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Instability and Crisis in Financial Complex Systems

Lino Sau

Abstract: This paper contrasts the Efficient Markets Hypothesis with Hyman Minsky's Financial Instability Hypothesis (FIH), taking into account the dynamic complexity of financial markets. This approach offers analytical tools that can account for crisis through processes endogenous to contemporary economies. Recent work, notably by J. Barkley Rosser, has suggested that complex dynamics is a strong foundations for Keynesian models and results. Group dynamics enter into the analysis in at least two ways: they provide an independent source of fundamental uncertainty which, as discussed by Keynes himself, can lead to speculative bubbles in asset markets, and they can cause overreactions in both lenders' and borrowers' attitudes toward risk. These aspects can lead to financial fragility and instability following a variety of complex dynamics. I shall argue that a financially complex system is, according to the FIH, inherently flawed and unstable: in the absence of adequate economic policy boom and bust phenomena, in financial markets which are fuelled by credit booms and busts, may generate endogenous instability and systemic crisis, such as the recent sub-prime mortgage crisis.

[O]ur economic leadership does not seem to be aware that the normal functioning of our economy leads to financial trauma and crisis, inflation, currency depreciations, unemployment, and poverty in the midst of what could be virtually universal affluence—in short, that financially complex capitalism is inherently flawed. (Minsky, 1986, p. 287; our emphasis)
1. INTRODUCTION

The severe consequences on the real economy of the current sub-prime crisis have reopened the theoretical and empirical debate on the causes of and possible remedies for financial instability and crisis. One of the most puzzling aspects of the recent crisis was the failure of leading economists in academic and international institutions. Numerous economists working within the Keynesian tradition have harshly denounced the inadequacy of mainstream macroeconomic models in accounting for the origins, nature and effects of the current crisis, especially as regards the aspects connected with the behavior of the real variables and with the phenomena of contagion and propagation (cf. Arestis, 1992; Chick, 2008; Dow, 2008; Kregel, 2007; Whalen, 2008; Wray, 2008, 2009).

As is well-known, the traditional approaches in economics and finance have been based on the propositions of the so-called Efficient Markets Hypothesis (EMH) developed at the University of Chicago in the 1970s. According to this approach, financial markets are efficient, self-regulating and self-stabilizing; hence instability and crisis come about only as temporary shocks. New Classical Macroeconomics (NCM), reflecting this view, assigns real exogenous shocks a central role in the analysis of the cycle and of the instability of developed capitalist systems.

The standard views in economics so far have largely ignored the fact that capitalist economies are now characterized by complex and increasingly sophisticated financial systems driven by the activity of money-managers (cf. Whalen, 2001; Wray, 2009). It is the money-managers who move today's markets and who have played a predominant role in the process that created financial fragility and instability at the global level.

In this paper I set out to contrast EMH with the Financial Instability Hypothesis (FIH) that was proposed by Hyman Minsky, taking into account the dynamic complexity of financial markets and the role of fundamental uncertainty and organic interdependence. We shall see that Minsky's approach provides analytical tools to account for a crisis through processes endogenous to contemporary economies.

The relevance of complex dynamics has recently been stressed by Barkley Rosser (2004, 2005) who sees in complex dynamics strong foundations for Keynesian models and results. Complex dynamics enter into the analysis in at least two ways. Complex dynamics provide an independent source of fundamental uncertainty which, as discussed by Keynes himself (1936, [1937] 1973), can lead to speculative bubbles in assets markets and can cause overreactions in both lenders' and borrowers' attitudes toward risk. These factors can lead to financial fragility and instability through a variety of complex dynamics (cf. Day & Huang, 1990; Keen, 1995, 1997, 2009; Moore, 2005; Sordi & Vercelli, 2006; Vercelli, 2000). I shall argue that a financially complex capitalism is, according to the FIH, inherently flawed and unstable; that is, in the absence of adequate economic policy, the booms and busts phenomena in financial markets that are fuelled by credit booms and busts, may generate endogenous instability and systemic crises, as has recently been the case.
The paper is structured as follows. Section 2 presents an overview and critical assessments of the EMH; Section 3 deals with financial markets as complex dynamic systems; Section 4 shows how group dynamics may offer the analytical tools to account for the current crisis through endogenous processes; Section 5 examines the relevance of this approach to both the national and international contexts.

