Financial Bubbles, Real Estate Bubbles, Derivative Bubbles, and the Financial and Economic Crisis

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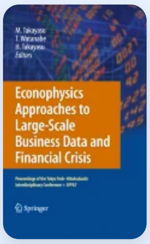

Econophysics Approaches to Large-Scale Business Data and Financial Crisis

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Abstract

The financial crisis of 2008, which started with an initially well-defined epicenter focused on mortgage backed securities (MBS), has been cascading into a global economic recession, whose increasing severity and uncertain duration has led and is continuing to lead to massive losses and damage for billions of people. Heavy central bank interventions and government spending programs have been launched worldwide and especially in the USA and Europe, with the hope to unfreeze credit and bolster consumption. Here, we present evidence and articulate a general framework that allows one to diagnose the fundamental cause

of the unfolding financial and economic crisis: the accumulation of several bubbles and their interplay and mutual reinforcement have led to an illusion of a "perpetual money machine" allowing financial institutions to extract wealth from an unsustainable artificial process. Taking stock of this diagnostic, we conclude that many of the interventions to address the so-called liquidity crisis and to encourage more consumption are ill-advised and even dangerous, given that precautionary reserves were not accumulated in the "good times" but that huge liabilities were. The most "interesting" present times constitute unique opportunities but also great challenges, for which we offer a few recommendations.

Notes

1. Currency in circulation + checkable deposits (checking deposits, officially called demand deposits, and other deposits that work like checking deposits) + traveler's checks, that is, all assets that strictly conform to the definition of money and can be used to pay for a good or service or to repay debt.

2. In this respect, note the information from Reuters, Santiago, March 27, 2009, reporting that Chile's President Michelle Bachelet unwittingly embarrassed British Prime Minister Gordon Brown when she said Chile had put aside money during good economic times to help it through the downturn. "I would say that because of our decision during …the good times in copper prices, we decided to save some of the money for the bad times and I would say that policy today is producing good results."

3. The Swiss Economic Circle (Wirtschaftsring-Genossenschaft or WIR) is an independent complementary currency system in Switzerland that serves small and medium-sized businesses. It was founded in 1934 by businessmen Werner Zimmermann and Paul Enz as a result of currency shortages after the stock market crash of 1929 and the great recession. “Its purpose is to encourage participating members to put their buying power at each other’s disposal and keep it circulating within their ranks, thereby providing members with additional sales volume.” Cited from Wikipedia.

4. See http://en.wikipedia.org/wiki/Financialization.

5. Governments use so-called hedonic regression in computing their CPI to take quality changes into account.

References

1. Gibbs L (trans) (2002) Aesop’s fables. Oxford University Press, Oxford

Google Scholar

2. Andersen JV, Sornette D (2004) Fearless versus fearful speculative financial bubbles. Physica A 337(3–4):565–585

Article MathSciNet ADS Google Scholar

3. Wikipedia (n.d.) Basel II accord. http://en.wikipedia.org/wiki/Basel_II

4. Berns G, Capra CM, Moore S, Noussair C (2009) Neural mechanisms of social influence in consumer decisions. Working paper

Google Scholar

5. Blanchard OJ (2008) The crisis: basic mechanisms, and appropriate policies. http://ssrn.com/abstract=1324280

6. Borgatti SP, Mehra A, Brass DJ, Labianca G (2009) Network analysis in the social sciences. Science 323:892–895

Article ADS Google Scholar

7. Boss M, Elsinger H, Summer M, Thurner S (2003) An empirical analysis of the network structure of the Austrian interbank market. Fin Stab Rep 7:77–87

Google Scholar

8. Brock WA, Hommes CH, Wagener FOO (2008) More hedging instruments may destabilize markets. CeNDEF Working paper 08-04, University of Amsterdam

Google Scholar

9. Broekstra G, Sornette D, Zhou W-X (2005) Bubble, critical zone and the crash of Royal Ahold. Physica A 346:529–560

Article ADS Google Scholar

10. Camerer CF (2003) Behavioral game theory: experiments in strategic interaction. Princeton University Press, Princeton

MATH Google Scholar

11. Campbell JY, Cocco JF (2005) How do house prices affect consumption? Evidence from micro data. NBER Working Paper No. 11534, August 2005

Google Scholar

12. Cannata F, Quagliariello M (2009) The role of Basel II in the subprime financial crisis: guilty or not guilty? CAREFIN Research Paper No. 3/09.

