For What It’s Worth: Historical Financial Bubbles and the Boundaries of Economic Rationality

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Abstract: This essay is a historical and epistemological exploration of a traditionally crazy economic event: the financial bubble. Venturing into two different moments in the history of economic thinking, it investigates financial bubbles as epistemic frontiers, where rationality has reached its limits. The first half forays into late twentieth-century economics. Since 1980, an interpretive battle over the ir/rationality of bubbles has made those peculiar events, long beyond the pale of the rational, contested terrain on which the limits of rationality have been fought out. The essay’s second half turns to one historical crisis, the South Sea Bubble. For contemporaries in 1720, the bubble was a different kind of epistemic frontier. As they tried to reckon what South Sea Company stock was worth, investors were confronted not with clearly rational or irrational choices but with a decidedly unruly collection of similarly plausible calculations. The story of 1720 suggests that studying historical confusion might be a profitable enterprise for scholars of the economic and epistemological past.

Are financial bubbles rational? Since 1980, this question has organized much inquiry into the financial past. It is a profoundly strange question. To begin with, for most of the history of financial capitalism it has been taken for granted that bubbles—those frenzied fits of financial boom and bust, when the price of some asset soars and then crashes—were, in a word, crazy. More fundamentally: bubbles are not people. They do not think. How could they be rational? How did they get minds of their own? This essay is a historical exploration of this odd question, in two very different historical settings. The first part examines how, in the second half of the twentieth century, a clash between rising confidence in market efficiency and traditional intuitions about the mindlessness of bubbles made our odd opening question—Are bubbles rational?—a thinkable one. The story of how bubbles became ir/rational things is an intriguing chapter in the tumultuous tale of rationality in the late twentieth century.
The essay’s second part ventures more deeply into this epistemological borderland, by observing people trying to reason through a financial bubble as it happened. The 1720 “South Sea Bubble” did indeed represent an epistemological frontier for eighteenth-century investors, but in a different sense. Faced with many different ways to calculate what the peculiar South Sea Company stock was worth, contemporaries found themselves with no guide to distinguish where the reasonable ended and the unreasonable began. This exploration into eighteenth-century financial confusion renews Simon Schaffer’s call for a history of plausibility. My goal is not to offer yet another historical critique of the conceptions of rationality propounded by some (certainly not all) twentieth-century economists. Rather, what follows is an excursion in historical epistemology, an adventure into spaces where the concept of rationality has somehow met its limits.

As long as there have been financial bubbles, they have been seen as stark testaments to the limits of human reason. In the wake of Britain’s first major mania, the 1720 South Sea Bubble, the political critics John Trenchard and Thomas Gordon commented that the bubble “shews the little power that reason and truth have over the passions of men.” Dutch publishers memorialized that year in a remarkable compilation of cartoons, broadsides, and ballads entitled Het Groote Tafereel der Dwaasheid—“the great mirror of folly.” The idea was extended in Charles Mackay’s Memoirs of Extraordinary Popular Delusions and the Madness of Crowds (1841), in which financial bubbles were cited as the first archetype of irrationality, before others like the alchemist’s search for the philosopher’s stone. The view that bubbles were baldly irrational prevailed into the second half of the twentieth century. John Kenneth Galbraith located the source of the “Great Crash” of 1929 in the “seminal lunacy which has always seized people who are seized in turn with the notion that they can become very rich.” The apotheosis of this traditional view came in Charles Kindleberger’s widely read Manias, Panics, and Crashes (1978), which recalled how “the pages of history are strewn with language . . . that allows no other interpretation than occasional irrational markets.” He assembled several choice examples: “insane land speculation . . . blind passion . . . financial orgies.”

Kindleberger’s Manias was a nostalgic synthesis of two and a half centuries of bubble thinking. But the author warily acknowledged that such traditional intuitions were no longer unquestioned. A belief was mounting among economists that men are inherently rational, that markets consistently produce rational outcomes, and therefore, as Milton Friedman put it in 1953, that “there can be no destabilizing speculation” of the sort depicted in traditional

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1 Compare Philip Mirowski, Machine Dreams: Economics Becomes a Cyborg Science (Cambridge: Cambridge Univ. Press, 2002); S. M. Amadae, Rationalizing Capitalist Democracy: The Cold War Origins of Rational Choice Liberalism (Chicago: Univ. Chicago Press, 2003); and Paul Erickson, Judy L. Klein, Lorraine Daston, Rebecca Lemov, Thomas Sturm, and Michael D. Gordin, How Reason Almost Lost Its Mind: The Strange Career of Cold War Rationality (Chicago: Univ. Chicago Press, 2013).

