Bubbles

Towards a Typology

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Bubbles: Towards a Typology

Player:	**How much to play?**
Croupier:	**Three billion.**
Player:	**Who'll be playing?**
Croupier:	**We won't know until they show up.**
Player:	**What are the rules?**
Croupier:	**Those will emerge as the game unfolds.**
Player:	**What are my odds of winning?**
Croupier:	**We can't say. *Do you still want to play?***

Arthur (1996, p. 104)

Introduction

Bubbles – periodic episodes where hype about an asset outpaces reasonable expectations about valuing the asset (Garber, 1990; Sheeran and Spain, 2004) – have been a part of modern economic history, including of course the notorious tulipmania in the Netherlands of the 17th century (Dash, 2000; Frankel, 2000; Galbraith, 1993; Garber, 2001; Perez, 2002; 2009). While bubbles are about the value of the underlying asset (Camerer, 1989; Siegel, 2003), the formation, inflation, hyper-enlargement and eventual bursting of bubbles cannot be understood in merely financial-economic terms. Bubbles are also socio-political-cultural phenomena, with intense and accelerating interactions of engineered hype and feverish expectations (Compton and Ozler, 2011; Turcan, 2011). It is therefore important to

view bubbles in a multidisciplinary frame; indeed, the language of bubbles is permeating fields beyond finance and economics (see, for example, Ekström and Glans 2011). A goal of our ongoing research stream is to develop a multidisciplinary metatheory of bubbles. In this viewpoint paper we put forward a typology of bubbles by comparing four types of assets – entertainment, commodities, financial securities (stocks), and housing properties – where bubbles could and do form occasionally. Cutting across and comparing such varied asset types provides some rich insights into the nature of bubbles – and offers an inductive way to arrive at the typology of bubbles.

In this viewpoint paper, we ground inductively the emergent typology of bubbles and related types, along with their dimensions in the extant empirical realm as well as in the emergent theoretical frames derived from some work on bubbles (e.g., Turcan 2010; 2011). We view the emergent typology of bubbles as a middle-range theory that we see as a catalyst for a dynamic scholarly conversation and future research, leading eventually to the development of a robust behavioral grand theory of bubbles. According to Weick (1989, p. 521), middle-range theories are solutions to problems that contain a limited number of assumptions and considerable accuracy and detail in the problem specification. In this viewpoint paper, middle-range theorizing helped us manage the complexity of the emergent typology of bubbles and related types.

As to the process of theory building, we side with Dubin (1978, p. 96) who maintains that empirically relevant theory in the behavioral and social sciences is built upon the

acceptance of the notion of relationship rather than of the notion of causality. This does not mean that causality (or prediction) is of secondary or lower importance. It means we have employed a theory building strategy firstly aimed at improving understanding before seeking to improve prediction: hence understanding the core asset-linked dimensions and as well as boundary meta-dimensions of the emergent typology of bubbles and related types.

In the sections that follow, first we present the three core asset-linked dimensions and four boundary meta-dimensions for understanding bubble processes. Next, we put forward the typology of bubbles by pulling together the core asset-linked dimensions and the boundary meta-dimensions of bubbles. We round out this viewpoint paper with some integrative and concluding remarks.

Asset-Linked Dimensions of the Typology

Regardless of the type of asset, three core asset-linked dimensions are important for bubbles to form, to inflate (often rapidly and dramatically), and eventually to burst: (1) perceived asset availability, (2) perceived asset value, and (3) perceived asset communication. Table 1 compares the asset types[1] – entertainment (such as movies), commodities (such as minerals or agricultural commodities), financial securities or stocks (such as shares of technology companies), and housing (such as real estate property values in a metro area) – on

[1] Types of assets where bubble processes could emerge are varied: new technologies and innovations (including financial innovations), high-tech products and services (and related financial securities or stocks), fashion items, entertainment products such as movies, and indeed many sophisticated derivative financial instruments that convert an otherwise slow-traded asset into a hyper-traded asset (see e.g., Galbraith, 1993; Martin 2011; Perez, 2003; 2009; Schmitt 2009; Turcan 2011).

these three dimensions: (1) those affecting *availability* of an asset, (2) those affecting *valuation* of an asset, and (3) those affecting *communications* about an asset. Each dimension has multiple factors that play some role in the formation and inflation (and eventual bursting) of bubbles.