2. THE EFFICIENT MARKET HYPOTHESIS: CRITICAL ASSESSMENTS

The central propositions of the EMH had their infancy in the University of Chicago, which became the leading academic centre of mainstream monetary macroeconomics and finance for nearly 30 years (see Fama, 1970; Shleifer, 2000). As is well known, this theoretical approach stressed the relevance of different types of financial market efficiency: fundamental-valuation efficiency, information-arbitrage efficiency, full-insurance efficiency and functional efficiency.

According to the principle of fundamental-valuation efficiency, investors are perfectly rational, from which it follows that markets are efficient in the sense that all the usable information about fundamentals is discounted into the current prices of financial assets.

On the other hand, if the financial markets satisfy the requirements of information-arbitrage efficiency, then speculative profits, via technical trading or other means, are not obtainable (i.e. an average investor cannot hope to consistently beat the market). In fact, if some investors are not rational, then their trades are random and, being uncorrelated, they cancel out each other; even in the presence of correlated trading strategies, the EMH stresses that the activity of rational arbitrageurs or market makers may totally eliminate their irrational influences on prices (Fama, 1965), selling overpriced and buying underpriced securities with respects to fundamentals. It follows that temporary or persistent bubbles and crashes cannot occur, other than as adjustments to market news, since the information that might cause them to occur would be discounted into the price instantaneously.

As for full-insurance efficiency, financial markets as a whole are efficient if it is possible to insure the delivery of goods and services under any and all circumstances à la Arrow-Debreu. Consider, for example, mortgage contracts; according to EMH the markets for such contracts are efficient if, and only if, the probabilistic risk that the debtors will be unable to meet all future cash outflows can be known with actuarial certainty. In this case insurance companies (such as AIG in the current crisis) can always provide insurance guaranteeing debtor solvency, to the investors in these financial assets.

Functional efficiency has to do with various activities assured by the financial system, namely: mobilization of saving; provision of scope for risk diversification and sharing; production and dissemination of information; enhancement of corporate governance; facilitation of investment
and innovation; and last but not least, promotion of an orderly financial market for liquid and illiquid assets.\(^3\)

As has been pointed out by Whalen (2008, p. 8), one of the starting points of EMH (i.e. fundamental-valuation efficiency) is that ‘even if individual decision makers get asset prices or portfolio values wrong, the market as a whole gets them right which means that financial instruments are driven by a sort of invisible hand to some set of prices that reflect the underlying or fundamental value of assets: traditional finance assumes that when processing data, practitioners use statistical tools appropriately and correctly.’ Citing Shefrin (2000), Whalen summarizes: in the classical EMH, ‘as a group, investors, lenders and other practitioners are not predisposed to over-confidence and to other biases.’

In its forecasting models, the mainstream approach does in fact assume agents who possess perfect rationality and arrive at shared, logical conclusions or expectations regarding a situation they face. When these expectations induce actions that in the aggregate validate them as predictions, the expectations are in equilibrium and are called rational expectations. New Classical Macroeconomics explains economic fluctuations and cycles as due only to exogenous shocks, which are presumed to be susceptible of description by a probability function implicitly known by agents with rational expectations. Hence the possibility of financial crisis is ruled out. Efficient markets cannot generate either over-borrowing (i.e., households and firms spending so much in excess of their cash-flows that the debt cannot be serviced) or over-lending. That is, decision-makers are assumed to have perfect knowledge of ‘their future intertemporal budget constraints and [to] act accordingly’ (Davidson, 2009, p. 3). In other words, under the EMH the future is not radically uncertain but only probabilistically risky.

The presumption that the future is probabilistically knowable is at the foundation of all contemporary efficient market theories. This sort of argument became even more entrenched with the development of sophisticated risk management and pricing tools that combine the insights of mathematicians and financial economists with the highly sophisticated computer models. In recent years, in order to evaluate and manage risks, the Wall Street investment bankers have based the analysis of historical data on statistical probability to predict the future.

From a statistical point of view, if the size of the sample increases, then the variance (the quantitative measure of white noise) decreases. Since computers have been able to bring together many more buyers and sellers globally than the pre-computer market systems, the size of the sample of trading participants in the computer age rose dramatically. If therefore we were to accept the validity of the EMH, then permitting computers to organize the market might significantly reduce the variance and so increase the probability of better organized, more insurable and orderly markets than before. In the computer era, financial instability and crisis may indeed prove to be the result of exogenous shock.