2 Simon Schaffer, “A Social History of Plausibility: Country, City, and Calculation in Augustan Britain,” in Rethinking Social History: English Society, 1570–1920, and Its Interpretation, ed. Adrian Wilson (Manchester: Manchester Univ. Press, 1993), pp. 128–157.

3 John Trenchard and Thomas Gordon, Cato’s Letters; or, Essays on Liberty, Civil and Religious (1720), ed. Ronald Hamowy, Vol. 1 (Indianapolis: Liberty Fund, 1995), p. 55; William N. Goetzmann et al., eds., The Great Mirror of Folly: Finance, Culture, and the Crash of 1720 (New Haven, Conn.: Yale Univ. Press, 2013); Charles Mackay, Memoirs of Extraordinary Popular Delusions and the Madness of Crowds (London: R. Bentley, 1841); John Kenneth Galbraith, The Great Crash, 1929 (1954), 3rd ed. (Boston: Houghton Mifflin, 1972), p. 4; and Charles P. Kindleberger, Manias, Panics, and Crashes: A History of Financial Crises (New York: Basic, 1978), pp. 3–4, 25–27.
bubble accounts. Two particular trends challenged long-held thinking about bubbles. First, financial economists led by Eugene Fama marshaled statistical evidence of the “random walk” behavior of asset prices to argue that financial markets were “efficient.” Because hyper-rational investors seized on new information to make profitable trades through “arbitrage,” they contended, market prices of assets necessarily reflected real values. Second, new “rational expectations” models made strong assumptions of rationality a guiding premise of macroeconomic analysis. Neither of these rationalizing projects had much room for bubbles. For efficient-markets advocates in finance, history’s apparent bubbles threatened to contradict directly the notion that markets yielded rational prices. For macroeconomists building general-equilibrium models, sudden crises proved computationally intractable. (Kindleberger wryly recalled: “econometricians among my friends tell me that rare events . . . cannot be dealt with by the normal techniques of regression.”)

Beginning in the late 1970s, a flurry of revisionist articles queried whether seemingly bubbly moments might be explained through purely “rational” means. In a 1980 article, Robert Flood and Peter Garber developed an econometric model to test whether, during one supposed bubble event—the German “hyperinflation” of 1918–1923, a “negative” bubble—there was evidence that prices actually deviated from real values. They concluded “no”: even hyperinflation could be explained in terms of rational agents tracking market “fundamentals.” Effectively, they argued that bubbles did not exist. Without empirical evidence for bubbles, requiring macroeconomists to account for them “is analogous to requiring . . . a chemist to explain why there is no philosopher’s stone.” Flood and Garber’s “first test” provoked various responses. Theorists like Maurice Obstfeld and Kenneth Rogoff complemented their empirical assay with abstract reasons “for ruling out explosive or implosive bubbles a priori.” Others, though, agreed with their rational-expectations approach but disputed their denial of bubbles. Olivier Blanchard and Mark Watson, by contrast, contended that the “rationality of both behavior and of expectations often does not imply that the price of an asset be equal to its fundamental value.” The authors examined a test case involving a dramatic, but rationally explicable, spike in gold prices in 1979 and coined a term for what they found: a “rational bubble.” A series of studies followed, trying to adjudicate whether, under strong assumptions of rationality, market prices could ever depart from fundamentals. As empiricists tested and retested for bubbles in commodities, stocks, and foreign currencies, econometricians struggled with new questions about observation—it was hard to distinguish a bubble from “fundamental” effects the econometrician could not see.