Bubbles and perceived asset availability

The first dimension concerns the *perceived asset availability*: how graspable, how comprehensible, how much available (how readily, how easily, how scarce, how abundant), when, where? The set of factors that define this dimension is about whether an underlying asset is creatable, consumable, storable, duplicable, divisible, renewable, perishable, depletable, or destroyable. We term these factors as *availability-related factors*.

All assets – with the exception of minerals – are creatable, but the pace and conditions that affect asset creation vary greatly. This gives rise to perceived supply-demand imbalances, which of course is a basic condition to initiate a bubble. Even a movie – such as a new Harry Potter release – could experience a temporary supply-demand imbalance with lines at the box office on the release date. Supply and demand, especially for bubble-prone assets, are perceptual states – it is *perceived* shortage, and the feeling that prices will rise (or the asset will disappear) and the deal must be done quickly, that contribute to the inflation of bubbles.

Table 1: Comparing Core Asset-Linked Dimensions and their Factors by Asset Types

Is the underlying asset…	**Asset Type** (Examples) Entertainment (Avatar - the movie)	Commodity (Silver, Hog Bellies)	Financial Stock (Google)	Housing (Shanghai mansion)	**Notes and Comments**
DIMENSION: PERCEIVED ASSET AVAILABILITY					
Creatable?	Yes	Yes or No	Yes	Yes	Agri-commodities are creatable
Consumable?	Yes	Yes	No	Yes	Houses are consumed as durable goods
Storable?	Yes	Yes	Yes	Yes	But see also the Perishable dimension
Duplicable?	Yes	No	No	No	Low or no marginal cost per digital copy
Divisible?	No	Yes	Often Yes	Yes	Stock-splits are used to divide financial stocks
Renewable?	No	Yes or No	No	No	Minerals are non-renewable
Perishable?	No	Yes or No	No	No	Agro-commodities are perishable
Depletable?	No	Yes	No	No	Minerals more depletable than Agri-commodities
Destroyable?	No	Yes or No	Usually No	Usually No	Agri-commodities are often destroyable
DIMENSION: PERCEIVED ASSET VALUE					
Depreciable?	Yes	Yes or No	No	Yes	In the accounting sense (losing value with age)
Appreciable?	Yes	Yes	No	Rarely Yes	In the collector sense (rarity, scarcity)
Tradable?	No	Yes	Yes	No	Refers to tradability on an exchange
Wagerable?	No	Yes	Yes	No	Refers to wagerability on an exchange
DIMENSION: PERCEIVED ASSET COMMUNICATION					
Discussable?	Yes	No	Yes	No	Internet has increased discussability
Reviewable?	Yes	No	Yes	Yes	Internet has increased reviewability
Hypeable?	Yes	Yes	Yes	Yes	Internet has increased hypeability

Bubbles and perceived asset value

The second core dimension pertains to the *perceived asset value*: how to value an asset that does not exist, or how to evaluate the *promise* of an emerging new asset? The *valuation-related factors* aim to understand whether an underlying asset is depreciable, appreciable, tradable, or wagerable. In economic terms, there is an implied inverse relationship between perceived availability and perceived valuation of an asset: the asset that appears to be scarcer is valued more highly.

Hence, beyond the perceived availability factors, the main factors affecting bubbles are the perceived asset value dimensions – particularly the ability to trade (in an exchange) or bet (again, in an organized exchange) on the asset. At the height of tulipmania, sometimes the ownership of a tulip bulb (still planted in the ground) changed hands as much as 8-10 times in a day, via auction houses (Dash, 2000). Financial engineering or financial innovation (e.g., Perez, 2009) – the ability to craft derivatives for almost anything – has injected tradability and wagerability (the ability to place bets, in stock or commodity exchanges) in asset categories that were previously not tradable or wagerable. The housing bubble in the U.S. (Baker, 2007) that burst in 2007 was fueled largely by the creation of Credit Default Swaps, derivatives that allowed trading and wagering on home mortgage debt notes (Cohan, 2009). In this sense, the portrayal shown in Table 1 is a cross-sectional snapshot, reflective of the closing years of the 20th century. Indeed, the Internet has accelerated tradability and wagerability – as well as discussability, reviewability, and hypeability – of all asset types. Hence, a future portrayal of

Table 1 would likely look somewhat different (with more evidence and examples available for all these processes) than the one shown here.

