



# New thinking on the financial crisis

Roy E. Allen and Donald Snyder

*Saint Mary's College of California, Moraga, California, USA*

## Abstract

**Purpose** – The purpose of this paper is to expand understanding of the current global financial crisis in light of other large-scale financial crises.

**Design/methodology/approach** – The phenomenon of large-scale financial crisis has not been modeled well by neo-classical general equilibrium approaches; the paper explores whether evolutionary and complex systems approaches might be more useful. Previous empirical work and current data are coalesced to identify fundamental drivers of the boom and bust phases of the current crisis.

**Findings** – Many features of financial crisis occur naturally in evolutionary and complex systems. The boom phase leading to this current crisis (early 1980s through 2006) and bust phase (2007-) are associated with structural changes in institutions, technologies, monetary processes, i.e. changing “meso structures”. Increasingly, purely financial constructs and processes are dominant infrastructures within the global economy.

**Research limitations/implications** – Rigorous analytical predictions of financial crisis variables are at present not possible using evolutionary and complex systems approaches; however, such systems can be fruitfully studied through simulation methods and certain types of econometric modeling.

**Practical implications** – Common patterns in large-scale financial crises might be better anticipated and guarded against. Better money-liquidity supply decisions on the part of official institutions might help prevent economy-wide money-liquidity crises from turning into systemic solvency crises.

**Originality/value** – Scholars, policymakers, and practitioners might appreciate the more comprehensive evolutionary and complex systems framework and see that it suggests a new political economy of financial crisis. Despite a huge scholarly literature (organized recently as first-second- and third-generation models of financial crises) and a flurry of topical essays in recent months, systemic understanding has been lacking.

**Keywords** Recession, Financial markets, Money, Credit

**Paper type** Viewpoint

## 1. Introduction

The current global financial crisis has many patterns in common with other recent large-scale financial crises, including in developed countries (e.g. Finland and Sweden in 1991, Japan after 1989) and less developed countries (e.g. Latin America in 1982, Asia in 1997, Russia and Brazil in 1998, Argentina in 2002). Despite a huge historical literature on boom-bust processes, and despite a flurry of topical essays in recent months, some of these more important patterns are only now being identified.

Section 2 summarizes recent taxonomies with particular attention to the current situation. In order to describe the current crisis, first-, second-, and third-generation financial crisis models, which are found in the economics literature, are all helpful, but remain incomplete, especially in explaining “non-equilibrium” movements in exchange rates, interest rates, international investment flows, stock market and real estate



---

values, and other key financial variables. Thus, as elaborated in Section 3, there is a revival of interest in psychological and social constructs, including what Keynes, in *The General Theory*, called “animal spirits” and other behaviors that may occur if people have a limited cognitive and informational basis for fully rational decision-making, and therefore, they may rely on less rational social conventions, vague beliefs, and other psychological factors.

### *1.1 What does this paper propose to contribute to this literature?*

First, in Section 4 key financial variables are, indeed, shown to be driven somewhat more by subjective, even transcendental (of observable gross domestic product – GDP – or “real” processes) psychological and social constructs than is commonly understood. Since the 1980s, structural changes in evolving financial markets, especially advances in information-processing technology and government deregulation, have allowed a greater separation of financial market processes from GDP processes. Specifically, as per the econometric research of one of the authors, the demand for money-liquidity for financial market participation has become – especially during episodes of chaotic structural change – an important source of money demand which absorbs money-liquidity away from observable GDP uses. As a related process, monetary wealth can thus be created, transferred, and destroyed across time and space more powerfully and independently of observed GDP processes than is commonly understood.

Second, as elaborated in Section 5, expanding our understanding of the current crisis can be assisted by evolutionary and complex systems approaches, especially ones that privilege the role of interactive knowledge and belief systems. The relative rise and fall of interactive institutional and technological systems, or “meso” structures in the language of evolutionary economics, are seen to play a key role in driving the current boom-bust pattern. Transitions and imbalance between meso structures can account for long-run discontinuities or instabilities beyond what can be explained by normal business cycle theory.

These conclusions are then summarized in Section 6 as they might direct us toward a new political economy of financial crisis.

## **2. Definitions and common patterns**

A “financial crisis” is generally defined to be “a wider range of disturbances, such as sharp declines in asset prices, failures of large financial intermediaries, or disruption in foreign exchange markets” (De Bonis *et al.*, 1999). There is a “crisis”, generally speaking, because the real economy is seriously and adversely affected, including negative impacts on employment, production, purchasing power, as well as the possibility that large numbers of households and firms or governments are fundamentally unable to meet their obligations, i.e. “insolvency”. When an organization is fundamentally solvent but temporarily unable to meet its financial obligations, then the notion of “illiquidity” is often used, but in practice insolvency and illiquidity are difficult to distinguish. For example, a common pattern is that “vicious circles” start from a money-liquidity crisis at a few banks, which then extends to an international crisis of investor confidence in the financial sector, which extends to a balance of payments problem for the country and currency devaluation, which extends to, therefore, even further liquidity and, at some point, solvency crises at the banks.

Recent models of large-scale financial crises are often characterized as “first-generation” models or “second-generation” or, in the last few years, “third-generation”. First-generation models, as pioneered by Krugman (1979) and others, emphasize the importance of a country’s foreign exchange reserves, i.e. if government budget deficits are excessive, then ultimately a government loses the ability to maintain these reserves, and a speculative attack on its currency exchange rate is inevitable. Second-generation models, as summarized by Rangvid (2001), arose during the 1990s when this cause-effect linkage no longer explained various currency crises. In particular, there is now a weaker relationship between economic fundamentals such as public sector deficits and the timing and severity of speculative currency attacks and related instabilities. The timing of government decisions to abandon a currency regime in favor of other political-economic goals has also proved difficult to predict. Second-generation models thus tell stories of “multiple equilibrium” values that key variables might assume, unpredictable or irrational behavior by private investors and governments, and there has been an effort to discover new “sunspot variables” that will better explain sudden changes in markets.

Third-generation models, as per Krugman (1999) and Allen *et al.* (2002), introduce additional variables and feedback processes, especially the role of companies’, entrepreneurs’, and governments’ balance sheets, and the impact of international financial flows and exchange rates on those balance sheets. During and after the 1997 Asian financial crises, the financial condition of firms weakened more than was anticipated by second-generation models, which drew attention to these processes. Furthermore, until new entrepreneurs come forward, or until balance sheets return to normal, it has been difficult for economies to return to normal growth and stability.

In most recent cases of large-scale financial crisis, a country or region initially benefits from expanded supplies of base money, new “quasi-moneys” which are created from base moneys, and credit supplies – a financial liberalization and deregulation phase. Typically the financial sector expands as it captures profit from new efficiencies and opportunities allowed by globalization. The country or region, for a time, may be favored by international investors; thus the banking system, including government, is well-capitalized and able to expand money-liquidity. Assets increase in monetary value and interest rates are low, and this wealth effect encourages consumption, borrowing, business investment, and government spending. Productive resources are more fully utilized and economic growth is well supported. There is a “boom”, as measured by increased monetary wealth held by private and public sectors of an economy, such as the value of stocks, real estate, currency reserves, etc., and/or the current production of merchandise and services (GDP).