4 Milton Friedman, “The Case for Flexible Exchange Rates,” in Essays in Positive Economics (Chicago: Univ. Chicago Press, 1953), pp. 157–204, on pp. 176–177.
5 Eugene Fama, “Efficient Capital Markets: A Review of Theory and Empirical Work,” Journal of Finance, 1970, 25:383–417; Donald Mackenzie, An Engine, Not a Camera: How Financial Models Shape Markets (Cambridge, Mass.: MIT Press, 2006), Chs. 2–3; and Justin Fox, The Myth of the Rational Market: A History of Risk, Reward, and Delusion on Wall Street (New York: Harper Business, 2009), Ch. 6.
6 Kindleberger, Manias, Panics, and Crashes (cit. n. 3), p. 8. On the new “rational expectations” models see Esther-Mirjam Sent, The Evolving Rationality of Rational Expectations: An Assessment of Thomas Sargent’s Achievements (Cambridge: Cambridge Univ. Press, 1998), pp. 1–12.
7 Robert P. Flood and Peter M. Garber, “Market Fundamentals versus Price-Level Bubbles: The First Tests,” Journal of Political Economy, 1980, 88:745–770, on pp. 760–762; Maurice Obstfeld and Kenneth Rogoff, “Ruling Out Divergent Speculative Bubbles,” Journal of Monetary Economics, 1986, 17:349–362, on p. 349; Olivier Jean Blanchard and Mark W. Watson, “Bubbles, Rational Expectations, and Financial Markets,” National Bureau of Economic Research Working Paper 945; July 1982, p. 1; and Blanchard, “Speculative Bubbles, Crashes, and Rational Expectations,” Economics Letters, 1979, 3:387–389.
8 See, e.g., Richard A. Meese, “Testing for Bubbles in Exchange Markets: A Case of Sparkling Rates?” J. Polit. Econ., 1986,
The debate between “fundamental”-ist bubble deniers and more moderate bubble “rationalists” was an internecine dispute, Kuhnian “puzzle solving” at its clearest. All agreed that the game at hand involved explaining the asset price movements without jettisoning any assumptions about agents’ rationality. At the same time, new “behavioral economics” researchers led by Robert Shiller and Richard Thaler began to mount a more direct challenge to this strong rationalism. In 1984, Shiller lamented how recent interest in speculative bubbles had been “pursued within rational expectations models with unchanging tastes.”9 While Shiller looked to social psychology for corrections to the strong rationality of efficient markets, Thaler looked to cognitive psychology, particularly Daniel Kahneman and Amos Tversky’s research on humans’ persistent deviations from normative standards of rationality.10 Such efforts animated new attempts to understand financial bubbles. One influential behavioral model emphasized the role of market “noise”—various misleading inputs like hunches, rumors, and chart patterns. Noise theorists argued that a model of financial markets based on the interplay between irrational “noise traders” and rational arbitrageurs “accords with a variety of literary evidence on . . . bubbles” and “may be a plausible alternative to the rational bubbles theory.”11

By the late 1980s, a veritable bubble battle had developed, fueled by the precipitous collapse of U.S. stock prices in October 1987, the first such crash in decades. The Spring 1990 issue of the Journal of Economic Perspectives published a “Symposium on Bubbles,” featuring articles by Garber, Shiller, and leading “noise” theorists Andrei Shleifer and Lawrence Summers. These battles, while still unresolved, significantly reoriented economic discourse about extreme financial events around the rational/irrational axis. This ir/rationality fixation was promulgated through popular literature on financial crises, notably Shiller’s Irrational Exuberance (2000). Even Kindleberger’s ever-popular Manias, Panics, and Crashes was updated to accommodate the ir/rationality obsession. A revised first chapter warned readers about “a strong and persistent voice preaching that there are no manias or bubbles,” while a new appendix expounded on “irrationality in economics.”12 Though not uncontested, the taxonomy of rational versus irrational bubbles remains a prominent interpretive framework well into the twenty-first century.13

The rise of the binary ir/rationality framework was as much the work of critics of market rationality as of supporters. In arguing for the influence of specific deviations from rationality in moments of economic rupture, behavioral researchers effectively assented to the view of rationality assumed by their rationalist counterparts: to invest rationally was to

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94:345–373; Behzad T. Diba and Herschel I. Grossman, “Explosive Rational Bubbles in Stock Prices?” American Economic Review, 1988, 78:520–530; and Kenneth D. West, “A Specification Test for Speculative Bubbles,” Quarterly Journal of Economics, 1987, 102:553–580.

9 Robert Shiller, “Stock Prices and Social Dynamics,” Brookings Papers on Economic Activity, 1984, no. 2, pp. 457–498, on p. 458. See also Esther-Mirjam Sent, “Behavioral Economics: How Psychology Made Its (Limited) Way Back into Economics,” History of Political Economy, 2004, 36:735–760; and Fox, Myth of the Rational Market (cit. n. 5), Chs. 10–14.

10 See, e.g., Werner F. M. De Bondt and Richard Thaler, “Does the Stock Market Overreact?” J. Finance, 1985, 40:793–805. De Bondt and Thaler cite Daniel Kahneman and Amos Tversky, “Intuitive Prediction: Biases and Corrective Procedures,” in Judgment under Uncertainty: Heuristics and Biases, ed. Kahneman, Paul Slovic, and Tversky (Cambridge: Cambridge Univ. Press, 1982), pp. 414–421.

