ratio to be monitored against a benchmark of 3%.⁷ However the tendency of institutions to create new off-balance sheet securities in the past has circumnavigated this. In future such securities should be screened for systemic risk in the contemporary climate. Such instruments should be transparent and public to remove the asymmetric information issues of solvency that led to the freezing of lending markets. Regulation of the lending industry in general including greater monitoring of loans issued should lower default risk and excessive leveraging. This involves maintaining credit check standards such as income etc.

Acharya and Richardson make the point that financial institutions did not actually follow the originate-to-sell model and held on to these bundles of high risk assets, thereby not spreading the credit risk over investors. Regulation should further stipulate what proportions of assets can be held, perhaps in the style often found in company financial reports of stating an exposure to a 1% fall in an asset’s price (house prices being of particular relevance in bubbles and credit) and setting a limit on this. Finally regulation should focus on continuously updating the way in which firms are monitored to reduce the presence of fraudulent activity.

If a cross feedback loop between the stock market and housing market does exist, it would make sense to heighten these measures following market crashes as housing booms make credit booms and irresponsible leveraging more likely.

5. Conclusions

Asset price bubbles display several defining characteristics; a period of over-optimism that results in the price deviating largely from fundamental valuations, a crisis of confidence and the resulting crash in asset prices, this exposes an environment of fraudulent activities and results in a period of pessimism and economic downturn.

⁷ Taken from Independent Commission on Banking Final Report Recommendations. “Loss absorption” P 85.

As explored the presence of feedback loops fuels the optimism. Rising prices have a psychological effect on investors especially over prolonged periods, and this plays upon pre-conditions of an optimistic nature often present during such a bubble. The 2007 financial crisis demonstrated how a bubble can affect the current economic system on a more global scale than ever with the bubble asset underpinning globally traded securities and providing collateral to fuel a credit boom and the systemic risk accompanying this. The implications to policy focused on containing the credit boom with stricter capital requirements, risk exposures, and focus during times of exaggerated collateral. Importantly all bubbles are different so staying one step ahead is crucial, retrospective fixes will not suffice to limit their impact.

6. References

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