Then, typically, the supply of base money ( $m$ ) times its rate of circulation or velocity for GDP purposes ( $v$ ) contracts, and therefore so does the equivalent nominal GDP. The decline in nominal GDP is usually split between its two components:

- (1) real GDP, which is the volume of current production measured in constant prices ( $q$ ); and
- (2) and the GDP price level ( $p$ ).

By definition, these variables are linked by the equation of exchange: ( $m \times v = p \times q$ ). When  $q$  declines for a sustained period (typically at least six months) we call it a recession, and when  $p$  declines we call it deflation. After this process starts, monetary

---

policymakers may react by rapidly expanding ( $m$ ), but this action may be too little too late – individuals and institutions may have non-payable debts, banks may be failing, and international confidence in the country or region may already be damaged. In this pessimistic case, which is typical in less-developed countries with weak financial systems, the desperate increase in  $m$  may reverse the slide in  $p$  and even lead to hyper-inflation (destabilizing, rapid increases in  $p$ ), but  $q$  would continue to fall. Also, a weak financial system may be unable to maintain the circulation rate of secure currencies for productive activities, especially if people are hoarding money, and thus  $v$  would decline.

The initial contraction in “effective money” ( $m \times v$ ) in a crisis may be caused by monetary authorities or national and international investors draining money ( $m$ ) from the country or region, or there may be a decline in  $v$  for reasons having to do with the inability of the financial system to direct money toward productive activities. A contraction in effective money or withdrawal of international investment may undermine equity markets, debt markets, bank capital, or government reserves, and monetary wealth is then revalued downwards. General economic or political uncertainty worsens the situation – the resulting austerity-mentality causes a contraction of spending and credit, and an increased “risk premium” attached to business activity scares away investment and bank lending. Interest rates rise, the demand for quasi-money and credit – i.e. the desire to hold and use the insecure “monetary float” – declines and people try to convert the monetary float into more secure base money, Treasury securities, and other more secure assets. No reserve-currency banking system is able to cover all of its monetary float with secure bank reserves if customers try to redeem too much of the float at once, and thus “runs” on banks can destroy the banks themselves. A deteriorating banking sector may be unable to honor its deposits, bad loan problems surface and a “lender of last resort” such as the central bank, taxpayers, or the International Monetary Fund (IMF) may need to be found.

How far do these common patterns go toward explaining the current global financial crisis? The authors agree with many other commentators, such as Reinhart and Rogoff (2007), that the current crisis fits many historical patterns, as explained next with emphasis on the US situation. In particular, Reinhart and Rogoff (2007) find that:

... the run-up in US housing and equity prices that Kaminsky and Reinhart (1999) find to be the best leading indicators of crisis in countries experiencing large capital inflows closely tracks the average of the previous 18 post-World War II banking crises in industrial countries (p. 339).

The initial financial liberalization and globalization boom phase of the current crisis was driven in the early 1980s by widespread deregulation of financial markets in the developed world especially the Reagan administration reforms in the USA and the Thatcher administration reforms in the UK. These policies were guided by ideologies and belief systems aimed at restoring a more capitalist tradition, and they eventually prevailed across the global system. French President Mitterrand’s attempt to advance a more socialist set of values and policies floundered by late 1982 and financial market deregulation and international integration spread not only in Europe and North America, but also Asia, Latin America, Africa, and Eastern Europe. Newly unregulated financial products, entities and markets came to play a larger role. Also, dramatic

advances in information-processing technology (electronic banking systems, communication satellites, the computer revolution, etc.) facilitated international arbitrage. The commoditization and securitization of financial products by the private sector, including through virtually unregulated no-reserve-requirement “offshore banking facilities” led to dramatic increases in international money liquidity and credit, and by the end of the 1980s, global financial markets were generating a *net* international flow of funds of more than \$3 trillion each month, i.e. the flow of funds between countries that reconciles end of the month balance of payments accounts. Of that \$3 trillion, \$2 trillion was so-called stateless money, which was virtually beyond the control of any government or official institution, but available for use by all countries (*Barron’s Magazine*, 1987, p. 45).

This 1980-2006 boom phase of the current crisis was driven by fundamental changes in the basic social and technical rules of the game, or “meso” structure of the global economy (as per the evolutionary economics language of Section 5), which, among other characteristics, replaced more hierarchically organized, communitarian-disciplined, national-government-controlled rules with, instead, more free-market, technologically innovative, decentralized, and chaotically-individualistic meso structures as financial globalism prevailed.

As one of the authors has elaborated elsewhere (Allen, 1999), these structural changes associated with financial globalization supported an increasing net financial inflow from the rest of the world into the USA from near-balance in 1980 to approximately \$800 billion per year or 6 percent of GDP as a net financial inflow in 2006 – the peak of the long boom – which supported classic-pattern excesses in low-interest rate debt financing and spending, monetary wealth creation processes, consumerism and financial asset inflation, and now-famous lax standards in mortgage financing and securitization vehicles such as “collateralized debt obligations” and “structured investment vehicles” that passed the rights to the mortgage payments and related credit/default risk to third-party investors. The US household personal savings rate dropped from 8 percent of disposable income to 0 percent over this 1980-2006 period, while the “net wealth of the US” (net value of business assets, real estate, consumer durables, and US government property) increased from approximately \$7 trillion to \$50 trillion in nominal terms.

The end of this long boom from the early 1980s to 2006, and the beginning of the crisis or bust phase, began with the bursting of the US housing bubble and a sharp rise in home foreclosures in the USA in late 2006, which spread to become a more broad-based global financial crisis within a year. The mortgage lenders that retained the risk of payment default, such as Countrywide Financial, were the first financial institutions to be affected as borrowers defaulted. Major banks and other financial institutions reported losses of approximately \$100 billion by the end of 2007. By October 2007, 16 percent of subprime loans in the USA with variable interest rate features were 90 days delinquent or in foreclosure proceedings, roughly triple the rate of 2005, and by January of 2008, this number increased to 21 percent.

Losses in the money-credit pyramid then began to spread across the system including through the collapse in June 2007 of two hedge funds owned by Bear Stearns that were invested heavily in subprime mortgages. The lender-of-last-resort (LOLR) phase of the crisis began as the Federal Reserve took unprecedented steps to avoid a Bear Stearns bankruptcy by assuming \$30 billion in its liabilities and engineering the sale of Bear Stearns to JPMorgan Chase. In August 2008 the US Treasury (and

---

therefore the US taxpayer) joined the LOLR phase by taking over and guaranteeing the funding of Fannie Mae and Freddie Mac, the quasi-government housing market entities. In September 2008 American International Group, because of its exposure to credit default swaps, was bailed out by the Federal Reserve in an \$85 billion deal, and then later that month the US taxpayer-sponsored \$700 billion bailout bill was passed after Congress amended the plan to add more oversight, limits on executive pay, and the option for the government to gain equity in the companies that it bails out. As in Finland and Sweden's crises in 1991, Europe and the USA quickly moved to acquire equity stakes in, and partly nationalize, the banks.