11 Fischer Black, “Noise,” J. Finance, 1986, 41:529–543; and J. Bradford De Long et al., “Positive Feedback Investment Strategies and Destabilizing Rational Speculation,” ibid., 1990, 45:379–395.

12 Journal of Economic Perspectives, 1990, 4(2); Robert Shiller, Irrational Exuberance (Princeton, N.J.: Princeton Univ. Press, 2000); and Charles P. Kindleberger, Manias, Panics, and Crashes, 4th ed. (New York: Wiley, 2000), pp. 4, 217–221.

13 For an intriguing recent example see Sophie Moinas and Sebastien Pouget, “The Bubble Game: An Experimental Study of Speculation,” Econometrica, 2013, 81:1507–1539.
invest in accordance with economists’ models of fundamental value, based on discounted future income streams. The noise theorists, for example, did not offer a new conception of investor rationality or acknowledge that all investors’ rationality was limited in some way—only that it was limited for some people. As Lawrence Summers reportedly once wrote to Fischer Black: “THERE ARE IDIOTS. Look around.” This was typical of the new behavioral economics that emerged in the 1980s, which intentionally shied away from the wholesale redefinition of rationality advocated two decades earlier by Herbert Simon. As Esther-Mirjam Sent has shown, behaviorists preferred “to strengthen mainstream economics by taking rationality as the yardstick as opposed to ... developing an alternative based squarely on bounded rationality.” In the end, the bubble battle was about the explanatory bounds of rationality within economic methodology, not about the empirical limits of human reasoning.

All this attention to the rationality of bubbles fundamentally energized research into financial history but did so around a narrow set of problems. Economic historians revisited historical bubbles in order to assay their rationality. In the early 1990s researchers squared off in the *Journal of Economic History* over whether the famed crash of 1929 was a collapsing “bubble.” Leading behaviorists J. Bradford De Long and Andrei Shleifer used evidence from closed-end mutual funds to quantify how much irrationality existed in the Roaring Twenties market. They estimated that “about a fifth of the runup in stock prices from 1927 to 1929 and about half of the fall in stock prices from 1929 to 1931 were the results of shifts in irrational investor sentiment.” Arguably, no historical crisis has received more attention in this regard, though, than the South Sea Bubble. Since the closing months of 1720, histories of that bubble had invariably explained it in terms of a combination of mass gullibility and massive deception. Recently, however, some researchers have attempted to “rationalize” the events of 1720. In response, others have renewed efforts to prove the irrational behavior of South Sea investors or, drawing on “noise” models, have sought to explain the bubble through the interactions between the impulsive masses and sophisticated investors who tried to “ride the bubble.” The ir/rationalist showdown over 1720 peaked in dueling articles in 2005 and 2007: “Financial Markets Can Go Mad: Evidence of Irrational Behavior during the South Sea Bubble,” by Richard Dale and collaborators, versus Gary Shea’s response, “Financial Market Analysis Can Go Mad (in the Search for Irrational Behavior during the South Sea Bubble).” The ir/rational bubble debate has largely been a boon for economic historical inquiry.

14 Lawrence Summers, quoted in Fox, *Myth of the Rational Market* (cit. n 5), p. 199; and Sent, “Behavioral Economics” (cit. n. 9), p. 747.
15 On the fundamentalist side see Peter M. Garber, *Famous First Bubbles: The Fundamentals of Early Manias* (Cambridge, Mass.: MIT Press, 2000).
16 J. Bradford De Long and Andrei Shleifer, “The Stock Market Bubble of 1929: Evidence from Closed-End Mutual Funds,” *Journal of Economic History*, 1991, 51:675–700, on p. 678.
17 For an explanation in terms of gullibility and deception see John Carswell, *The South Sea Bubble* (1960), 2nd ed. (Dover, N.H.: Sutton, 1993). For attempts to rationalize the events of 1720 see Larry Neal, *The Rise of Financial Capitalism: International Capital Markets in the Age of Reason* (Cambridge: Cambridge Univ. Press, 1991), pp. 80–88; and Helen J. Paul, *The South Sea Bubble: An Economic History of Its Origins and Consequences* (London: Routledge, 2011), esp. p. 5. For renewed efforts pointing to irrational behavior see Richard Dale, *The First Crash: Lessons from the South Sea Bubble* (Princeton, N.J.: Princeton Univ. Press, 2004). For an interpretation drawing on “noise” models see Peter Temin and Hans-Joachim Voth, “Riding the South Sea Bubble,” *Amer. Econ. Rev.*, 2004, 94:1654–1668.
18 Richard S. Dale, Johnnie E. V. Johnson, and Leilei Tang, “Financial Markets Can Go Mad: Evidence of Irrational Behavior during the South Sea Bubble,” *Economic History Review*, 2005, 58:233–271; and Gary S. Shea, “Financial Market Analysis Can Go Mad (in the Search for Irrational Behavior during the South Sea Bubble),” *ibid.*, 2007, 60:742–765.
uncovering many overlooked features of the financial past. Yet in promoting rational or irrational readings of crisis, recent historical work has left the oppositional paradigm itself essentially unquestioned.