Bubbles and perceived asset communication

The third and final core dimension relates to *perceived asset communication*: how can the target stakeholders distinguish between hype and reality; how much can the rules be bent; how many 'legitimacy lies' – defined as "intentional misrepresentations of the facts" (Rutherford *et al.*, 2009, p. 950) – can be told without bursting an inflating bubble? This dimension consists of three factors: communication related factors that are trying to explain whether an underlying asset is (a) discussable, (b) reviewable, or (c) hypeable. Intense and frequent communications are necessary (though of course not sufficient conditions) for the formation and enlargement of bubbles. Even in the case of tulipmania, when the mass media were hardly developed, the bubble phenomenon was an essentially urban one – in the Amsterdam and Haarlem metropolitan areas of the Netherlands. Rising wages and affluence of craft workers created conditions for these folks to meet in pubs and public places, to discuss the qualities of tulip varieties and to speculate on tulip bulbs.

The three items in the last set of factors in Table 1 are about communications pertaining to the underlying assets. Movies and financial stocks have been eminently discussable topics for a long time – in mass media, parlors, clubs and pubs. The spread of Internet has boosted the ability to discuss, review and hype all asset types – including the prosaic asset categories of commodities comprising of things such as titanium or pork bellies. Of course, for highly

valenced and often emotive categories of entertainment products (movies, music, books), storied stocks (such as those of technology companies), and high-end real estate (Manhattan, London), the discussions – facilitated by Internet – have proliferated in terms of numbers and intensity.

In the bubble process, the role of such communications is similar to the processes found in the formation of any "tipping point" (Gladwell, 2002). For a tipping point to form or a bubble to inflate rapidly, the following factors usually come into play:

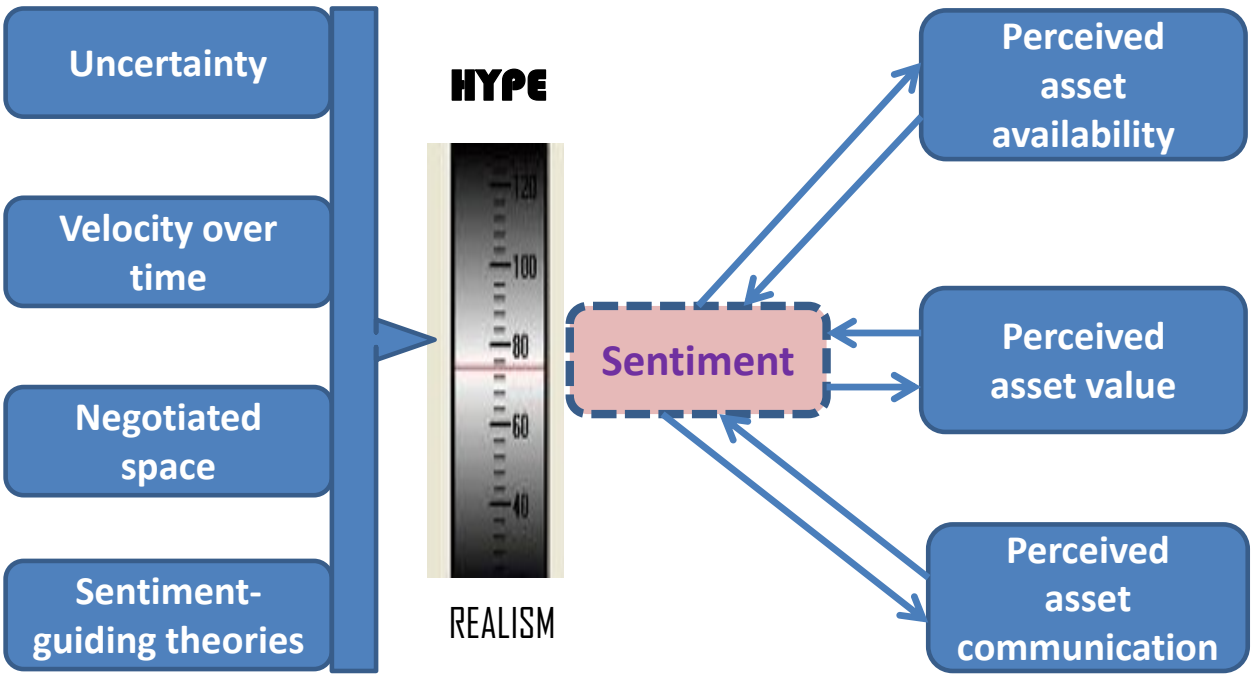
- Propitious Context: A fertile and propitious context is helpful. The dotcom tech-stock bubble could not have been formed until there were some early, dazzling successes in e-commerce.
- Irresistible Stickiness: Some aspect of the phenomenon must be irresistibly attractive to large numbers. In the U.S. housing bubble, the real estate price gains in some sunbelt states (like Florida and California) appeared to offer sweet, 'no-brainer' strategies for sure-fire capital gains: buy now, and you are guaranteed a higher sale price later.
- Nodal Roles: Central and nodal roles that advise, mentor, connect, and persuade are crucial for the propagation of an idea – including of course the idea behind a bubble, that an asset's price will rise and rise and rise; or the dire counter warning that the asset is inflating in unsustainable ways and that the bubble will burst. Economist Nouriel Roubini, for example, was a lone wolf in warning about the inflating housing and stock bubble of 2007-8, and this earned him the nickname of "Dr. Doom". Roubini

