Asset Bubbles: Predicate & Combat Against The Irrational Exuberance

*Debasish Maitra
**Kushankur Dey

"I can calculate the motion of the heavenly bodies, but not the madness of people"
-Sir Isaac Newton, upon losing £20,000 in the South Sea Bubble

INTRODUCTION

An overwhelming tide of the financial tsunami has been inundating the whole world, resulting in substantial drop of asset prices and credit crunches. Bankruptcies, bailouts, defaults, foreclosures, etc. have become daily news headlines. Dozens of books, research papers, reviews and commentaries have rushed to be published to provide explanations on this once-in-a-century crisis. During the run-up in prices of internet stocks, financial commentators of the time argued on whether the higher prices were justified. Once the prices fell, answers seemed to be too obvious. Investors had got carried away, had not paid attention to the fundamental determinants of value of the assets that they were buying. They had succumbed to one of the most mortifying of all investor pitfalls: a speculative "bubble". The spectacular rise and fall of stock prices in the late 1990s and housing prices in the mid 2000s have been interpreted by many *pundits* as examples of asset bubbles. Economists typically use the term "bubble" to mean that the price of an asset differs from its "fundamental" intrinsic value, i.e. the present discounted value of dividends generated by the asset. For ages, many economists have been trying to define the 'bubble' in different ways. Most of the economists fall into two schools. One school believes that the arbitrageurs push the overestimated market price to the sustained level. Other economists would say that asset prices become high when they are bought with hopes to sell further at higher prices. Alan Greenspan (1996) has also put forward a revolutionary comment on "*irrational exuberance* causing bubbles":

"Clearly, sustained low inflation implies less uncertainty about the future, and lower risk premiums imply higher prices of stocks and other earning assets. We can see that an inverse relationship is exhibited by price/earnings ratios and the rate of inflation in the past. But how do we know when irrational exuberance has unduly escalated asset values, which then become subject to unexpected and prolonged contractions as they have in Japan over the past decade?" (Alan Greenspan, 1996).

To distinguish the definition of bubble from the phenomenon of fluctuation of price of a good or asset because of cyclical changes in its inherent desirability or worth (Camerer, 1989), a mathematical form has been established. Let d_t denote the dividend income paid out by the asset at date *t,* when *t* runs from 0 to infinity. Let q_t denote the current price of a bond that pays one rupee at date *t.* Hence, the value any trader attaches to the dividend stream from this asset is given by:

$F = \sum q_t d_t$ (t tends to 0 to ∞) where F denotes the fundamental value of the asset. So, an asset bubble is an asset whose price *P* is more than its fundamental value (P>F).

OBJECTIVE AND SCOPE OF THE PAPER

The objective is to cover some important aspects of bubble in a nutshell. The objectives are boiled down to causes of bubble formation, then to examine the empirical evidences bolstering the timeline of bubble which also says the rarity on bubble formation, bubble and growth explaining the possibility of togetherness. Finally, the dealing strategies are

**Fellow Participant (2nd Year)*, Institute of Rural Management Anand, Anand, Gujarat. Email : debasishmaitra@gmail.com
***Fellow Participant (3rd Year)*,Institute of Rural Management Anand, Anand, Gujarat. Email : kushankurm@gmail.com

attempted to be arrived at based on some analysis and results. Bubbles are regarded as a result of an underestimation of risk exposure of investment. Unfortunately, risk assessment has long been difficult for investors (Bernstein, 1998). Even credit rating agencies have difficulties in assessing the risk level due to the lack of past record of nationwide credit defaults (Tett, 2009). It becomes very much indispensable to figure a proper credit rating system which can probe the risk exposure. So, considering these complications, it is targeted to establish a credit default forecasting model. In addition to this, some macro-economic remedies are suggested in the paper.

METHODOLOGY

The study is based on BSE 100 Index companies. However, for the purpose of study, the data are used from 2004-05 to 2008-09. BSE100 has been established in the year of 1989 with a base year of 1983-84.Monthly stock price, yearly market price of securities, number of outstanding shares, debts are used for this paper. The data were collected from *Centre for Monitoring Indian Economy (*CMIE-Prowess database), BSE, NSE, RBI, SEBI websites.