We have seen how our peculiar opening question—Are financial bubbles rational?—took on new meaning in modern economic and historical inquiry. Yet such rationality testing has depended on an overly optimistic and ahistorical epistemology of financial value. Rationalists and irrationalists dispute whether we can assume all investors to act rationally and whether market prices ultimately derived from rational or irrational actions. But neither side seriously disputes the notion that there were discernibly rational ways to have thought about South Sea Company stock in 1720—ways of thinking that would have been entirely evident and indisputable to the most sophisticated, “smart money” investors of the age. Consequently, economists have lost sight of an essential feature of financial thinking in the past: that it was a space not just for rationality but for knowledge, where people had to confront not just uncertainties but unknowns.

This is not to say that economic historians have wholly overlooked financial thought. Indeed, the ir/rational bubble debate has brought new attention to the history of financial analysis. Paul Harrison has argued that surviving calculations show that early eighteenth-century investors “used modern valuation techniques based on fundamentals” and therefore corroborate a rational interpretation of the crisis.19 On the other hand, Richard Dale and others have cited some of the very same calculations, notably by the calculator and M.P. Archibald Hutcheson, as evidence that sophisticated observers at the time knew what was going on—meaning that the bubble must have resulted from others’ irrationality. Such previous scholars have analyzed past financial thinking almost entirely against the benchmark of modern rational valuation. But those historical calculations emerged in a very different epistemological environment, a highly unsettled and lawless space where little was known or agreed upon about the value of stocks. The remainder of this essay ventures into that unruly world. What did it mean in 1720 to ask “What is South Sea stock worth?” Was it a question with a rational answer?

The scheme that spurred London’s first bubble was the culmination of years of political back-and-forth about how to unburden Britain from its massive national debt, which by the late 1710s amounted to over £40 million.20 Most frustrating were a collection of long-term “irredeemable” bonds, which not only carried high interest rates but which the government could not voluntarily repay for decades. The enterprising leaders of the South Sea Company, guided by John Blunt, offered the most promising solution. The company had been established in 1711 as part of the reigning Tory government’s efforts to deal with the national debt. At its founding, the South Sea Company had agreed to buy up £11 million of outstanding government debts by giving government creditors stock in the new company in exchange for their bonds. This financial operation was supposed to provide the initial capital to finance a massive trading operation with Spanish America—especially in African slaves, a special right

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19 Paul Harrison, “Rational Equity Valuation at the Time of the South Sea Bubble,” Hist. Polit. Econ., 2001, 33:269–281, on p. 270.
20 P. G. M. Dickson, The Financial Revolution in England: A Study in the Development of Public Credit (London: Macmillan, 1967), pp. 90–93.
granted by the Assiento (“Contract”) negotiated between the British and the Spanish Crown.21 By mid 1719, diplomatic tensions had largely stymied the company’s trading activities, yet key company directors began exploring a project to buy up even more government debt—potentially over three quarters of the total national debt. Under this new “engraftment” scheme, the company would exchange newly issued shares of stock for outstanding bonds, including the pesky irredeemables, at to-be-determined prices. The company even agreed to pay a substantial fee to the government for the right (eventually £7.5 million). After considerable Parliamentary debate, and a competing proposal by the Bank of England, the plan received royal approval in early April 1720.