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1330417

13. Case KE, Shiller RJ (2003) Is there a bubble in the housing market. Brookings Pap Econ Act 2:299–362

Article Google Scholar

14. Corcos A, Eckmann J-P, Malaspinas A, Malevergne Y, Sornette D (2002) Imitation and contrarian behavior: hyperbolic bubbles, crashes and chaos. Quant Finan 2:264–281

Article MathSciNet Google Scholar

15. Damasio A (1994) Descartes' error. Putman Adult, New York

Google Scholar

16. Demyanyk YS (2009) Quick exits of subprime mortgages. Federal Reserve Bank of St. Louis Rev 91(2):79–93

Google Scholar

17. Demyanyk Y, van Hemert O (2009) Understanding the subprime mortgage crisis. Rev Fin Stud 1305 (forthcoming). http://ssrn.com/abstract=1020396

18. Doms M, Furlong F, Krainer J (2007) Subprime mortgage delinquency rates. Working Paper Series 2007-33, Federal Reserve Bank of San Francisco. http://www.frbsf.org/publications/economics/papers/2007/wp07-33bk.pdf

19. Dunbar RIM (1998) The social brain hypothesis. Evol Anthropol 6:178–190

Article Google Scholar

20. Farmer JD (2002) Market force, ecology and evolution. Ind Corp Change

11(5):895–953

Article Google Scholar

21. Fogedby HC (2003) Damped finite-time-singularity driven by noise. Phys Rev E 68:051105

Article MathSciNet ADS Google Scholar

22. Fogedby HC, Poukaradzez V (2002) Power laws and stretched exponentials in a noisy finite-time-singularity model. Phys Rev E 66:021103

Article ADS Google Scholar

23. Freixas X, Parigi BM, Rochet J-C (2000) Systemic risk, interbank relations, and liquidity provision by the central bank. J Money Credit Banking 32(3):611–638

Article Google Scholar

24. Garber PM (2000) Famous first bubbles: the fundamentals of early manias. MIT Press, Cambridge, MA

Google Scholar

25. Gintis H, Bowles S, Boyd R, Fehr E (eds) (2005) Moral sentiments and material interests. MIT Press, Cambridge, MA

Google Scholar

26. Gluzman S, Sornette D (2002) Classification of possible finite-time singularities by functional renormalization. Phys Rev E 66:016134

Article MathSciNet ADS Google Scholar

27. Greenspan A (1997) Federal Reserve's semiannual monetary policy report, before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, February 26, 1997

Google Scholar

28. Greenspan A, Kennedy J (2008) Sources and uses of equity extracted from homes. Oxford Rev Econ Policy 24(1):120–144

Article Google Scholar

29. Helbing D (ed) (2008) Managing complexity: insights, concepts, applications. Understanding complex systems. Springer, Heidelberg

Google Scholar

30. Ide K, Sornette D (2002) Oscillatory finite-time singularities in finance, population and rupture. Physica A 307(1–2):63–106

Article MathSciNet ADS MATH Google Scholar

31. Johansen A (2003) Characterization of large price variations in financial markets. Physica A 324(1–2):157–166

Article MathSciNet ADS MATH Google Scholar

32. Johansen A, Ledoit O, Sornette D (2000) Crashes as critical points. Int J Theor Appl Fin 3(2):219–255

Article MATH Google Scholar

33. Johansen A, Sornette D (1998) Stock market crashes are outliers. Eur Phys J B 1:141–143

Article ADS Google Scholar

34. Johansen A, Sornette D (2000) The Nasdaq crash of April 2000: yet another example of log-periodicity in a speculative bubble ending in a crash. Eur Phys J B 17:319–328

Article ADS Google Scholar

35. Johansen A, Sornette D (2001) Finite-time singularity in the dynamics of the world population and economic indices. Physica A 294(3–4):465–502

Article ADS MATH Google Scholar

36. Johansen A, Sornette D (2001) Large stock market price drawdowns are outliers. J Risk 4(2):69–110

Google Scholar

37. Johansen A, Sornette D (2006) Shocks, crashes and bubbles in financial markets. Brussels Econ Rev (Cahiers economiques de Bruxelles) 49(3/4). Special issue on nonlinear analysis. http://papers.ssrn.com/abstract=344980

38. Johansen A, Sornette D, Ledoit O (1999) Predicting financial crashes using discrete scale invariance. J Risk 1(4):5–32

Google Scholar

39. Kaizoji T, Sornette D (2010) Market bubbles and crashes. In: Encyclopedia of quantitative finance. Wiley, New York (in press). http://www.wiley.com//legacy/wileychi/eqf/ (long version of the paper at http://arXiv.org/abs/0812.2449)

40. Keys BJ, Mukherjee T, Seru A, Vig V (2008) Did securitization lead to lax screening? Evidence from subprime loans. Athens Meetings Paper, European Finance Association, December 2008. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1093137

41. Kindleberger CP (2005) Manias, panics, and crashes: a history of financial crises, 5th edn. Wiley, New York

Book Google Scholar

42. Krugman P (2008) The return of depression economics. W.W. Norton, New York

Google Scholar

43. Krugman PR, Dominquez KM, Rogoff K (1998) It's baaack: Japan's slump and the return of the liquidity trap. Brookings Pap Econ Act 1998(2):137–205

Article Google Scholar

44. Laherrère J, Sornette D (1998) Stretched exponential distributions in nature and economy: "fat tails" with characteristic scales. Eur Phys J B 2:525–539