became a nodal and central celebrity once his warnings came true (see, for example, Chen, 2009; Das and Roubini, 2012).

Boundary Meta-Dimensions of the Typology

After identifying the core asset-linked dimensions of the bubble typology – availability, valuation and communication – it is useful to identify the boundaries, i.e., the limiting values of the core asset-linked dimensions comprising the typology. We identify four meta-dimensions that delineate the boundaries of the emergent typology: uncertainty, velocity over time, negotiated space, and sentiment-guiding theories (see Figure 1).

Figure 1: Asset-related and Meta-Dimensions affecting Bubbles



A key factor contributing to the bubble formation is the state of *uncertainty* (linked to the degree of newness of an underlying asset). We distinguish between uncertain and risky decision making situations. A risky situation is similar to rolling a dice that is balanced and fair: it is possible to assess the probability of the outcomes. An uncertain situation, on the other hand, resembles rolling a dice with infinite number of sides, without knowing whether the dice is balanced and fair. Under uncertainty thus, it is impossible to assess the probability of the outcomes.

For example, under uncertain decision making situations the cash flow a new asset is expected to generate (the mean of the distribution) and the rate at which the cash flow should be discounted over time (the variance of the distribution) are unknown (Alvarez and Barney, 2005). In other words, net present value cannot be calculated under uncertain decision making situations. The stage gets set, in other words, for feverish speculation (during bubble inflation) or for panicked exit (during bubble bursting). For example, during the dotcom boom, some futuristic predictions were driven by the prospects of the introduction of 3G mobile phones, adoption of smart cards, internet banking and data mining, to name a few: bank branches will disappear, 3G mobile phones will replace home computers, brands will die, prices will fall, and middlemen will be disintermediated (Coltman *et al.*, 2001).

We view uncertainty and newness of an underlying asset as two sides of the same coin. For an asset, uncertainty could arise from many sources: technical uncertainty (especially for high-tech products), market uncertainty (for mass market items), and goal ambiguity (Turcan,

2011). For some cutting edge products, such as a new genetic biotech therapy, both the availability of the asset to the market (will the genetics research and drug tests be successful?) as well as its value (how effective and unique will the drug be, and how big a market can be expected?) are unknown. Yet, communications – typically in rosy and optimistic terms – are provided to the market by the innovators and lead investors (Rutherford *et al.*, 2009). As a result, an overall *sentiment* of the environmental context about the future is created within which the asset is embedded – a state that can be termed as 'hype' (Turcan, 2011).