As this essay is written in late 2008, the world thus moves quickly to regain coordinated state "social market capitalism" control of the financial system, i.e. back toward the pre-1980 "meso" rule structures that were more hierarchically organized and communitarian-disciplined (by treasuries and central banks and other official institutions) in place of the more free-market innovative, decentralized, and individualistic rule structures that dominated between 1980 and 2008. In testimony before the US Congress on 23 October 2008, former US Federal Reserve Chairman Alan Greenspan famously said that "I made a mistake in presuming that the self-interest of organizations, specifically banks and others, was such that they were best capable of protecting their own shareholders".

### 3. The role of psychological and social factors

Second- and now third-generation models of financial crisis, while simulating many common patterns, do not yet explain sudden movements in exchange rates, interest rates, international investment flows, stock market and real estate values, and other key variables to levels beyond normal fluctuations. Thus, there is a revival of interest in what Keynes, in *The General Theory*, called "animal spirits" such as "spontaneous optimism" among entrepreneurs and others (Marchionatti, 1999). Essentially, Keynes argued that people may have a limited cognitive and informational basis for fully rational decision-making, and therefore, they may rely on less rational social conventions, vague beliefs, and other psychological factors. One implication is that:

... the market will be subject to waves of optimistic and pessimistic sentiment, which are unreasoning and yet in a sense legitimate where no solid basis exists for a reasonable calculation (Keynes, 1936, p. 154).

As authoritatively summarized by Kindleberger (1989) in *Manias, Panics, and Crashes: A History of Financial Crises*, over the long history of market capitalism, the start of an unsustainable financial boom or "mania" is always linked to a sudden increase in money liquidity and lending. Unstable and exaggerated expectations, which are quite subjective, play a role:

The heart of this book is that the Keynesian theory is incomplete [in explaining economic instabilities and crises], and not merely because it ignores the money supply. Monetarism is incomplete, too. A synthesis of Keynesianism and monetarism, such as the Hansen-Hicks IS-LM curves that bring together the investment-saving (IS) and liquidity-money (LM) relationships, remains incomplete, even when it brings in production and prices (as does the most up-to-date macroeconomic analysis), if it leaves out the instability of expectations, speculation, and credit and the role of leveraged speculation in various assets (Kindleberger, 1989, p. 25).

Given the increased importance, across a larger and more dynamic global political economy, of subjective expectations, leveraged investment as supported by new electronic and derivative money and credit forms, unregulated no-reserve-requirement offshore financial markets, etc., some current research is consistent with the innovative notion that monetary-wealth, or what Marx called “unproductive finance capital” (as opposed to physical capital or capital goods such as machines and factories) may be a “driver” of economic instabilities. As elaborated by Philip Cerny among others, the new global financial markets may even be an “infrastructure of the infrastructure”. Cerny’s initial position, elaborated in debates that began in the early 1990s, was that “a country without efficient and profitable financial markets and institutions will suffer multiple disadvantages in a more open world [...] [and will] attempt to *free-ride* on financial globalization through increasing market liberalization” (Cerny, 1993, p. 338). Helleiner (1995) restrained this position – of a determinist, autonomous, technology-driven financial globalization – by demonstrating that states, especially the USA and the UK, have fostered and guided the entire process.

Scholarly journals have been launched in recent decades to respond to these issues. For example, in the first edition of *Review of International Political Economy*, the editors state:

The creation of a global economic order has come to represent the defining feature of our age, as a major force shaping economies and livelihoods in all areas of the world. Globalization, of course, has many aspects [...] The first of these is the emergence of a truly global financial market [...] and the resulting increase in the power of finance over production (*Review of International Political Economy*, 1994, p. 3).

Reversing the causality of Karl Marx’s (and many others’) philosophical materialism, it may increasingly be true that autonomous, invisible financial processes can drive changes in the physical relations of production, as well as *vice versa*. As part of this process, central banks and other financial market participants can (usually haphazardly) increase or reduce wealth independently of any initial changes in the production of GDP or other “real” economic prospects. The Chairman of the US Federal Reserve, Alan Greenspan, began allowing for this possibility in the late 1990s:

Today’s central banks have the capability of creating or destroying unlimited supplies of money and credit [...]. It is probably fair to say that the very efficiency of global financial markets, engendered by the rapid proliferation of financial products, also has the capability of transmitting mistakes at a far faster pace throughout the financial system in ways that were unknown a generation ago, and not even remotely imagined in the 19th century [...]. Clearly, not only has the productivity of global finance increased markedly, but so, obviously, has the ability to generate losses at a previously inconceivable rate (Greenspan, 1998).

The authors would emphasize from Greenspan’s quote that “the capability of creating or destroying unlimited supplies of money and credit” is equivalent to “the capability of creating or destroying monetary wealth”. Money and credit are “stores of value”, as determined by social consensus within nations and between nations.

Transcendental notions of value applied to monetary assets need not reflect, or even be compatible with, the observed empirical world. For example, the purely transcendental “law of compound interest” is a social agreement, which may not correlate with the way that the physical economy grows. Growth in the physical economy is subject to thermodynamics, biological growth processes and carrying

---

capacity, endowments of resources, sunlight and rain, etc. Perhaps debtors as a group, who are required to pay *exponentially* increasing interest under this transcendental law, can generate goods and services and therefore economic revenues only in *arithmetically* increasing increments over time. Therefore, perhaps some debtors have to fail, and yield their economic resources to the others, so that the others can meet their obligations.

Invisible belief systems, including those of money-gamblers and optimistic market capitalists, have supported a money economy based on exponential interest payments, and an easing of lending restrictions. The acceptance and growth of offshore finance in the 1980s and 1990s, without reserve requirements or other significant regulations, is an example of how belief systems – in this case market capitalist ideology — drive institutional change. Offshore market institutions, such as the Bangkok International Banking Facility, encouraged unsustainable over-lending, excessive unprofitable construction of real estate, etc., and ultimately contributed to the risk of crisis, recession and misery in the Asian financial crisis of 1997. Belief systems and their supporting institutions can thus drive empirical changes in human populations and their physical environments. Much of the economic wealth that was initially created through deposit-lending, as it exercised itself in production power, consumption power, and power to change institutions, was destroyed in the recent Asian crisis, but it nevertheless did exist as a broad social agreement.

Whether or not financial crises arising from over-indebtedness and deflation – as per Irving Fisher’s classic work (Fisher, 1933) – should be systemically expected in modern capitalism has been debated. Mainstream economic thinking has until recently been generally confident that “hard-to-qualify” lending-restrictions, wherein all parties are conscious of systemic risk, can avoid over-lending and debt-failure. In contrast, Marxists (see Clarke, 1994) and others across various disciplines, such as Frederick Soddy (1926), are convinced that these crises are endemic to capitalism. Most recently, as summarized by Reinhart and Rogoff (2008), a new data set covering eight centuries and 68 countries shows “a perennial problem of serial default [...] in this respect the 2007-08 US sub-prime financial crisis is hardly exceptional” (p. 2).

