



# BUBBLES & CONTAGION

*in Financial Markets*

VOLUME 1: AN INTEGRATIVE VIEW

EVA R. PORRAS

# Bubbles and Contagion in Financial Markets, Volume 1



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## An Integrative View

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*To Luis Javier*



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# Preface

Between June and September 2015 the Shanghai Stock Exchange Composite Index lost around 40 percent of its value, and China, the world's second-largest economy after the USA, experienced a stock market crash. Earlier, while the bubble – the inflationary process – was still growing, the Chinese government had tried to take measures to moderate the bubble's progress; nonetheless, these measures failed. Later, when the bubble was about to burst, the government again attempted to control the situation by slowing the pace of its collapse. Once more, however, these desperate actions failed to achieve their objective. Fearing a slowdown of its economic growth China devalued its currency and then cut interest rates repeatedly, but to no avail. At the time of writing this book, the Chinese government is looking into the activities of individuals who expressed negative sentiments about the stock market, hence supposedly contributing to its demise – yet another effort to “set the record straight.” China's continuous, and ultimately futile, struggle to contain the development and collapse of a bubble demonstrates the difficulty of dealing with these types of occurrences.

In retrospect, the bubble was in the making for years. However, it is difficult to detect clear cues as to when this process began gaining shape and speed. Given that the Chinese crash was preceded by unprecedented growth, the implications of this crisis were not immediately obvious from the start. But now it is becoming clear that this event has serious implications in terms of China's real output of goods, and the current public debate centers on whether a recession will strike this nation. Should this turn out to be the case, the world will have to brace itself for yet another global economic upheaval.

So what determines the price of a commodity, whether real estate or equity shares? And why is it that often these prices seem to develop in a manner totally unrelated to their fundamental economic parameters, defying “logical” reasoning? Well, as we have experienced time and again in the last decade, the powerful forces fueling these events are the so-called bubbles: inflationary processes that burst, sending shockwaves throughout different markets and unsettling financial stability.

Thanks to the recent subprime mortgage crisis in the USA and the ensuing worldwide economic crisis, everyone is now familiar with the occurrence of bubbles. However, what do you really know about them? Are you aware that there are many kinds of bubbles and that some can actually become contagious? Do you know there are specific conditions where bubbles form and that there are methods to detect the growth of a bubble, even at a very early stage?

Bubbles are fascinating phenomena. In my university days economists often used this term to refer to significant inflationary runs in specific assets which ended abruptly and for which they had no precise explanation. However, in 1997 during the Asian crisis this colorful, exciting, and emotionally charged word took a more definite shape for me. And “contagion” – the spread of market changes or disturbances from one regional market to others – went along with it, as the crisis which began in Thailand soon spread to other countries near and far.

At the outset of the Asian crisis, my attention was initially focused on the specific mechanisms of contagion. However, soon thereafter I dedicated an equal amount of attention to the bubble formation process. While studying these matters, I learnt a lot from books such as Malkiel’s *A Random Walk Down Wall Street*<sup>1</sup> and Galbraith’s *A Short History of Financial Euphoria*.<sup>2</sup> However, it was Keynes’s *General Theory*<sup>3</sup> that I remember as being groundbreaking for me, especially the chapters dedicated to the “workings” of the capital markets as well as investor psychology and behavior.

Eight decades have passed since Keynes first wrote his masterpiece, and during this time a sequence of bubble episodes has taken place in various markets around the world, most recently in China as already mentioned. However, even though the amount of research and analysis dedicated to these subjects is flabbergasting, still no uniform economic theory exists to explain stock market bubbles, or contagion for that matter. Furthermore, the key questions posed today are the same Keynes used to introduce his study: How and why do price bubbles form and burst? And what are the necessary and sufficient conditions for these events to take place?

This two-volume work approaches these questions by providing a well-rounded synthesis of the different aspects of bubbles. In addition, this outlook is extended to contagion and the infection mechanisms that work to extend these crises beyond their initial epicenters.

These pages explore the existing main models and their conclusions: issues such as share price development in the presence of symmetric and asymmetric information in the context of rational expectations, fundamental value, and herding; key aspects related to behavioral finance; and the empirical findings pertinent to decision-making or behavioral patterns that trigger market price and volume changes.

The results of empirical economics, carried out through simulations, add valuable insights. But no less relevant is the speculative behavior of not entirely rational noise traders and chartists, and the feedback and learning mechanisms that surge within the markets and which help transmit crises. In addition to exposing the most common trading techniques followed by speculators and their impacts on the bubble formation processes, typical biases such as overconfidence, accessibility, and other psychological mechanisms and traits which influence decision-making in trading are also considered.