To see why this is not likely to be the case, and why the EMH is weakly grounded, we must recall the emphasis that Keynes (1936) and many of his followers (cf. Davidson, 2009; Minsky, 1982; Tobin, 1984) placed on the role of speculation in financial markets. Keynes (1936, p. 158) pointed
out that speculation is ‘the activity of forecasting the psychology of the market’; that is, the aim of the speculator is to ‘beat the gun’ (Keynes, 1936, p. 155), which is exactly the opposite of the mechanism described by the EMH approach.

The major puzzle in finance seems to be that mainstream theorists do not see markets in the same way as do traders or practitioners: i.e., investors believe that technical trading is profitable. Furthermore, market psychology and herd effects unrelated to market news can cause endogenously persistent bubbles and crashes. Markets, as Keynes (1936, [1937] 1973) observed, have ‘moods’; at different times they may be ‘nervous’ or ‘sluggish’ or ‘jittery’ (see also Arthur, 1995; Shiller, 2000). Empirical analysis shows that trading volume and price volatility in the real financial markets are higher than the standard theory, based on the EMH, predicts. These considerations cast doubt on fundamental-valuation efficiency and information-arbitrage efficiency.

There are also serious problems with the hypothesis of full-insurance efficiency, despite the fact that financial innovation increases the set of financial instruments linked to different ‘states of nature’. However, the economic system is complex and the future is characterized by radical uncertainty; and, as Davidson (2009, p. 9) has observed, ‘if ... future outcomes cannot be reliably predicted on the basis of existing past and present data, then there is no actuarial basis for insurance companies to provide holders of these assets protection against unfavourable outcomes.’

As for functional efficiency, a great problem arises in particular over the existence of true orderly financial markets for liquid and illiquid assets, that is, markets that encourage investors to believe that they will be able to sell their securities on short notice should they need to do so. As long as the future is uncertain and not just probabilistically risky, the prices for which liquid and illiquid assets can be sold at any future date in a free market could vary dramatically and almost instantaneously. That is, in a real economic system there are no perfect resale markets for any assets and securities. As we shall see in Section 4, this is particularly relevant to understanding what, for example, has happened to prices in the markets for real estate and mortgage-backed securities, and especially sub-prime mortgage derivatives, in the US.

3. FINANCIAL MARKETS AS COMPLEX SYSTEMS

As argued in the previous section, the EMH is founded on an Arrow–Debreu type analytical context in which the hypotheses of complete markets, perfect information and the idea that risk can always be perfectly shared or insured, seem at best applicable to an ideal world rather than to a real economy. It ignores the processes that unfold within and beyond economic and financial complex systems (Foster, 2005; Rosser & Rosser, 1997; Rosser, 1999, 2001).
Keynes, by contrast, was very well aware of these aspects of financial markets (Carabelli, 1988; Marchionatti, 1999, 2009). The most important loci of economic complexity in The General Theory are the analyses of long-term expectations and of the business cycle. In his discussions of financial markets, Keynes (1936, p. 151) argued that investment depends on ‘the average expectation of those who deal on the Stock Exchange as revealed in the price of shares.’ Investors largely base their decisions on conventions, the essence of which lies ‘in assuming that the existent state of affairs will continue indefinitely, except in so far as we have specific reasons to expect a change’ (Keynes, 1936, p. 158). He later elaborated:

We assume that the present is much more serviceable guide to the future than a candid examination of past experience would show it to have been hitherto. In other words we largely ignore the prospects of future changes about the actual character of which we know nothing. 
We assume that the existing state of opinion as expressed in prices and the character of existing output is based on a correct summing up of future prospects, so that we can accept it as such unless and until something new and relevant comes into the picture. 
Knowing that our own individual judgement is worthless, we endeavour to fall back on the judgement of the rest of the world which is perhaps better informed. 
The psychology of a society of individuals each of whom is endeavouring to copy the others leads to what we may strictly term a conventional judgement. (Keynes, [1937] 1973, p. 114)

Entrepreneurs and stock market investors must often fall back on motives that are ‘not rational in the sense of being concerned with the evaluation of consequences, but are decided by habit, instinct, preference, desire, will, etc’ (Keynes, 1979, p. 294). These factors determine people’s state of confidence and therefore the magnitude of investment. Both conventional judgments and animal spirits constitute fundamental determinants of the state of confidence.