Given that massive debt-repudiation crises continue to happen in the world system, we have not yet been able to avoid over-lending and periodic disjuncture-crises between, on the one hand, the belief system which includes mathematical compound interest, and on the other hand, the ability to generate money from tangible “real world” processes. Some borrowers and lenders are well informed but reckless risk-takers who know that periodic failures are required in “casino capitalism” (John Maynard Keynes’s phrase), whereas other borrowers and lenders underestimate systemic risk and allow over-lending based upon a mistaken ideology regarding the stability of the system. Thus, on both accounts, the literature generally concludes that debt crises are likely to remain with us.

#### 4. New thinking

##### 4.1 What do the authors propose to contribute to this literature?

First, in the authors’ view, key financial variables can be driven somewhat more by subjective, even transcendental (of observable GDP or “real sector” processes) psychological and social constructs than is commonly understood. Consequently, there has been an even greater separation of financial market processes from GDP processes than is commonly understood. And, monetary wealth has thus been created,

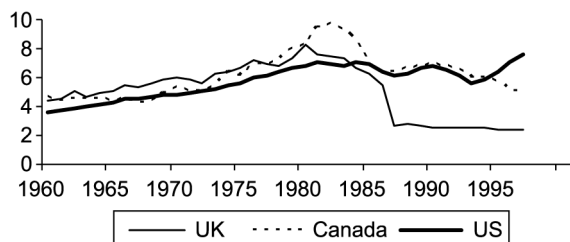
transferred, and destroyed across time and space more powerfully and more independently of observed GDP processes.

Second, a better understanding of the current crisis can be assisted by evolutionary and complex systems approaches (as elaborated in Section 5), especially ones that privilege the role of interactive knowledge and belief systems and the psychological and social factors discussed above.

The econometric work of one of the authors (Allen, 1989, 1999) supports this “new thinking” – essentially by showing that, under certain conditions, financial markets can “absorb” a portion of the money supply, such that the absorbed money is not contemporaneously available to support and induce the “real economy”. *While economic literature has examined various demands for money for financial market participation, the author’s contribution to that literature was the first to show that the absorbed money was not simultaneously available even to induce or incentivize GDP activity.* This absorption shows up as a decline in the GDP-velocity of narrow money ( $v$ ), *ceteris paribus*, and it can also be measured by a divergence in the growth of broad money supply aggregates (such as M3) relative to narrow money supply (such as M1), *ceteris paribus*. This absorbed money-power might be used at a later date to reengage GDP production or consumption, or it might be destroyed in a financial crisis before its title-holders can use it. Therefore, money is not a neutral driver of the real economy over time. Furthermore, this absorption process can occur to facilitate the boom phase of a financial crisis cycle, and it can also facilitate the bust phase – by driving asset values beyond normal or sustainable levels.

For example, Figure 1 shows a structural decline in the long-term trend GDP velocity of money ( $v$ ) in the USA, the UK, and Canada in the early 1980s that corresponded with the beginning of the boom phase of this current financial crisis. In each of these countries, corresponding with the particular timing of the break in  $v$ , governments dramatically abandoned financial market protectionism. Policymakers removed ceilings on interest rates, reduced taxes and brokerage commissions on financial transactions, gave foreign financial firms greater access to the home financial markets, allowed increased privatization and securitization of assets, and took other steps that allowed money to move more freely and profitably between international and national markets. As can be seen in Figures 2 and 3 for the USA and the UK, in these key “phase shift” years, there was a corresponding dramatic expansion in the transactions volumes of money-absorbing financial transactions (measured as the combined value of stock, bond, and government securities transactions) – shown as an inverse relationship between  $v$  and financial transactions volumes. In the USA, the major structural break in  $v$  along with other monetary-transmission relationships

**Figure 1.**  
Structural declines in the income (GDP) velocity of money in the 1980s: identifying the start of the current financial boom (Source: IMF)

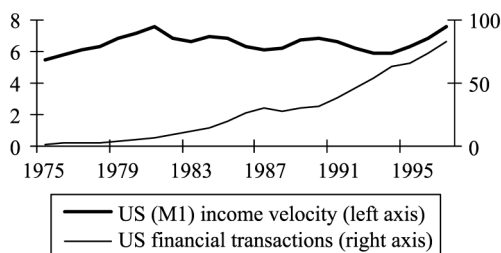


Source: IMF

occurred in 1982 as participants responded to newly profitable forms of liberalized financial market participation with the aid of new information processing technologies (Allen, 1989, p. 273). The major structural break in the UK occurred in 1985-1986 as participants anticipated the UK's "big bang" of October 1986, which ended fixed commissions for brokers and separation of powers between brokers, and allowed a rush of foreign financial firms into the marketing of British stocks and government bonds and other securities.

In addition to the direct absorption of money away from GDP activity to accommodate transactions demands for exploding volumes of financial activity, a related form of absorption occurred in the UK case due to uncertainty or information failure experienced by holders of money. That is, during a dramatic upheaval or structural change as per Big Bang, financial portfolios must be reallocated dramatically as the new opportunities are figured out and reacted to. For a time, there is not sufficient information for investors to pursue rational strategies, and the price of money-liquidity rises sharply. An increase in money demand occurs to reduce the risk of loss and in order to regain an optimal portfolio quickly once the information environment improves.

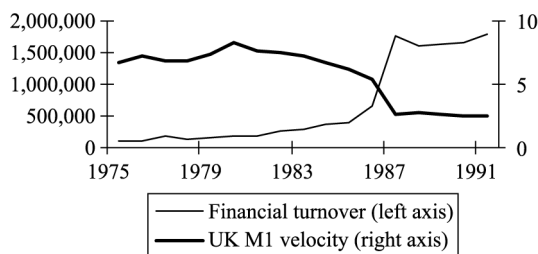
In the authors' view, this "options demand" for money can divert money-liquidity away from GDP and other markets during chaotic times (once again such that GDP activity is neither accommodated or incentivized by this portion of the money supply –



**Note:** Money-absorbing financial transactions are the combined value of stock, bond, and government securities transactions

**Source:** U.S. Department of Commerce, Federal Reserve Bank

**Figure 2.** Expanding volumes of money-absorbing financial transactions in the USA (\$trillion/year) and the US income velocity of money (M1)



**Note:** Money-absorbing financial transactions are the combined value of stock, bond, and government securities transactions

**Source:** IMF, Bank of England

**Figure 3.** Expanding volumes of money-absorbing financial transactions in the UK (million of pounds/year) and the UK income velocity of money (M1)

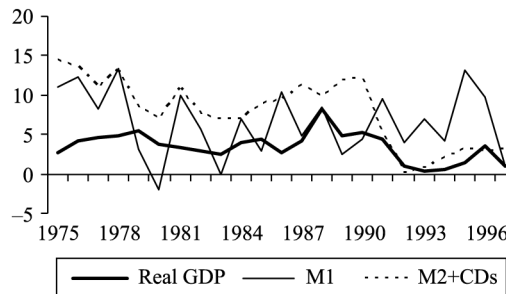
the “new” claim of the authors), but it is not generally recognized by the economics profession. However, many securities market professionals swear by it. For example, Joseph Grundfest, former Commissioner of the US Securities and Exchange Commission, explained the 1987 world stock market crash as follows:

Simply put, I suggest that a large component of recent market volatility is the rational result of an “information failure” in the market for liquidity rather than the consequence of rapid and irrational changes in the market’s assessment of the value of securities [...] The lack of information about either fundamental business prospects or about the magnitude and composition of an atypically large demand for immediate trading can be sufficient to induce substantial market volatility [...] [A] sharp increase in the price of liquidity is reflected in a simultaneous widening of spreads and in a general price decline in the equities and futures market alike [...] Once sufficient information comes to the market describing expected short-term trading flows, and once the returns to providing liquidity become high enough, the peak-load nature of the demand subsides, the risk involved in trading is reduced, the price of liquidity declines, spreads narrow, and equity prices recover a large portion of their losses (Grundfest, 1991, p. 67-8).