Assets with bubble potential also have a temporal dimension, *velocity over time*. That is, with elapsed time, a history about the asset is being formed, making stakeholders involved more knowledgeable about the asset, and in the end allowing them to make more accurate predictions about asset potential. In other words, with elapsed time and with growing experience and knowledge, the asset transitions from an uncertain state (unknown probabilities) to a risky state (known probabilities of outcomes). With such transition, it becomes possible to differentiate between hype (a crafted and slanted projection – a mythical one, if you will – of probability of success) and reality (a projection where probabilities of outcomes are calculable).

In addition to the temporal dimension, we also introduce the *enviro-contextual dimension*. That is, regardless of the type of asset that is to be made available, valued, and communicated about, in the process of bubble formation a physical exchange usually does not take place. The tulips, for example, were in the ground while they were being traded in the

pubs of Amsterdam. We term this enviro-contextual dimension as *negotiated space*. In contrast to traditional (physical, palpable) marketplace exchange, in the negotiated space the parties arbitrate the value of an asset that is not readily available for physical inspection or exchange. Rather than speaking about a marketing mix, in the negotiated space there is a negotiated mix – product and place may have to be imagined, but elements of promotion (often hyped) and price (also hyped) are vividly present.

Finally, sentiments about an asset's value – current and anticipated – are linked strongly to people's beliefs about the performance of the asset. People rely on *sentiment-guiding theories*. Uncertainty, for example, diminishes with elapsed time – and eventually transforms into measurable risk. Sentiments, on the other hand, are temporally sticky. Once a sentiment is formed, it is very hard to challenge it and eventually to change it. What people tend to change instead are the theories they use to justify their sentiments. We call these *sentiment-guiding theories*. A sentiment often remains temporally invariant and sticky because a majority in the stakeholder network is willing to change the sentiment-guiding *theory* rather than the sentiment itself – and this helps in coping with the perceived uncertainty. With sticky sentiments, 'theories' become convenient and expendable and changeable: it is psychologically easy (less taxing) to change the guiding theory rather than to drop or reverse the sentiment.

In the hype processes that lead to bubble formation, mid-level (or meso level) signals have a stronger effect on sentiments formation than macro level signals. For example, biotech investors pay less attention to the growth outlook of a nation issued by the European Union but

pay close attention to the growth prospects of the biotech sector from a reputable consulting or investment advisory firm. Overall sentiment – the sentiment of the multitude – arises from interaction among individuals and the changes in behavior which they induce in one another (Ormerod, 1998). In other words, positive feedback reinforces positive behavior, whereas negative feedback attenuates behavior – and these processes play out at an accelerated pace in the era of the Internet.

Four types of the hype-related states may occur: (1) delusional optimism, (2) over-optimism, (3) pessimism, and (4) realism talk (Turcan, 2011). Stakeholders are delusionally optimistic about an asset when sentiments about the future – in the environmental context within which the asset is embedded – are wildly positive. Reinforcing positive signals could come from meso as well as macro levels. Such delusional states typically do not last long. Stakeholders can be said to turn overoptimistic about an asset when they ignore negative signals emanating from the macro environment, and base their sentiments on the meso level signals which remain positive. When both macro and meso level signals turn negative, then sentiments usually sink – often in an extreme and precipitate manner. The sentimental milieu that emerges is that of pervasive skepticism or pessimism. Finally, realism talk propagates in a social network when the sentiments about the future from meso level are negative but signals from macro level are positive. The housing bubble (the bubble in residential real estate property prices) leading up to 2008 exhibited parts of such a cycle. Sentiments about real estate prices went from delusional optimism, to over-optimism, and entered a profound skepticism-

pessimism phase – devoid of all hope – by early 2011. The likely next phase may entail moving into realism talk.

The Typology of Bubbles

Having pulled together the three core asset-linked dimensions – perceived asset availability, perceived asset value, and perceived asset communication; and the four boundary meta-dimensions (see Figure 1) – we propose a typology of bubbles. Table 2 depicts the basic typology and emerged bubble types; and Tables 3 and 4 profile the six bubble types in terms of the meta-dimensions (Table 3) and in terms of the asset-linked dimensions (Table 4).