The scheme was, for its time, an intricate piece of financial engineering. The benefits for the government were plain: they could dispense with the irredeemables, reduce interest rates on the national debt, and earn £7.5 million. The benefits to the company were more opaque. One obvious benefit came from becoming the government’s main creditor: the company would earn 5 percent on all the debt it absorbed, up to £31 million. But that hardly explained the incredible enthusiasm for the scheme. What made it so appealing for the company and investors—and so hard to evaluate—was how the planned refinancing maneuvers unlocked the company’s ability to raise additional capital. If the company could convince holders of government debt to accept stock at less than one-to-one (for prices over “par” of £100 per share) the company could generate a surplus of extra stock, which could be distributed as dividends or, most enticingly, sold to new investors for cash. This unprecedented influx of capital would allow the company to venture into new businesses and dominate global trade.22

And at first, such optimism appeared more than justified. Investors could not get enough of the South Sea Company stock. The company began exchanging stock for government debts, and selling new stock for cash, in April 1720. By May, the stock’s price had begun an unprecedented and meteoric rise. South Sea stock sold in the London markets at almost £350 at the end of April, nearly £600 by the end of May, and £950 by the end of June. In mid June the company made a new offering of company stock to the public, priced at £1,000 per share; eager investors subscribed to buy more than twice the stock that was available. The crash that followed was dramatic and not soon to be forgotten. The stock’s price sagged into the £800s in July and August, then to barely over £300 by the end of September. It would fall more than £100 more by year’s end.

What did observers in 1720 think was going on? How did they reckon what South Sea Company stock was worth? The problem of how to calculate the stock’s value was an open question in 1720, which permitted a wide range of plausible answers. Financial analysis—and particularly the valuation of stocks—was an inchoate field of knowledge in 1720. Britons increasingly agreed that stocks were not purely fictitious forms of “paper wealth” and instead carried some intrinsic value—an ancient ethical concept popularized and reconfigured in seventeenth-century political economic debates about coinage. In 1710, for example, an economic propagandist named Simon Clement argued that investors should look to calculate the intrinsic value of stocks rather than following the caprice of the marketplace: “People ought never to value [stocks] by the Rates they may go at in Exchange-Alley, but to inform themselves truly of the certain Sum that has been paid into the Stock, and of the Dividend

21 Carl Wennerlind, Casualties of Credit: The English Financial Revolution, 1620–1720 (Cambridge, Mass.: Harvard Univ. Press, 2011), Ch. 6; and Paul, South Sea Bubble (cit. n. 17), Ch. 6.
22 See Simon Schaffer, “The Show That Never Ends: Perpetual Motion in the Early Eighteenth Century,” British Journal for the History of Science, 1995, 28:157–189.
that is constantly made, together with the probable Success of the Management, and then they may make a rational Judgment.”23 The problem was that Britons shared little consensus on how actually to calculate intrinsic value. By 1720, relatively coherent theories of valuation had been established for some financial objects, in particular real estate and fixed-income securities like annuities, but not for stocks.24 The instability of financial knowledge did not stop financial invention, though. Britain’s wily financial “projectors” pitched new financial objects faster than the community as a whole could understand them. Stocks—shares in “joint-stock companies”—were themselves peculiar and perplexing objects. Though joint-stock companies had been around since 1553, the mechanics of such companies were still poorly defined in many ways.25

The new joint-stock projects that sprouted up around 1700 often boasted novel corporate structures that made those stocks hard to evaluate—none more so than the South Sea Company. The company was always a corporate monstrosity, half overseas trading company and half financier. In 1712 one of the company’s chief propagandists, probably Daniel Defoe, testified to how perplexing this was: “There has not been in our Memory an Undertaking of such Consequence . . . nor has there been an Undertaking, about which the People, even those who are to be concern’d, have been so uneasy [and] their Opinions of it so confused.”26 Such quandaries were no less evident eight years later, when the company undertook its larger and more complicated refinancing scheme. In particular, two analytical dilemmas frustrated potential investors in 1720. The first was the problem of combining the potential benefits from the company’s two very different businesses—government finance and overseas trading—into a single number. Whereas the company’s financial activities brought predictable, if less spectacular, income from the interest to be earned on government debt balances, its trading activities derived their conceivable value from unrealized and uncertain future profits. A second key problem came in making sense of what might be termed the company’s “capital structure.” The 1720 “engraftment” involved a series of transactions—in particular, exchanging stock for various government debts and selling new stock for cash—that were not scheduled in advance of the project’s execution. Each maneuver changed essential facts about how the company’s capital was organized, and how each change would affect different shareholders or the stock’s total value was unclear. Behind this ambiguity was a more fundamental confusion about how to think about, and mathematically account for, a corporate entity that existed over time. The didactic commercial literature offered little instruction beyond “the rule of fellowship,” an arithmetic rule for dividing profits in a small trading partnership.27