Japan’s financial crisis, which saw 50 percent declines in stock market prices along with similar declines in real estate and other asset prices after 1989, shows how this money absorption can occur in the bust phase of a financial crisis. Namely, absorption of base money by financial markets and therefore a decline in its rate of circulation for GDP purposes ( $v$ ), in times of financial distress, can also be measured by a weakness in the growth of broad money. Expanded supplies of high-powered money may not be able to serve as a base for expanded supplies of broad money if the high-powered money supplies are instead consumed by financial institutions to resolve bankruptcies, increase reserves, and meet other capital requirements. In this case, a decline in broad money would correspond to a decline in the velocity of high-powered money as it is absorbed by distressed financial markets rather than being used to support growth in GDP.

Japan’s narrow (M1) velocity began dropping significantly in the early 1990s – by approximately 30 percent from a value of 3.5 (= nominal GDP divided by M1) in 1990 to 2.5 in 1995. Just as dramatically, Figure 4 shows the big decline in the growth of Japan’s broad money supply (M2 + CDs) in the 1990s which correlated with declines in

**Figure 4.**  
Japan’s financial crisis.  
The dramatic decline in Japan’s broad money supply growth rate (M2 + CDs) in the 1990s was correlated with declines in the stock market, real estate values, and real GDP



**Note:** Maintaining the growth of the narrow money supply (M1), did not prevent deflation, because more of the M1 was absorbed by distressed financial institutions (annual percentage rates of change, 1975-1997)

**Source:** IMF

---

the stock market, real estate values, and real GDP (in July 1998 a GDP recession began but was mostly avoided). Maintaining the growth of the narrow money supply (M1) did not prevent deflation and recessionary conditions, because more of the M1 was absorbed by distressed financial institutions. Elaborating this situation further, research in 1998 indicated that:

A central bank *in a deflationary situation with troubled banks* must avoid interpreting low [nominal] interest rates as an indicator of an expansionary policy. When monetary growth is low and default risks are high as in Japan today, low interest rates reflect expectations of both low (or negative) inflation and rates of return. In such a situation, *the appropriate focus of monetary policy is on money and not interest rates* [broad money supplies should be expanded despite low interest rates] (Federal Reserve Bank of St Louis, 1998, p. 1).

The current global financial crisis mirrors many aspects of Japan's crisis after 1989. Developed-country stock markets are down close to 50 per cent from their peak, real estate prices, as they did in Japan, are falling more slowly but on the same trajectory (currently down 20 per cent from their peak), expanded 'rescue' supplies of high-powered money are not yet serving as a base for expanded supplies of broad money as the high-powered money supplies are instead consumed by financial institutions to resolve bankruptcies, increase reserves, and meet other capital goals in an environment of uncertainty and information failure. There is a decline in the income velocity of narrow money supplies and recession and the risk of deflation in the real sector are imminent.

Although the US Federal Reserve took the controversial decision to stop reporting broad US money supply M3 data (supplies of cash and a wide range of bank instruments) in 2005 on the grounds that the modern financial system made this data unmanageable and not useful, estimates compiled by Lombard Street Research show a decline in the US M3 growth rate from 19 percent in early 2008 to 2.1 percent (annualized) in the period May-June 2008 – a decline very similar to Japan's M2 + CD decline in 1991-1992 as shown in Figure 4. A continuing decline in estimated US M3 in July 2008 by \$50 billion was the biggest one-month fall of US M3 since modern records began in 1959. The US M1 growth rate, which had fluctuated around 0 percent during 2006 and 2007 and the first half of 2008, was dramatically increased by the Federal Reserve (too little too late in the view of the authors) to approximately 5 percent in September 2008 (and thus it has not served as a base for expanded supplies of broad money as these supplies are instead consumed by financial institutions in distress). As this article is written, with nominal GDP declining from trend, the recent 5 percent increase in the growth rate of US M1 translates into a greater than 5 percent structural decline in the US income velocity of money (M1).

What will prove interesting to estimate, when a few more quarters of GDP data are available, is whether the econometric equations (Allen, 1989, 1999) that measured the share of narrow money supplies contemporaneously absorbed for financial purposes in the boom phase of the 1980s is similar to the share of narrow money supplies absorbed for financial purposes in this bust phase. Also to be encouraged is research on whether typical boom and bust phase money absorption magnitudes across various large-scale country crises have been similar – thus supporting better money-liquidity supply decisions on the part of central banks and official institutions that might help prevent liquidity crises from turning into solvency crises.

---

## 5. Evolutionary and complex systems approaches toward understanding the current crisis

### 5.1 *Mainstream economic theory and financial crises*

The neoclassical general equilibrium model has long provided the theoretical rationale underlying mainstream economic efforts to understand macroeconomic fluctuations. This model conceives of an economy as a set of fully connected interlocking markets which can be analyzed like a force field in physics. To make the model work it is virtually imperative to assume that the market participants are homogeneous or nearly so. Prices in this model are not negotiated, they are set by a central authority (the famous Walrasian auctioneer) who assesses prevailing excess demands and imposes a set of prices that will clear all markets simultaneously. The model presumes strong tendencies towards equilibrium: it would be in equilibrium most of the time unless some exogenous force was to disturb it, in which case it would normally settle back quickly. But nominal and institutional rigidities are assumed to prevent such shocks from being perfectly damped, which generates business fluctuations.

Markets in a model like this satisfy the *efficient markets hypothesis* and, (because of the strong equilibrium tendencies), have price changes that are Gaussian (normally) distributed. An important feature of a Gaussian distribution is that very large positive and very large negative deviations from the mean (more than three standard deviations, say) are virtually impossible. Yet price changes of these magnitudes routinely occur during financial crises. This suggests that whatever is occurring during these episodes is not following the processes embodied in the general equilibrium model.

The general equilibrium model also assumes that promises are always fulfilled: when goods are purchased or loans are made, the goods get paid for and the loans get repaid on schedule. This condition is routinely violated in a financial crisis. Leijonhufvud (2004) notes that, despite the obvious importance of understanding better such breakdowns in the equilibrating processes, which can threaten the social order, modern macroeconomics sheds little light on their nature. LeRoy (2004), in his survey of traditional economic analyses of price bubbles, comes to a similar conclusion.