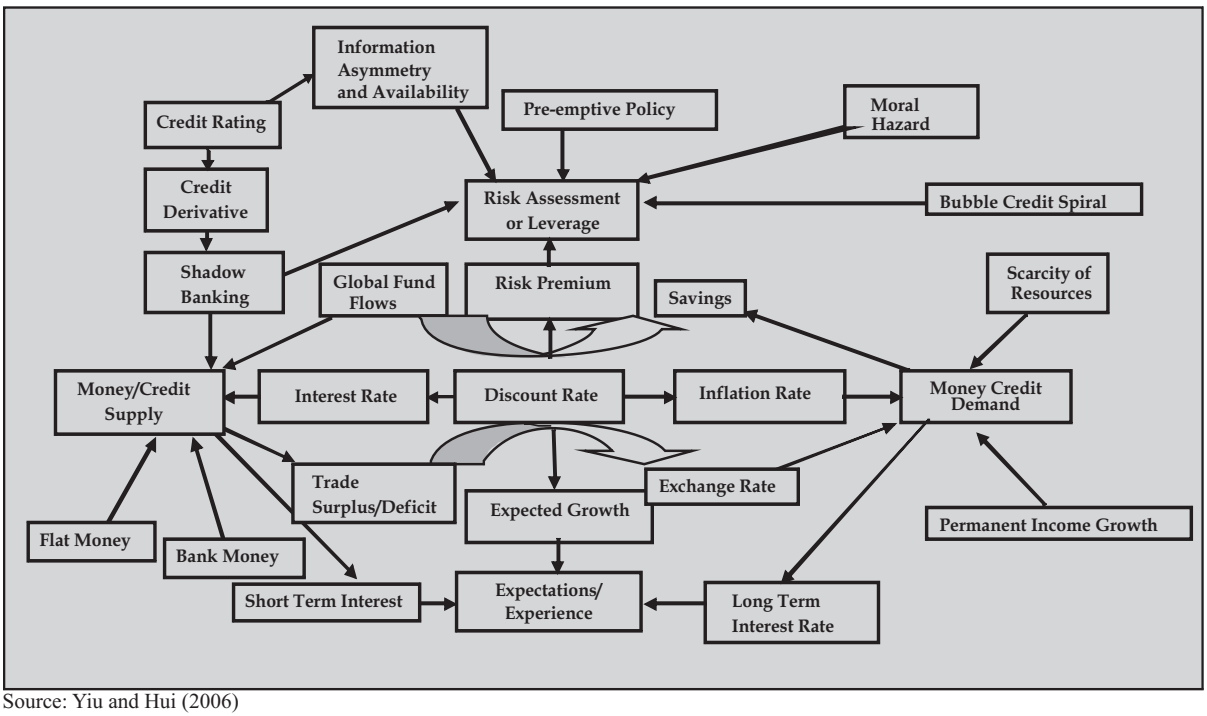
CAUSES OF "BUBBLE"- HARD TO TELL

On August 12-13, 2005, at the Department of Finance at the Kelley School of Business, Indiana University, Utpal Bhattacharya and Xiaoyun Yu commented on the "causes and consequences of bubble" :

"What caused the bubble? This seems like a naïve question, considering that we still do not know how to figure out whether and when as asset price is a bubble or not. However, if we can live with this unanswered question, the pragmatists among us can still go on to address the causes of the so-called internet bubble."

To date, there is dearth of widely accepted theories to explain the occurrence of bubble. Tirole (1982) conceptualized that if traders start out with a common set of beliefs, that all traders are rational and the resources are allocated efficiently prior to trading and there are finite numbers(many participants who can trade in the assets although each can trade it infinitely many times), then asset bubbles cannot occur. Bradley, Jordan and Ritter (2007) focused on stock analysts and their recommendations cause the bubble formation. In view of these assumptions, Yiu and Hui (2006) gave a comprehensive holistic framework which groups the explanation into four main categories; **1)** Money/Credit supply, **2)** Money/Credit demand, **3)** Risk premium and **4)** Income Growth (Figure -1).

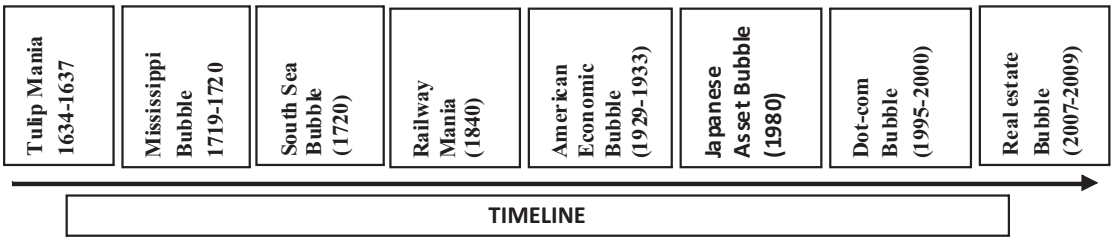
Figure -1: **An Integrated Comprehensive Theoretical Framework: Causes of Asset Bubbles**