A rational bubble occurs when the differences between the market price of an asset and the fundamental value of that asset are justified on the bases of the rational expectations of the market players. However, in the event of speculative bubbles, the market price and the fundamental value differ to a point that no dividend income that could be realistically expected can support the current market price of an asset. Consequently, some chapters are dedicated to the issues of valuation and value growth, including related aspects of technical trading and fundamental valuation principles.

Given that the sufficient and necessary conditions for bubbles to form and contagion to occur escape a narrow exploration of financial markets, we look beyond into macroeconomics, monetary policy, risk aggregation, psychology, incentive structures, and many more subjects which are in part co-responsible for these events.

Thus, in these volumes the concepts, intuition, theory, models, mathematical and statistical background, and alternative thoughts related to bubbles and contagion in financial markets are explored. The aim is to give readers the conceptual and information background to provide them with a command of the theory and practice in all matters related to the subjects addressed within these pages. The key objective is to ensure a comprehensive understanding of the aspects that can potentially create the conditions for the formation of bubbles, the mechanisms that make a bubble burst, and the inner workings of the aftermath of such an event: the contagion of macroeconomic processes and the ensuing recession.

Within this volume, Chapter 1 summarizes the events experienced as a result of the recent housing crisis and those of other historically relevant bubbles, presenting well-defined scenarios where patterns begin to emerge. In addition, formal definitions for these processes are proposed and the “life cycle of a bubble” is examined; appropriate policy responses to the challenges presented at different stages of this cycle are explained.

Chapter 2 analyzes the key macro players in the bubble and contagion formation processes. Issues such as monetary and fiscal policy, credit and global cash flows resulting in excess liquidity, and the connectivity system and risk sharing of the modern financial world, together with systemic risk and transmission mechanisms, and feedback effects between financial sector risk and sovereign risk and the real economy, are some of the aspects developed in this chapter.

Chapter 3 investigates the idiosyncrasies of the markets and investors’ psychology which are vital to the bubble and contagion formation processes. The relevance of asymmetric information between the various parties to a negotiation is highlighted. However, other mechanisms of primary importance, such as self-fulfilling expectations and reflexivity, and the role of perverse incentive structures in the reward systems of top management and traders, are also scrutinized and debated along with a number of biases in the thought processes of market players. Additional market failures as well as policies and regulation are also analyzed and thoroughly discussed.

In a “rational expectations” framework, the price of a financial asset contains a bubble when the expected rents derived from holding the asset cannot be “sensibly” expected to justify its market price. Hence, valuation techniques as well as the concept of economic value creation are useful in assessing the bubble component of prices. Chapter 4 addresses these matters and helps clarify the issue of value while establishing a framework for the variables that can be affected by the bubble.

The investment horizon of market participants differs and with it the range of tools and strategies they use to trade. These disparate approaches impact prices and contribute to the creation of bubbles and the contagion mechanisms. Chapter 4 explores the scenario from the perspective of long-term investors, whereas Chapter 5 investigates the approach taken by short-term investors and speculators, looking into technical trading and chartism in financial markets. Here the basics of technical analysis and the impact that some of these techniques and strategies, such as positive feedback trading, have on prices are exposed.

Chapter 6 is dedicated to contagion and views this phenomenon from two different angles. The first meaning refers to the transmission of crises across borders or markets and the channels through which this occurs. The second is the transmission of opinion, information, and behavior among market participants. First, the chapter looks into contagion within the context of prior financial crises, analyzing the channels of propagation. Second, it examines “social learning”, exposing how informational cascades and herding occur within this context giving rise to bubbles and accelerating their implosion. These pages also introduce various theories and models of contagion, herding, and cascades, as well as noise trading and behavioral models. Finally, some of the most relevant studies within the contagion literature are reviewed to uncover numerous meaningful details relevant to the understanding of these multifaceted and complex issues.

Chapter 7 is dedicated to exploring bubbles using frames such as rationality, information, value, and terminal life of the bubbled asset to structure their analysis. The chapter starts with an overview of rational and near-rational growing bubble models like “sunspots,” and then discusses others such as “fads” and “information bubbles.” A partial history of the classical literature on bubbles is also presented along with the findings of bubble modelling experiments and the related accounting literature. The last section of this chapter summarizes the findings with respect to the most frequently asked questions about bubbles: How are bubbles started? Why do bubbles implode? What are the consequences? Should the government intervene?

Given the breadth of subjects discussed, it is my hope that anyone interested in learning more about bubbles and contagion will find this volume enlightening, including undergraduate, postgraduate, and PhD students in business administration, as well as those specializing in economics, finance,

and accounting. Students in areas as diverse as mathematics, physics, statistics, and computer engineering may also find it of value. It goes without saying that I hope to attract the interest of the financial industry itself: the practitioners, analysts, and researchers with an academic interest in investment banking, hedge funds, and risk management institutions and organizations.