### 5.2 *Complexity theory*

Given the inability of standard general equilibrium theory to explain the occurrence of financial bubbles and crises, researchers have explored other avenues. One promising approach is to look at the economic system through the lens of complexity theory. A complex system differs in important ways from the general equilibrium system of neoclassical economics. If an economy is a complex system, all behavior emanates from the bottom, from the actions of individual agents: there is no global controller or auctioneer to set parameters or behavior. Because agent behaviors interact in nonlinear ways, the macro result which emerges can have a life of its own which is not obviously deducible from the properties of the agents: the whole is not only greater than the sum of the parts, it is different as well. Positive feedback loops often exist, which amplify the effects of small changes into large cascades with significant influence. Complex systems are path-dependent, meaning that their present state is determined by what happened to them in the past (history matters). They exhibit perpetual novelty: new behaviors and structures constantly stimulate more of the same. Dynamics dominates statics; the system evolves and adapts rather than just “running” as general equilibrium models tend to do. As a consequence, a complex system is rarely in

---

equilibrium. It may have long periods of stability, but stability is not the same as equilibrium: it can degenerate into chaotic behavior at short notice without exogenous disturbance. This often signals what is known as a phase shift, whereby the system changes from one way of functioning to a distinctly different way. Financial crises can often be thought of as phase shifts.

Because a complex system does not have strong tendencies to equilibrium, it does not usually generate variables with Gaussian distributions. Instead, it tends to produce power law distributions, which have fatter tails than the Gaussian and thus explain the frequent occurrence of extreme positive and negative values. Benoit Mandelbrot (Mandelbrot and Hudson, 2004) has been a student of financial system prices for many decades and has produced persuasive evidence that they follow power law distributions. His work, long ignored and even suppressed by efficient market theorists, is now widely recognized as correct and has been brought to the attention of the general public by Nassim Taleb (2007).

### 5.3 Complex adaptive systems

The mathematics of complex systems has been studied for some time now and is reasonably well understood. Although phase shifts and cascades are suggestive of financial crises and power laws are consistent with frequent large price changes, complex systems were originally developed to explain inanimate phenomena such as chemical reactions. The agents in that type of complex system have no volition of their own: they passively respond to whatever natural forces affect them. An economy on the other hand is composed of agents who both perceive their situation and are capable of changing their behavior in response to it. This suggests the notion of a complex *adaptive* system (CAS) in which the agents are active participants. The behavior of a CAS is much more difficult to study, yet reflection suggests that a modern economy is almost surely a CAS, so this is a task which must be undertaken if we are to make progress understanding financial crises.

Foster (2005) has developed a useful taxonomy for complexity systems. He identifies four types:

- (1) *First-order (imposed energy)* – Found in inanimate settings when energy is imposed on chemical elements. Characterized by fractal patterns, butterfly effects, etc. Can be modeled with dynamical mathematics. This is the approach Mandelbrot applied to financial prices. The agents react passively, so this is a complex system.
- (2) *Second-order (imposed knowledge, acquired energy)* – Found in organic settings. Plants and animals receive imposed (genetically encoded) knowledge and also gain knowledge from experience. All of this gets translated into a knowledge structure that permits some control over energy acquisition. Agents both react and adapt to their environment, so this is a CAS.
- (3) *Third-order (acquired knowledge)* – Agents interact not only with their environment but also with images of possible worlds, i.e. mental models. When this happens, some mental models will wind up determining aspects of reality. This is a CAS where “adaptive” involves creativity. If everyone has a mental model of the market and begins associating with their fellow agents according to market rules, the market gets transformed from mental model into reality.

- (4) *Fourth-order (interactive knowledge)* – At this stage mental models began interacting with each other. Agents imagine what other agents might be imagining and alter their own models accordingly in a potentially infinite regression. Agents form aspirations and commitments into the future. This type of CAS gets extremely complicated and depends heavily on trust and understanding to achieve the cooperation necessary for the system to function.

In the study of financial crises, the first-order type of complex system is of interest because it provides realistic description of how prices behave in bubbles and panics. However, it gives us a little in the way of a behavioral explanation for these price changes. The fourth-order type does provide a basis for the behavioral explanation we seek. The problem is that fourth-order complex systems cannot at present be analyzed mathematically. However, though analytical solutions are at present not possible, such systems can be fruitfully studied through simulation methods and through certain types of econometric modeling, as detailed below.

The Federal Reserve has become interested in a complex adaptive systems approach to managing financial crises. In the world at large, complex systems abound – weather patterns, tectonic processes, disease contagion, power grids, etc. Their instability and potential for large, disruptive regime shifts are major social concerns. The ubiquity of such problems suggests that there may be common principles at work. A 2006 Federal Reserve conference on systemic risk (Kambhu *et al.*, 2007) saw experts from fields such a civil engineering, disease control, ecology, national security, and finance discuss their approaches to catastrophe control. The following composite picture emerged: an initial shock (possibly a seemingly insignificant one) leads to a coordinated behavior in the system with reinforcing (positive) feedbacks. A contagion begins, which spreads the original shock. When the pressure becomes too much the system makes a regime shift “from a stable state to an inferior stable state while shedding energy so that it cannot readily recover its original state, a process known as hysteresis” (Kambhu *et al.*, 2007, p. 7). Research is focusing on factors that increase resistance to regime shifts and hysteresis, and on factors than can help the system recover. Some of this research may prove helpful in managing financial crises.

#### *5.4 Evolutionary economics*

If an economy is a complex adaptive system, then as time passes it does not just run like an electric motor; its form and structure evolves. The machine is the metaphor of the general equilibrium economy; for the complex adaptive system economy, the metaphor is the living organism. It is not easy to model an evolving economy using the neoclassical model, which can accommodate growth fairly readily but structural change only with great difficulty. In a neoclassical model of an evolving economy based on past history, the parameter values are always becoming obsolete – slowly and steadily sometimes, or very quickly when there is a structural shift.

The field of evolutionary economics has emphasized these issues for some time and has made efforts to incorporate capacity for structural change into its models. Schumpeter’s idea that creative destruction is the essence of capitalism forms the basis of much modern thinking in evolutionary economics. Schumpeter emphasized the role of liberal credit as a driver of speculative booms, and sudden credit contraction as a major contributor to the severity of the ensuing crash (Leathers and Raines, 2004). The version of evolutionary economics which appears most useful for analyzing financial

---

crises is the “Micro-Meso-Macro” framework of Dopfer *et al.* (2004). This framework centers on two novel concepts:

- (1) rules; and
- (2) meso units.

A rule is a pattern that agents follow in their everyday economic behavior: it may be cognitive, behavioral, technological, institutional, organizational, sociocultural, etc. Rules may be nested in other rules: we might talk about a motorcycle rule that includes engine rules, tire rules, etc. or a market rule that includes a double auction rule, a fixed-price rule, etc. Rules are carried out (actualized) by microeconomic agents (individuals, families, organizations, etc.). A meso unit is a rule plus its population of actualizations (e.g. the motorcycle meso is the motorcycle rule plus all agents who make, sell, repair, or drive motorcycles). An economic system (assumed to be complex adaptive) is a collection of meso units evolving over time. Macroeconomic behavior is the result of interactions among meso units. Economic evolution is the process by which new rules originate and diffuse through the population: very often this process takes the form of a logistic growth path in the new rule’s meso unit. Structural change occurs when a new meso rule permanently alters the coordination structure of the meso units of the economic system. Over time, creative destruction occurs: new rules are constantly being originated; the successful ones develop strong mesos which displace previously dominant mesos; the weak ones disappear.