23 [Simon Clement], A Vindication of the Faults on Both Sides . . . with a Dissertation on the Nature and Use of Money . . . (London: Printed and Sold by the Booksellers of London and Westminster, 1710), p. 16; and Wennerlind, Casualties of Credit (cit. n. 21), pp. 169–189. On intrinsic value see William Deringer, “Calculated Values: The Politics and Epistemology of Economic Numbers in Britain, 1688–1738” (Ph.D. diss., Princeton Univ., 2012), pp. 296–306.
24 Alex Preda, “The Rise of the Popular Investor: Financial Knowledge and Investing in England and France, 1840–1880,” Sociological Quarterly, 2001, 42:205–232; Janette Rutterford, “From Dividend Yield to Discounted Cash Flow: A History of U.S. and U.K. Equity Valuation Techniques,” Accounting, Business, and Financial History, 2004, 14:115–149; Paul, South Sea Bubble (cit. n. 17), p. 55; William C. Baer, “The Institution of Residential Investment in Seventeenth-Century London,” Business History Review, 2001, 76:515–551, esp. pp. 539–544; and Geoffrey Poitras, The Early History of Financial Economics, 1478–1776: From Commercial Arithmetic to Life Annuities and Joint Stock (Cheltenham: Elgar, 2000), Chs. 5–6.
25 W. R. Scott, The Constitution and Finance of English, Scottish, and Irish Joint-Stock Companies to 1720 (1910), Vol. 1, rpt. ed. (Gloucester, Mass.: Smith, 1968), esp. pp. 15, 59–62.
26 [Daniel Defoe], An Essay on the South-Sea Trade . . . (London: Printed for J. Baker, 1712), p. 5.
27 Edward Cocker, Cocker’s Arithmetic: Being a Plain and Familiar Method . . . , 20th ed., corrected (London: J. R. for Eben Tracey, 1780), pp. 141–145.
Investors in 1720 confronted many sources of uncertainty that made distinguishing a correct financial calculation challenging: asymmetries in information, ambiguities about fundamental financial concepts, unfamiliar financial operations, difficulty in assessing financial expertise. These dimensions of plausibility created an environment in which, during 1720, a wide range of computational claims could be made about South Sea Company stock. This can be seen by looking at a collection of more-or-less simultaneous calculations. In February and March 1720, while the South Sea scheme was under public debate but before it was put into operation, analysts offered page upon page of dense printed figures, elaborating the scheme’s fiscal efficacy and merits as an investment. Critically, prebubble computations built on the same limited base of public information: primarily, the value of the company’s preexisting capital stock (£11 million), the volume of redeemable (£16 million) and irredeemable (£15 million) debts to be exchanged, and the promised company fee (£7.5 million). Yet calculators combined these same inputs into a startling variety of models. Analysts had to make numerous interpretive decisions without guidance from past experience. Was the company’s stock price an output of the model or an input? How to quantify the multistage transactions needed to effect the scheme? What was the best way to reconcile the different financial instruments involved?

None of these questions had obvious answers. Three different calculations from that early period offer a sense of this plausible divergence. The first was a pessimistic model that reckoned a fair price at just over £118, from the anonymous pamphlet *An Examination and Explanation of the South-Sea Company’s Scheme*. The author pursued what might be termed an “asset-backing” or “book value” approach: he calculated what the company’s total financial assets would be after the scheme’s completion and then divided those resources among the total base of stockholders projected to result from the various transactions. The conclusion was that if the stock’s price were set at £150 for exchanging government debts, the stock would really be worth only £118 3⁄4, a nearly 21 percent loss to new investors. A second model, created by Archibald Hutcheson and published in a detailed pamphlet dated 31 March, was the most intricate. It used a complex mathematical technique, “discounting” future incomes, to argue that the stock’s value was inflated at prices above approximately £150. While he agreed with other skeptics that the company’s assets did not justify high stock prices for investors, he felt that the question of the stock’s value did not end there. Hutcheson calculated what profits the company’s overseas trade would need to generate in order to compensate new subscribers for those projected losses, using the logic of exponential discounting based on compound interest. He actually considered sixteen hypothetical scenarios, considering eight initial prices for the stock and two possible outcomes regarding the absorption of the “irredeemable” debts.

Not all South Sea models produced pessimistic conclusions. A third model, in the awkwardly titled *Argument to Shew the Disadvantage That Would Accrue to the Publick, from Obliging the South-Sea Company to Fix What Capital Stock They Will Give for the Annuities*, conceived of the scheme’s quantitative mechanics in a much different way and came to a much more positive conclusion. The *Argument* claimed that the stock was worth at least £175 but potentially much more, up to £200–£300. Much like the *Examination and Explanation*, the *Argument* tried to assess the value of South Sea stock primarily by analyzing the

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28 [Anon.], *An Examination and Explanation of the South-Sea Company’s Scheme* . . . (London: Printed for J. Roberts, 1720), pp. 5–7; and [Archibald Hutcheson], *Some Calculations Relating to the Proposals Made by the South-Sea Company, and the Bank of England* . . . (London: Printed and Sold by J. Morphew, 1720). For discussion of all three calculations see Deringer, “Calculated Values” (cit. n. 23), pp. 248–277.