Table 2: The Typology of Bubbles

Bubble Types	Examples	Comments	Social Impacts
Transient or Playful Bubble	Massive failure of Disney sci-fi film 'John Carter', 2012	For one particular (usually entertainment) asset, hype far outpaces realism	Individual persons or corporations may suffer, but such bubbles are socially harmless
Inflating Bubble	Social media stock valuations 2012	Asset valuations are rising, but not too fast	Major problems can be avoided if asset values are carefully monitored
Deflating Bubble	Gold prices – 1980 to 1983	Asset valuations are falling, but at precipitate speeds	Major problems can be avoided if asset values are carefully monitored
Contagious Bubble	Dotcom E-commerce valuations 1999	Asset valuations are rising at hyper speed – everyone wants to be "in on the action"	No visible locus of control – bubble has its own logic and momentum
Irrational Bubble	USA Housing valuations 2003-2007	Asset valuations are rising in inexplicable ways (Schiller 2006)	Dangerous and unsustainable rise in valuations – often engineered by few
Punctured Bubble	Dotcom E-commerce valuations in mid-2000	Asset valuations drop at precipitate speed – asset holders are paralyzed, then seek a quick exit	Crisis state – huge loss of asset values and wealth, major bankruptcies

Table 3: Boundary Meta-Dimensions by Bubble Types

	Uncertainty	Velocity over time	Negotiated space	Sentiment-guiding theories
Transient or Playful Bubble	Low Uncertainty	High Velocity	Virtual Asset	Over-optimism, sometimes Delusional Optimism
Inflating Bubble	Low Uncertainty	Low and Decelerating Velocity	Virtual Asset	Over-optimism
Deflating Bubble	Low Uncertainty	Low but Accelerating Velocity	Virtual Asset	Build up of Skepticism
Contagious Bubble	High Uncertainty	High, first Accelerating Velocity; then Decelerating Velocity	Virtual Asset	Delusional Optimism (especially near the peak)
Irrational Bubble	High Uncertainty	Low and Decelerating Velocity	Palpable Asset	Delusional Optimism (especially near the peak)
Punctured Bubble	High Uncertainty	High and Accelerating Velocity	Virtual Asset	Profound Pessimism

Table 4: Asset-linked Dimensions by Bubble Types

	Perceived Asset Availability	Perceived Asset Value	Perceived Asset Communication
Transient or Playful Bubble	No (once the asset is available, it is valued very quickly and realistically)	Wagerable (actual or mock bets are placed)	Discussable, Reviewable, Hypeable
Inflating Bubble	Yes	Tradable and wagerable (Bets tend to be well-calculated)	Discussable, Reviewable, Hypeable
Deflating Bubble	Yes	Tradable and wagerable (Bets tend to be well-calculated)	Discussable, Reviewable
Contagious Bubble	Usually No (Trading is based on asset's promise)	Tradable and wagerable (rising loss of logic)	Discussable and ultra-Hypeable
Irrational Bubble	Yes	Tradable and wagerable (rising loss of logic)	Reviewable, Hypeable
Punctured Bubble	Yes (for palpable assets) or No (for virtual, promised assets)	No	Reviewable (but only after the shock phase)

Compared to the other five bubble types, transient or playful bubbles are the least socially harmful. Particular individual investors or corporate executives may be hurt by the bursting of transient bubbles, but the social effects are minimal. Examples of such transient or playful bubbles occur occasionally in the movie making industry, specifically in the period prior to the movie release and immediately after. Though characterized by low uncertainty, the hype about certain movies as a virtual asset that is not yet released far outpaces realism, leading sometimes to over-optimism or delusional optimism. The 2012 Disney sci-fi film *John Carter* is a case in point: it cost over $300 million to make and market and earned only a disappointing $31 million on the first weekend of release (Kay, 2012). The value put on such virtual asset depends chiefly on the previous experience the stakeholders have had with similar assets and on the extent and degree of its discussability and reviewability. Transient or playful bubbles move away from the uncertain state relatively fast, either reinforcing or dissipating the hype around the asset.