Source: Yiu and Hui (2006)

ASSET BUBBLES: A TIMELINE ANALYSIS

Financial crises and bubbles are not new phenomena; Kindleberger and Aliber (2005) have reviewed 46 financial crises in the past 380 years (1618-1998), the dutch Tulip Bulb Bubble in 1634-1637, the French Mississippi Bubble in 1719-1720, the South Sea Bubble in the UK in 1720 and the worldwide great depression in the 1930s are some of the well known crises.



Data source: www.wikipedia.com

It is evident from the above events of occurrence that formation or occurrence of bubble is very sparse and non-frequent. Tulip mania dated back to very early (1634-1637). Almost after 85 years, the next bubble occurred. But both the bubbles ; The Mississippi Bubble and The South Sea bubble happened in the US and UK respectively, where the share prices of both Mississippi and South Sea company soared very high and reached the stratosphere. But both the events were not lashed out or worldwide. Again after almost 120 years, Railway mania was observed. It also followed the same pattern -where the stock value of Railway increased, more and more money poured in by speculators until the inevitable collapse. But as we move forward, the frequency of the bubble increases which starts with the Japanese asset bubble followed by the dot-com bubble and now the real estate bubble. But the analysis of the current crisis identifies some theoretical underpinnings which differentiates them from previous financial crises episodes. The theorems which explain the present days' crises are - *The standard Keyneysian liquidity preference theory, Ponzi finance theory of financial fragility, flaws of investment , originate and distribute bank model rather originate and hold model and influence of shadow banking (investment banks, hedge funds, private equity groups)* (Wolfson,2002).

BUBBLES AND GROWTH : ANOTHER PERSPECTIVE

For many a time, the effects of bubbles raised many questions in the minds of economists, analysts and theorists. It is often assumed that bubbles are bad. But Bhattacharya and Yu (2005) attempted to investigate the welfare effects of bubbles. They derived that it makes possible overinvestment for nascent, emerging industries for innovation. They are also in sync with the opinion that bubbles also change the wealth dynamics of the society through the mechanism of investment. It is also assumed that bubbles remove inefficiency from the market. But one of the most seminal contributions was made by Jaume Ventura in the year 2003 in his research on "*Economic Growth with Bubbles*". He presented a stylized model of economic growth with bubbles, where it is viewed that asset price bubbles are a market-generated device to moderate the effects of frictions in financial markets, improve the allocation of investments and raise capital stock and welfare. The presence of a bubble raises the incentives for labor-augmenting inventions, since these inventions not only raise the labor productivity, but also have the additional benefit of raising the bubble. Daniel Gross, a prolific economic writer, in his new book "*Pop! Why Bubbles are Great for the Economy"* summarized the whole concept in the following way:

".....Bubbles leave behind a new commercial and consumer infrastructure...The stuffs built during bubbles-housing, telegraph wire, optic fiber cable and railroads- do not get plowed under when its owners go bankrupt. It gets reused quickly by entrepreneurs with new business plan, lower cost bases and better capital structure. And when new services and businesses are rolled out over the new infrastructure, entrepreneurs can tap into the legions of users who were coaxed during the bubble. This dynamic is precisely what has Google the 'IT' company of this decade. But certainly, these would not have developed as they did without the Pop! Dynamic" (Daniel Gross, Citation from the book "Pop! Why Bubbles are Great for Economy", 2007).

MANEUVERING THE BUBBLE: A WAY OUT

Government policy is modeled to deflate the overstated assets by revealing information about whether or not the asset is overpriced. It is shown that such policy tends to improve welfare if it protects less-informed buyers from 'bad'

sellers, who know the asset is overpriced. In this paper, two propositions are highlighted to prevent or manage asset bubbles : **1) Monetary and Fiscal Policy and 2) Necessity Of Proper Credit Default Forecasting Model.**