29 [Anon.], *Argument to Shew the Disadvantage* . . . (London: Printed for J. Roberts, 1720).
value of the “assets” the company held. But it did so in a rather creative—and, to modern eyes, somewhat peculiar—way. The calculation captured the relationships between the company’s stock and different kinds of public debt involved in the scheme using a traditional valuation practice, borrowed from land transactions, known as “years’ purchase.” Further, unlike the Examination and Explanation, the Argument did not consider the company’s assets as temporally fixed. Rather, it argued that the refinancing operations that the company was involved in would have a feedback effect that would fuel the growth of the stock’s value over time.

In only these three quantitative models from February–March 1720, it is evident just how many interpretive choices contemporary analysts had to make in evaluating the South Sea scheme and just how broad the space of plausible computations would therefore have been. Such quandaries became even more perplexing as the price investors were willing to offer for South Sea Company stock began to rise to unprecedented heights. Calculations became even more divergent over the course of the year. One calculation, for example, published in the Flying-Post newspaper in early April, when the stock had yet to hit £300, suggested that it might be worth as much as £880. It argued, rather ingenuously, that the stock’s value derived from its operation as a pyramid scheme. Another calculation, published in June when the stock’s price was soaring past £600, suggested it was really worth only £100. What was rational? Who was to say?

Just as the “smart money” investor might reap the handsomest profits in moments of financial chaos, so might scholars profit by venturing more deeply into moments of economic confusion—benefiting our understanding of both economic history and historical epistemology. For one, the disorderly story of the South Sea Bubble suggests that greater attention ought to be paid to how epistemic instability contributes to financial crisis. Instead of asking whether bubbles are rational, we might ask whether financial crises are also epistemic crises, moments in which the complexity of financial invention radically outstrips the capacity of the financial community to understand what is going on. Humanistic analysis of economic disagreement might have much to add to a line of economic research that, though first conceived in the 1970s, has emerged primarily in the last fifteen years as an alternative to the ir/rationalist paradigm. Some economists have come to argue that a prime determinant of bubbles is the amount of disagreement, or “dispersion of opinion,” among investors about an asset’s value. Economists have explored various factors that might permit such significant disagreements, notably including investors’ overconfidence and limited attention. A few economists have even begun to think about investor disagreement in terms of differences in knowledge and to borrow theoretical insights from the history and philosophy of science. Looking to disagreement, it seems, may allow for new (and agreeable) collaborations between humanistic and

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30 *Flying-Post*; or, *Post-master*, 7–9 Apr. 1720, no. 4428; and [Archibald Hutcheson], *An Estimate of the Instrinsick Value of South-Sea Stock* ([London, 1720]).

31 Harrison Hong and Jeremy C. Stein, “Disagreement and the Stock Market,” *J. Econ. Perspect.*, 2007, 21:109–128; Edward Miller, “Risk, Uncertainty, and Divergence of Opinion,” *J. Finance*, 1977, 32:1151–1168; and J. Michael Harrison and David M. Kreps, “Speculative Investor Behavior in a Stock Market with Heterogeneous Expectations,” *Q. J. Econ.*, 1978, 92:323–336.

32 David Hirschleifer and Siew Hong Teoh, “Limited Attention, Information Disclosure, and Financial Reporting,” *Journal of Accounting and Economics*, 2003, 36(1–3):337–386, esp. pp. 341–344; and Jose A. Scheinkman and Wei Xiong, “Overconfidence and Speculative Bubbles,” *J. Polit. Econ.*, 2003, 111:1183–1220.

33 Harrison Hong, Jeremy C. Stein, and Jialin Yu, “Simple Forecasts and Paradigm Shifts,” *J. Finance*, 2007, 62:1207–1242.
social scientific interpretations of economic life. But even more broadly, *confusion* itself merits much greater attention as an object of historical and humanist inquiry. How can we tell when individuals or groups are genuinely confused about something? How can we identify what was plausible — but could not be clearly affirmable or deniable — in the past? These are promising questions for the field of historical epistemology. To understand where the possibilities of rationality — or knowledge, or understanding — begin and end, we must attend to its messy and contested borders in the past. Herbert Simon might approve.