In this framework, a bubble or crisis in the financial sector would be analyzed as a structural change. Foster and Wild (1999b) have developed a promising econometric methodology for analyzing such structural shifts in terms of the logistic function, and for identifying early warning signals that the macro economy may be about to undergo a structural change. A high priority today is to analyze the international growth of money and credit over recent decades using these techniques.

## 6. Conclusion: toward a new political economy of financial crisis

This paper has characterized the current financial crisis as having a long “boom” phase (early 1980s-2006), followed by a turning point and continuing “bust” phase (2007-) with many patterns in common relative to other financial crises. It is beyond the scope of this paper to model this financial crisis rigorously; instead the goal has been to suggest the best analytical framework – some of which is “new” as applied to financial crises – that might direct more rigorous modeling.

Departing from the neoclassical general equilibrium model and other mainstream approaches, this paper proposes an evolutionary and complex systems approach toward understanding the current crisis (as well as to rethink other large-scale crises). The 1980s boom in leveraged financial transactions was thus a ‘phase shift’ in a complex adaptive system, and it was a transition to a new ‘meso structure’ in the language of evolutionary economics. As the econometric research of one of the authors has verified, structural changes in normal money supply and demand relationships occurred in the USA, the UK, and other money centers at this time that were associated with government deregulation, advances in information-processing technology, and other aspects of financial liberalization and globalization (Allen, 1999). Although beyond the scope of this paper to simulate rigorously, most of the trajectories of financial market data associated with this crisis time period – as per Figures 1-4 – fit

the patterns identified by Foster and Wild (1999a, p. 754) as “logistic diffusion trajectories” with three self-organizing phases called the “emergent”, “inflexion”, and “saturation” phases.

As a result of these structural changes, financial markets absorbed newly-created money-power beyond levels predicted by general equilibrium models, which in turn were used to inflate asset prices and incentivize production or consumption beyond predictions; then, during the bust phase, these variables moved in the opposite direction more than expected including a greater than expected fall in stock and real estate prices and destruction of monetary wealth.

Depending on the magnitudes of these transfers and re-valuations of monetary wealth over (how much) time and space in the global system, serious real effects can be produced over time and space. These processes, generally not accepted by mainstream, Marxist, and many other economists, can nevertheless account for what the mainstream has understood as “business cycles”, “debt-deflation crises” including depressions (Fisher, 1933), etc., and what Marxists have understood as crises of “underconsumption”, “overproduction”, and ‘disproportionality’ (Clarke, 1994). The ideologies and institutions of finance, are not only “where the action is” and where differential economic power is determined across the world system, but these institutions are also increasingly key to the sustainability of the current global economic system – a necessary “infrastructure of the infrastructure”, as per Cerny’s (1993) analysis.

This expansion and globalization of financial markets that accelerated in the 1980s, which seemed to take on a dramatic life of its own somewhat separate from GDP processes, can be modeled with the help of third-order and fourth-order complexity processes – acquired knowledge and interactive knowledge processes, respectively – as discussed in the previous section. Given the “animal spirits” of irrational exuberance or fear, transcendental “laws of compound interest” and no-reserve-requirement money-liquidity creation, etc., interactive mental models drove financial cycles and monetary wealth creation and destruction processes beyond the bounds of general equilibrium to levels that required a breakdown in the equilibrating processes – the boom phase and its accompanying meso structure were unsustainable (beyond 2006 or so), and now a new meso structure is in process of adaptation.

In the new ordering of the global economy, it should be accepted that, increasingly, autonomous, invisible financial processes can drive changes in the physical relations of production, rather than *vice versa*. As part of this process, central banks and other financial market participants such as offshore banks can in some cases (haphazardly) increase or reduce wealth independently of any initial changes in the production of GDP or other “real” economic prospects. *And, this wealth – literally created or destroyed out of thin air (or cyberspace) in some cases – is generally allocated through the arbitrary customs and interest rates concessions of particular social networks. Wealth itself in the global human ecology, in these cases, can thus be derived entirely from “pure social agreement”, depending on how well one can participate in the financial system.*

A review of the authors’ controversial position as italicized here, especially critiquing it from the Marxist and other philosophical-materialist frameworks, appeared in *Review of International Political Economy* (1996). To the reviewer, the authors’ approach incorrectly “privileges financial changes *vis-à-vis* changes in the real economy (production of value)” (p. 532). Furthermore, to the reviewer, any perceived initial creation and distribution of wealth or “value” that happens in “the thin air” of

---

financial markets could not be sustained over time without correspondence to supportive GDP activity.

In contrast, to the authors, “money is wealth” in the sense that it gives the holder a claim on the entire social product. The “social product” includes not only consumption power and production power, but also the power to direct and control large social processes – such as those that are dependent on (gaining access to) the institutions of government, courts, communications, and so on. The accumulation of monetary assets, or what Marxists would call the accumulation of finance capital, represents a social power claim that becomes a key driver in the evolution of the world system. Once monetary wealth is understood as power claims over the social product, then monetary wealth is “real”, and it is limited only by the degree to which power can be exerted over others. Presumably this limit would only be found in the unlikely event that an all-encompassing global monopoly has maximized its differential power.

Recent research in the field of international political economy also treats monetary wealth, or finance capital (as opposed to physical capital or capital goods such as machines and factories) as an accumulation of broad social powers:

Drawing on the institutional frameworks of Veblen and Mumford, our principal contribution is to *integrate power into the definition of capital*. Briefly, the value of capital represents discounted expected earnings. Some of these earnings could be associated with the productivity (or exploitation) of the owned industrial apparatus, but this is only part of the story. As capitalism grows in complexity, the earnings of any given business concern come to depend less on its own industrial undertakings and more on the *community’s overall productivity*. In this sense, the value of capital represents a *distributional* claim. This claim is manifested partly through ownership, but more broadly through the *whole spectrum of social power*. Moreover, power is not only a means of accumulation, but also its most fundamental end. For the absentee owner, the purpose is not to “maximize” profits but to “beat the average”. The ultimate goal of business is not hedonic pleasure, but *differential* gain. In our view, this differential aspect of accumulation offers a promising avenue for putting power into the definition of capital [. . .]. In the eyes of a modern investor, capital means a *capitalized earning capacity*. It consists not of the owned factories, mines, aeroplanes or retail establishments, but of the present value of profits expected to be earned by force of such ownership (Nitzan, 1998, pp. 173, 182).

Building on this quote, Nitzan argues that wealth accumulation processes allowed by monetary capital have favored pecuniary business activities and owners over tangible industrial productivity and working consumers. He argues that, increasingly, “the causal link runs not from the creation of earnings to the right of ownership, but from the right of ownership to the appropriation of earnings” (p. 180). This causality is consistent with the writings of Thorstein Veblen, who insisted that the “natural right of ownership” conferred by society to various people (initially to own slaves, then animals, land, and now capital including ever more symbolic monetary forms), can be used competitively to obtain further social powers at the expense of others (Veblen, 1923).