1) MONETARY AND FISCAL POLICY

There are two schools of thoughts- one believes more in monetary policy and the other one believes in fiscal policy. Classical economists believe that people are rational and act optimally. Say' law (1834) says that supply creates its own demand, so everything should be decided by the market. Government should only play the role of looking after defense, law and order. But an increase in money supply could cause an upward swing in the business cycle. As a result of which, inflation of asset prices rises up and in the long run, leads to bubble formation. But in the year 1936, Keynes came out with the theory which reverses the classicalist Say's law. It said that during the time of downward movement of business cycle, monetary policy is not effective, then only fiscal policy works as demand for goods and services go down abruptly. But this fiscal policy comes as *post-hoc* measure to deal with asset bubbles. Government of India adopted the policy by public spending under National Rural Employment Guarantee Programme, Rural Self-Employment Programme and Rural Road Construction Programme under flagship Government sponsored schemes. It is quite evident from the Table-1 that during the year 2009-10, the budgetary allocation for NREGA increased by 144.37% to create demand in the market. National Highway Development Programme is given allocation with the increase of 27.27 % from the year 2008-09. Handloom sector also saw a growth of 47.06 %. It also shows that due to adoption of expansionary fiscal policy, the fiscal deficit increases from 2.5% to 6.8% of GDP.

Table 1: Government Expenditure On Infrastructure

Item	Year		(Rs. in crore)	
	2006-07	2007-08	2008-09	2009-10
NREGA	11700	12000 (2.5)	16000 (33.33)	39100 (144.37)
Rajiv Gandhi Rural Electrification	3000	3983(32.77)	5500 (38.08)	700 (27.27)
ROAD (National Highway Development Programme)	9045	10667(17.93)	12966 (21.55)	15950 (23.04)
Rural Handlooms Sector	241	321(33.20)	340 (5.91)	500 (47.06)
Fiscal Deficit (as % of GDP)	3.8	3.3	2.5	6.8

Source: www.indiastat.com . Data in parenthesis are of growth in percentage.

So, there is always a trade-off between fiscal policy and fiscal deficit. To meet this deficit, the Government has to either borrow from internal sources or external sources or from monetarization means i.e. issuing of currency. Considering these circumstances, it is proposed that it would be useful to incorporate a robust model of the monetary policy instrument. This would potentially include mechanisms other than central bank announcements, such as an effect through open market operations.

2)CREDIT DEFAULT PROBABILITY FORECASTING

Due to the advent of innovative corporate debt products and credit derivatives, academicians and practitioners have recently shown their renewed interest in models that forecast corporate defaults. One innovative forecasting model which has been widely applied in both practice and academic research by Duffie and Singleton (2003), Saunders and Allen (2002) and Vassalou and Xing (2003) in many contexts (but in not many Indian contexts which is a particular application of Merton's model (Merton, 1974) that was developed by the KMV Corporation) is referred to as the KMV-Merton model. The KMV-Merton model is a clever application of classic finance theory, but how well it performs in forecasting depends on how realistic its assumptions are. Campbell, Hilscher and Szilagyi (2004) found that π_{KMV} (Implied probability default or Expected Default Frequency) using KMV-Merton model seems to have relatively little forecasting power.

Since this model is quite complicated and needs iteration techniques, ***an innovative model has been adopted to estimate probability of defaults using Naïve Alternative*** *(Bharath and Shumway,2005). This model is attempted to be used in the Indian context.* To begin constructing naive probability, it is taken that value of each firm's debt with the face value of its debt,

$$\text{Naive } D = F \qquad (1)$$

Since firms that are close to default have very risky debt, and the risk of their debt is correlated with their equity risk,

the volatility of each firm's debt is approximated as:

$$\text{Naive } \sigma D = 0.05 + 0.25 * \sigma E \qquad (2)$$

σ_E *is defined as the volatility of equity.* It is assumed that the five percentage points in this term represent term structure volatility and the twenty-five percent times equity volatility is included for volatility associated with default risk (Bharath and Shumway, 2005).

This gives us an approximation to the total volatility of the firm of

$$\text{Naive } \sigma_V = [E/(E + \text{Naive } D)] * \sigma_E + [(\text{Naive } D/(E + \text{Naive } D)] * \text{Naive } \sigma$$

$$= [E/(E + F)] * \sigma_E + [F/(E + F)] * (0.05 + 0.25 * \sigma_E). \qquad (3)$$

Where, E captures the value of a company's equity (stock price times number of outstanding shares). Next, it is set that the expected return on the firm's assets equal to the firm's stock return over the previous year,

$$\text{Naive } \mu = r_{it-1} \qquad (4)$$

μ is past returns on assets. Following Vassalou and Xing (2003), *F*, the face value of debt is the debt in current liabilities plus one half of long term debt. The naive distance to default is then

$$\text{Naive } DD = [\ln [(E + F)/F] + (r_{it-1} - 0.5 \text{ Naive } \sigma^2_V) T]/\text{Naive } \sigma_V \sqrt{T} \qquad (5)$$