Article ADS Google Scholar

45. Lietaer B, Ulanowicz R, Goerner S (2008) White paper on the options for managing systemic bank crises (November 2008). http://www.lietaer.com

46. Lux T, Sornette D (2002) On rational bubbles and fat tails. J Money Credit Banking 34(3): 589–610

Article Google Scholar

47. Malkiel BG (2003) A random walk down Wall Street, 8th edn. W.W. Norton, New York

Google Scholar

48. Marsili M (2008) Eroding market stability by proliferation of financial

instruments. Working paper (November 21, 2008). Available at SSRN: http://ssrn.com/abstract=1305174

49. Marsili M, Raffaelli G, Ponsot B (2008) Dynamic instability in generic model of multi-assets markets. Working paper (November 21, 2008). Available at SSRN: http://ssrn.com/abstract=1305205

50. Mauboussin MJ, Hiler R (1999) Rational exuberance? Equity research report of Credit Suisse First Boston, January 26, 1999

Google Scholar

51. Philippon T, Reshef A (2009) Wages and human capital in the U.S. financial industry: 1909–2006. Working Paper 14644, National Bureau of Economic Research. http://www.nber.org/papers/w14644

52. Poser NS (2009) Why the SEC failed: regulators against regulation. Brooklyn J Corp Fin Comm Law 3(Spring). Brooklyn Law School, Legal Studies Paper No. 132. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1348612

53. Roehner BM, Sornette D (2000) “Thermometers” of speculative frenzy. Eur Phys J B 16: 729–739

Article ADS Google Scholar

54. Rowe N (2009) No, Greenspan was not right. http://macromarketmusings.blogspot.com/2009/02/no-greenspan-was-not-right.html

55. Serrano MA, Boguna M, Vespignani A (2007) Patterns of dominant flows in the world trade web. J Econ Interact Coord 2(2):111–124

Article Google Scholar

56. Sheffrin H (2005) A behavioral approach to asset pricing. Academic, New York

Google Scholar

57. Shiller RJ (2000) Irrational exuberance. Princeton University Press, New York

Google Scholar

58. Sornette D (1998) Discrete scale invariance and complex dimensions. Phys Rep 297(5): 239–270

Article MathSciNet ADS Google Scholar

59. Sornette D (2003) Why stock markets crash (critical events in complex financial systems). Princeton University Press, New York

MATH Google Scholar

60. Sornette D (2008) Nurturing breakthroughs: lessons from complexity theory. J Econ Interact Coord 3:165–181

Article Google Scholar

61. Sornette D, Andersen JV (2002) A nonlinear super-exponential rational model of speculative financial bubbles. Int J Mod Phys C 13(2):171–188

Article ADS MATH Google Scholar

62. Sornette D, Johansen A (2001) Significance of log-periodic precursors to financial crashes. Quant Fin 1(4):452–471

Article Google Scholar

63. Sornette D, Takayasu H, Zhou W-X (2003) Finite-time singularity signature of hyperinflation. Physica A 325:492–506

Article MathSciNet ADS MATH Google Scholar

64. Sornette D, Woodard R, Zhou W-X (2009) The 2006–2008 oil bubble and beyond. Physica A 388:1571–1576

Article ADS Google Scholar

65. Sornette D, Zhou W-X (2004) Evidence of fueling of the 2000 new economy bubble by foreign capital inflow: implications for the future of the US economy and its stock market. Physica A 332:412–440

Article ADS Google Scholar

66. Stodder J (2000) Reciprocal exchange networks: implications for macroeconomic stability. Paper presented at the International Electronic and Electrical Engineering (IEEE) Engineering Management Society (EMS), August 2000, Albuquerque, New Mexico

Google Scholar

67. Taylor JB (2009) How government created the financial crisis. Wall Street Journal, February 9, 2009

Google Scholar

68. Taylor JB (2009) Getting off track: how government actions and interventions caused, prolonged, and worsened the financial crisis. Hoover Institution Press, Stanford

Google Scholar

69. Vasiliki S, Veldkamp L (2009) Ratings shopping and asset complexity: a

theory of ratings inflation. NBER working paper 14761.
http://www.nber.org/papers/w14761

70. Zhou W-X, Sornette D (2003) 2000–2003 Real estate bubble in the UK but not in the USA. Physica A 329:249–263

Article ADS MATH Google Scholar

71. Zhou W-X, Sornette D (2004) Causal slaving of the U.S. treasury bond yield antibubble by the stock market antibubble of August 2000. Physica A 337:586–608

Article ADS Google Scholar

72. Zhou W-X, Sornette D (2006) Is there a real-estate bubble in the US? Physica A 361:297–308

Article MathSciNet ADS Google Scholar

73. Zhou W-X, Sornette D (2008) Analysis of the real estate market in Las Vegas: bubble, seasonal patterns, and prediction of the CSW indexes. Physica A 387:243–260

Article ADS Google Scholar

74. Zhou W-X, Sornette D, Hill RA, Dunbar RIM (2005) Discrete hierarchical organization of social group sizes. Proc R Soc London 272:439–444

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