To summarize, based upon these issues and frameworks, the authors and others gradually propose “a new political economy of financial crises” (Allen, 2004) – a project that is bound to gain further thrust both conceptually and empirically as analysis of the current crisis proceeds. In the language of evolutionary economics, hopefully this essay has usefully described some of the path-dependent trajectory of this ongoing scholarly project – itself a “meso structure”.

## References

- Allen, M., Rosenberg, C., Keller, C., Setser, B. and Roubini, N. (2002), "A balance sheet approach to financial crisis", Working Paper No. 02/210, International Monetary Fund, Washington, DC.
- Allen, R.E. (1989), "Globalization of the US financial markets: the new structure for monetary policy", *International Economics and Financial Markets: The AMEX Bank Review Prize Essays*, Oxford University Press, Oxford.
- Allen, R.E. (1999), *Financial Crises and Recession in the Global Economy*, 2nd ed., Edward Elgar, Cheltenham/Northampton, MA.
- Allen, R.E. (Ed.) (2004), *The Political Economy of Financial Crisis*, Edward Elgar, Cheltenham/Northampton, MA.
- Barron's Magazine* (1987), "The globalization of the industrialized economies", *Barron's*, May 4.
- Cerny, P.G. (1993), "The political economy of international finance", in Cerny, P.G. (Ed.), *Finance and World Politics*, Edward Elgar, Aldershot/Brookfield, VT, pp. 3-19.
- Clarke, S. (1994), *Marx's Theory of Crisis*, St Martin's Press, New York, NY.
- De Bonis, R., Giustiniani, A. and Gomel, G. (1999), "Crises and bail-outs of banks and countries: linkages, analogies, and differences", *World Economy*, Vol. 22 No. 1, pp. 55-86.
- Dopfer, K., Foster, J. and Potts, J. (2004), "Micro, meso, macro", *Journal of Evolutionary Economics*, Vol. 14, pp. 263-79.
- Fisher, I. (1933), "The debt-deflation theory of great depressions", *Econometrica*, Vol. I, pp. 337-57.
- Foster, J. (2005), "From simplistic to complex systems in economics", *Cambridge Journal of Economics*, Vol. 29, pp. 873-92.
- Foster, J. and Wild, P. (1999a), "Detecting self-organizational change in economic processes exhibiting logistic growth", *Journal of Evolutionary Economics*, Vol. 9, pp. 109-33.
- Foster, J. and Wild, P. (1999b), "Econometric modeling in the presence of evolutionary change", *Cambridge Journal of Economics*, Vol. 23, pp. 749-70.
- Greenspan, A. (1998), "The globalization of finance", *Cato Journal*, Vol. 17 No. 3, pp. 243-56.
- Federal Reserve Bank of St Louis (1998), *International Economic Trends*, August.
- Grundfest, J.A. (1991), "When markets crash: the consequences of information failure in the market for liquidity", in Feldstein, M. (Ed.), *The Risk of Economic Crisis*, The University of Chicago Press, Chicago, IL.
- Helleiner, E. (1995), "Explaining the globalization of financial markets: bringing states back in", *Review of International Political Economy*, Vol. 2 No. 2, pp. 315-41.
- Kambhu, J., Weidman, S. and Krishnan, N. (2007), *New Directions for Understanding Systemic Risk: A Report on a Conference Co-sponsored by the Federal Reserve Bank of New York and the National Academy of Sciences*, National Academies Press, Washington, DC.
- Kaminsky, G.L. and Reinhart, C.M. (1999), "The twin crises: the causes of banking and balance of payments problems", *American Economic Review*, Vol. 89 No. 3, pp. 473-500.
- Keynes, J.M. (1936), *The General Theory of Employment, Interest, and Money*, Macmillan, London.
- Kindleberger, C.P. (1989), *Manias, Panics, and Crashes: A History of Financial Crises*, Basic Books, New York, NY.
- Krugman, P. (1979), "A model of balance-of-payment crises", *International Tax and Public Finance*, Vol. 6 No. 4, pp. 459-72.

- 
- Krugman, P. (1999), "Balance sheets, the transfer problem and financial crises", *Journal of Money, Credit, and Banking*, Vol. 11, pp. 311-25.
- LeRoy, S.F. (2004), "Rational exuberance", *Journal of Economic Literature*, Vol. XLII, September, pp. 801-3.
- Leathers, C.G. and Raines, J.P. (2004), "The Schumpeterian role of financial innovations in the new economy's business cycle", *Cambridge Journal of Economics*, Vol. 28 No. 5, pp. 667-81.
- Leijonhufvud, A. (2004), "Celebrating Ned", *Journal of Economic Literature*, Vol. XLII, pp. 820-1.
- Mandelbrot, B. and Hudson, R. (2004), *The Misbehavior of Markets*, Basic Books, New York, NY.
- Marchionatti, R. (1999), "On Keynes' animal spirits", *Kyklos*, Vol. 52 No. 3, pp. 415-39.
- Nitzan, J. (1998), "Differential accumulation: towards a new political economy of capital", *Review of International Political Economy*, Vol. 5 No. 2, Summer.
- Rangvid, J. (2001), "Second generation models of currency crises", *Journal of Economic Surveys*, Vol. 15 No. 5, pp. 613-46.
- Reinhart, C.M. and Rogoff, K.S. (2007), "Is the 2007 US sub-prime financial crisis so different? An international historical pattern", *American Economic Review: Papers and Proceedings*, Vol. 98 No. 2, pp. 339-44.
- Reinhart, C.M. and Rogoff, K.S. (2008), "This time is different: a panoramic view of eight centuries of financial crises", NBER, working paper, No. 13761, NBER, Cambridge, MA.
- Review of International Political Economy* (1994), Vol. 1 No. 1, Spring.
- Review of International Political Economy* (1996), Vol. 3 No. 3, pp. 528-37.
- Soddy, F. (1926), *Wealth, Virtual Wealth and Debt*, George Allen & Unwin, New York, NY.
- Taleb, N. (2007), *The Black Swan*, Random House, New York, NY.
- Veblen, T. (1923), *Absentee Ownership and Business Enterprise in Recent Times. The Case of America*, introduction by Robert Leckachman, Beacon Press, Boston, MA (reproduced 1967).

### About the authors

Roy E. Allen is Professor of Economics and Dean in the School of Economics and Business Administration, Saint Mary's College of California. His recent books are *Human Ecology Economics: A New Framework for Global Sustainability* (as editor, Routledge, 2008) and *Financial Crises and Recession in the Global Economy* (Edward Elgar, third edition forthcoming 2009). His research interests include globalization, sustainability studies, financial systems, and use of the humanities to gain critical insights into the functioning of the economic system. Roy E. Allen is the corresponding author and can be contacted at: [rallen@stmarys-ca.edu](mailto:rallen@stmarys-ca.edu).

Donald Snyder is Professor of Business Administration in the School of Economics and Business Administration, Saint Mary's College of California. His most recent publication is "Strange priors: understanding globalization" (in *Human Ecology Economics: A New Framework for Global Sustainability*, Routledge, 2008). His research interests include evolutionary and complex systems among other ways to model the economic system, economic growth and development, globalization, and financial market dynamics.