This naive alternative model is easy to compute- it does not require solving the equations simultaneously. However, it retains the structure of the KMV-Merton distance to default and expected default frequency. It also captures approximately the same quantity of information as the KMV-Merton probability. Naive probability is estimated as

$$\pi_{\text{Naive}} = N(-\text{Naive } DD) \qquad (6)$$

A set of Expected Default Frequencies (EDF) are obtained for some companies of BSE 100 Index which have debts to the financial institutions. However, due to dearth of space, EDF of only 2 years (2007-08 and 2008-09) are shown in Table-2. It is ostensible from the above fact that as the volatility of assets (σ_V) increases, then the probability of credit default also increases. If return on stock prices come down, it increases the credit default chances, but this can be minimized if market capitalization is more. As credit ratings are revised relatively infrequently, so equity prices linked model can provide more up-to-date information for estimating default probabilities. This suggests that if credit rating is estimated based on equity, it would provide a better picture of the real world rather than risk-neutral default probability in combating bubbles.

SUMMARY AND CONCLUSION

The present study has not only elucidated the timeline or frequency of occurrence and the aftermath effects of asset bubbles, but also tried to conjure up the Expected Default Frequency based on a new innovative approach which also follows the basic underlying assumptions of the KMV-Merton model. But it is more practically feasible as it does not undergo iteration or simultaneous equation modeling. Credit rating agencies like Moody's, S&P and Fitch provide ratings on creditworthiness, so this kind of user friendly with robustness method can give them better opportunity to estimate the default probability. This measure will be preventive and *Ex ante* rather than *post-hoc.* This paper also examines the interrelation of fiscal and monetary policy which can provide a better cushion.

Few caveats revealed in this paper or dissertation could be the use of methodology of estimating or approximating Naive σ_D. *Another could be of not validating the explainability of Naïve Alternative with KMV-Merton model which is often used in other context (Bharath and Shumway, 2005).*

The lack of a regular institutional framework to manage the debt at the international level viz., an international debt court similar to those created to manage bankruptcies in national economies is one of the major deficiencies of the current international financial architecture (South Centre, EPW, 2008). The current proposition also sheds some light on the possibility of far-reaching structural reforms of the international financial architecture that would allow developing countries to have greater autonomy and protection from the dominance of speculative financial flows for

Table 2: Output Summary of Companies' EDF (Expected Default Frequency)

	Year-2007-08								Year2008 09							
Company	Naïve D=F (Rs.Cr)	E (Rs.cr)	σ_E	Naive σ_D	Naive σ_V	Naive μ	Naive *DD*	πNaive (EDF)	Naïve D=F (Rs.Cr)	E (Rs.cr)	σ_E	Naive σ_D	Naive σ_V	Naive μ	Naive *DD* & π_{Naive}	π_{Naive} (EDF)
ACC	2346.19	17794.74	0.42	0.155	0.389	0.1359	**5.680**	**0.00**	2866.29	10759.22	0.36	0.14	0.314	-0.2682	**3.957**	**0%**
Abani	627.815	13260.83	0.48	0.17	0.466	0.5002	**7.486**	**0.00**	1677.445	6992.37	0.79	0.25	0.685	-0.8677	**0.789**	**22%**
Essar Oil	11192.94	14764.70	1.25	0.3625	0.867	2.943	**3.929**	**0.00**	11020.18	18213.99	0.75	0.24	0.557	-0.6444	**0.316**	**38%**
HDFC	12131.47	65308.29	0.25	0.1125	0.228	0.5873	**10.570**	**0.00**	15220.52	55417.31	0.75	0.14	0.304	-0.4008	**3.576**	**0%**
JSW Steel	5835.20	15545.99	0.53	0.1825	0.435	0.6599	**4.283**	**0.00**	9973.57	10149.82	0.35	0.28	0.609	-0.7135	**0.324**	**37%**
Jindal Steel	2477.83	3872.36	0.75	0.2375	0.550	3.376	**7.574**	**0.00**	4419.15	3743.52	0.82	0.26	0.514	-0.4193	**0.121**	**45%**
United Spirits	1001.96	15124.85	0.35	0.1375	0.337	0.8222	**10.523**	**0.00**	1159.23	10939.33	0.59	0.20	0.552	-0.5683	**2.941**	**0%**

more progressive developmental agenda with minimal *irrational exuberance.*

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