Inflating bubbles are characterized by low uncertainty whereby the asset valuations are rising at a slow pace driven by an over-optimistic sentiment about the asset potential. The example of such bubbles is the 2011-2012 emergence of the social media bubble. Low uncertainty around an asset such as social media is driven by its availability in a vividly visible form, a form that facilitates understanding and actual experiencing of it. In the context of inflating bubbles, the velocity is low and decelerating. The asset value moves towards more uncertain settings, driven by the over-optimistic sentiments about the potential of the asset combined with the asset tradability and wagerability as well as asset discussability and

reviewability. Given the low velocity of the hype that is built around the asset, major problems associated with such bubble could be avoided, provided the values put on the asset are carefully monitored.

Deflating bubbles are rarer – sometimes found in commodity markets. Gold prices deflated relatively fast (but not in a precipitate manner) during 1980-83 period, and continued to decline mildly or stagnate for the rest of the 20th century. Asset values decrease – at least at the deflation stage – at an accelerating velocity. We characterize the deflating bubble with the following conditions: (1) low uncertainty decision-making setting, (2) driven by an overall skepticism about an asset potential, and (3) the asset is available, tradable, wagerable, discussable and reviewable. The low velocity associated with a deflating bubble, and thus the gradual rise in skepticism, may allow actors and policymakers to avoid major problems or potential negative effects by carefully monitoring the values of the assets.

High uncertainty dominates the process of emergence of contagious bubbles that have their own logic and momentum with no visible locus of control. The Dotcom bubble (1999 e-commerce valuations) is an eloquent example of such contagious bubbles. During such bubbles the virtual assets that are tradable and wagerable usually are *not* available for palpable exchange. The valuations of such assets are rising at hyper speeds, being driven by delusional optimism over the promises these assets make. Such bubbles have high, at first accelerating (an epidemiological process – contagion spreading fast) and then a decelerating velocity (every vulnerable entity is infected – the contagion slows down). There is hyper-speed movement

towards uncertain-decision making settings, making it hard for the stakeholders to learn and actually distinguish between hype and reality.

Irrational bubbles resemble contagious bubbles in that they are also driven by high uncertainty, though low and decelerating velocity. Probably the key difference is in the availability of what we call palpability of assets – the assets are available to touch, see, feel – but the values are rising in inexplicable ways (Schiller, 2006). USA housing (residential property) valuations during 2003-2007 exemplify this type of bubble. Irrational bubbles are characterized by dangerous and unsustainable rise in valuations that are often engineered by few stakeholders, eventually leading to delusional optimism displaying the same contagion effects as in contagious bubbles.

Punctured bubbles are characterized by high uncertainty and high, accelerating velocity. The system moves away from uncertain decision-making settings, and towards profound pessimism. An example of such bubbles is the dotcom (e-commerce) valuations in mid-2000. Although the underlying assets may or may not be available for palpable exchange, during such punctured bubbles asset valuations drop at precipitate speed, and asset holders are paralyzed at first (like in a traumatic fire) and then start looking for a quick exit. Effectively the system is in a crisis state whereby huge losses of asset values and wealth are encountered, and major bankruptcies are witnessed.

Concluding Comments

In this viewpoint paper we aimed at defining the typology of bubbles and its dimensions. We approached this task inductively by drawing from empirical realm but also employing the emergent theoretical frames from ongoing work on bubbles. We have identified five types of bubbles: transient or playful, inflating, deflating, contagious, irrational, and punctured bubbles. For each type we have identified four meta-dimensions that delineate the boundaries of the typology: uncertainty, velocity over time, negotiated space, and sentiment-guiding theory. Furthermore, we have identified three dimensions that are linked to the assets themselves that underlie the bubble phenomena: perceived asset availability, perceived asset value, and perceived asset communication.

We have discussed each type along the above mentioned meta- and asset-linked dimensions by comparing and contrasting bubbles in the fields of entertainment, technology, commodities, housing, and stock markets. In this process we have highlighted major challenges and issues that characterize each bubble type, including those that may affect bubble manageability.

A promising area for research is to contrast and compare the relationship between sentiment-guiding theories and sentiments within and across each bubble type (within the scope of boundary meta- and asset-linked dimensions). This may lead, with a sustained stream of research efforts, to the development of a robust behavioral grand theory of bubbles.

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