Achieving a better understanding of the formation of bubbles and the impact of contagion will no doubt determine the stability of future economies. Perhaps these two volumes will help provide a rational approach to mastering these seemingly irrational phenomena.

Eva R. Porras

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This book is the product of the efforts and experience of many people who in different ways have contributed toward its development.

First, I would like to thank all the professors who devoted their energy and time to my education. It was their persistence and dedication which instilled in me the love for the subject of finance and the insatiable curiosity I have for all matters related to bubble events and contagion in financial markets.

Second, I thank my parents whose motto was “the more you know, the more you will relish life.” It was their guidance in intellectual matters which has endowed my existence with endless sources of inspiration, gratitude, and joy.

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I also wish to give special thanks to Noelia Camilla, my assistant, and particularly to Peter Baker and Josephine Taylor of Palgrave Macmillan. They already know the many reasons for my gratefulness. Of course, any errors remain my sole responsibility.

# List of Acronyms

ABS	Asset-backed security
AIG	American International Group
Alt-A	Alternative A-paper
ARM	Adjustable rate mortgages
CDO	Collateralized debt obligations
CDS	Credit default swaps
CED	Committee for Economic Development
CEO	Chief executive officer
CF	Cash flows
CFTC	US Commodity Futures Trading Commission
CLO	Collateralized loan obligations
DCF	Discounted cash flow
DJIA	Dow Jones Industrial Average
DLRE	Dynamic linear rational expectations
EAT	Earnings after tax
EBIT	Earnings before interest and taxes
EBT	Earnings before tax
ECF	Equity cash flows
EMH	Efficient market hypothesis
EMT	Efficient market theory
EPS	Earnings per share
EU	European Union
EVA	Economic value added
EWP	Elliott Wave Principle
FCF	Free cash flows
FCIC	Financial Crisis Inquiry Commission
Fed	Federal Reserve System (USA)
FSA	Financial Services Authority
FX	Foreign exchange
GDP	Gross domestic product
GE	General Electric
HAM	Heterogeneous agent model
IMF	International Monetary Fund
IPO	Initial public offering
IPT	Informational price theory
LU	Lucent Technologies
MBS	Mortgage-backed securities

Nasdaq	National Association of Securities Dealers Automated Quotations
NPV	Net present value
NYSE	New York Stock Exchange
OBV	On-balance volume
P/E	Price-to-earnings ratio
P&F	Point and figure chart
PV	Present value
RE	Rational expectations
REE	Rational expectations equilibrium
ROE	Return on equity
RSI	Relative strength index
RV	Residual value
S&P	Standard & Poor's
S&P500	Standard & Poor's 500 Index
SEC	Securities and Exchange Commission
VNM	Von Neumann–Morgenstern utility theorem

# 1

## Introduction to Bubbles and Contagion

### 1.1. Current situation

The harm caused by the bursting of financial asset bubbles can have a devastating impact on investors' wealth and the welfare of society. For instance, at the end of the 1990s, the rise and fall of Internet stock prices during the dot-com bubble destroyed about \$8 trillion worth of shareholders' wealth.<sup>1</sup> More recently, the bursting of the housing bubble created a global financial crisis that affected nations around the world, its impacts likely to be felt for generations to come with many people and communities irreparably harmed.

Given its size, it is difficult to get a comprehensive idea of the housing bubble wreck. Nonetheless, we can get partial information from reports such as "The Financial Crisis Response in Charts"<sup>2</sup> which highlights that \$19.2 trillion in household wealth was lost between 2007 and 2009 during the financial crisis, peak-to-trough. For its part, the US Financial Crisis Inquiry Commission (FCIC) reported that more than 26 million Americans lost their jobs, and about 8.5 million either lost their homes to foreclosure, having slipped into the foreclosure process, or fell badly behind on their mortgage payments as of 2011.<sup>3</sup> Thus, 1 in 20 families lost their homes and livelihood in the USA, an impact usually associated with major natural disasters or war.

The data above refers to the USA alone, but the burst of the housing bubble triggered a worldwide crisis that many countries are still trying to overcome. In Spain, for example, as of the first quarter of 2013, unemployment reached six million, close to one-third of the total working population and double the average of the European Union (EU). As of August 2015, joblessness afflicts approximately over four million, representing 22.37 percent of the workforce.<sup>4</sup> These figures can be contrasted with those of 2006–2007, when the unemployment rate in Spain was at 8 percent.<sup>5</sup>

Moreover, a large number of European countries have seen their sovereign debt cost skyrocket and their economies slump. This ongoing eurozone