According to Keynes, fluctuations in the state of confidence make the business cycle a ‘highly complex’ phenomenon. Furthermore, the highly complex nature of the economy causes confidence to have the characteristics we have described; that is, a kind of interactive process is operating and is anchored by shared beliefs but has also an inherent tendency to drift. This, as we shall see presently, is due to the self-referential properties of the system. It follows, then, that expectations and investments cannot be modeled by using probabilistic relationships, and that the study of instability and crisis is therefore beyond the domain of probabilistic inference as assumed by EMH. Under conditions of fundamental uncertainty the behavior of economic agents is so complex that formal probabilistic treatment of expectations is not feasible.
There are in fact serious epistemological problem associated with complex economic systems, which imply that rationality is bounded (Simon, 1987). The bounds to rationality take many forms, such as the inability to understand the internal relations of a system, or to acquire full knowledge of crucial parameter values, as well as the inability to identify critical thresholds or bifurcation points, or indeed to understand the interactions of agents, especially when these agents are thinking about how the other agents are thinking about each others' thinking. This can lead, in turn, to group dynamics, captured by Keynes's well-known example of a beauty contest in which each participant tries to guess the average state of expectations of the other parties (Keynes, 1936, p. 156); participants in financial markets tend to be more interested in the average level of ‘sentiment’ in the market than in the relations of prices to the ‘fundamentals’.

Whenever forming expectations means predicting an aggregate outcome that is formed in part from others' expectations, expectations formation can become self-referential.4 The basis upon which expectations are formed becomes ill-defined, and rational deduction finds itself without any solid ground upon which to stand: thus we are faced with the so-called infinite regress problem in decision-making, which implies indeterminacy of expectations and non-computability of outcomes (see Arthur, 1990, 1995, 1999; Koppl & Rosser, 2002). The indeterminacy of expectations formation is by no means a rarity or anomaly within the real economy. On the contrary, it pervades all of economics—particularly financial markets. This is why we have to shift the ‘paradigm’ suggested by the EMH and consider the dynamic complexity of the financial markets (see Fontana, 2008; Holt et al., 2011).

Nevertheless, taking a complex approach requires choosing among various specific definitions of complexity.5 Following Rosser (2004), the relevant approaches that are in contention in economics are: the general view, the computational view, and the dynamic view. The advocates of the general view focus on the problem of reconciling microeconomic behavior and macroeconomic outcomes, recalling the old Keynesian problem of the fallacy of composition. The computability approach emphasizes difficulties of computation (Albin & Foley, 1998; Koppl & Rosser, 2002; Velupillai, 2000) or the ‘complicatedness’ of patterns of intersectoral connections and institutional relations (Pryor, 1995). The most pertinent type of complexity for the analysis of the Financial Instability Hypothesis is complex dynamics. Rosser (1999) has codified this as ‘broad tent complexity’ and draws on Day (1994) for its definition: a system is dynamically complex if, owing to endogenous reasons, it fails to converge to a point, a limit cycle, or a smooth explosion or implosion.

This broad tent complexity consists, in turn, of four sub-types—the four Cs: cybernetics, catastrophe theory, chaos theory and ‘narrow or small tent complexity’. The latter emphasizes the non-linear dynamics generated by dispersed and interacting heterogeneous agents (Arthur et al., 1997; Leijonhufvud, 2009; Tesfatsion, 2006).

Small tent complexity argues that behind the real and tangible components of an economy there is a set of beliefs—an ocean of both mutually competing and mutually reinforcing entities that will fall into a simple homogeneous equilibrium pattern only ‘by accident’ (Arthur, 1995). More often
they produce complex, ever-changing patterns. Interacting, non-equilibrium beliefs are unavoidable and since they govern economic behavior they may give rise to instability and crisis in the financial markets.

The most obvious implication of complexity is that a general assumption of rational expectations is very unlikely to hold: ‘complexity theory has shifted the perspective of many economists towards thinking that what was viewed as anomalous or unusual may actually be the usual and expected, especially in the realm of asset markets where the unusual seems increasingly commonplace’ (Arthur, 1995, p. 12). Agents deal with the indeterminacy of expectations formation by making decisions on ‘intuitive grounds’; i.e., ultimately relying on conventions, going with the herd or following their ‘animal spirits’. In this way, conventions shape the macro economy. That is, in contrast with the EMH, which largely ignored the formation of behavior, in the complexity approach ‘the way agents think about the environment, how they learn and process information, and so forth’ (Lucas, 1978, p. 1429) does matter for economic decisions.

When different people have different views about each other's expectations, as in Keynes's beauty contest, the results can indeed be dynamically complex. As John Foster (2005 p. 877) writes, ‘such systems come into being when mental models interact with each other. My imagination can still mould reality, but knowledge that this is so leads others to imagine what my imaginings might be.’ Furthermore, the problem of heterogeneous expectations renders the law of iterated expectations inoperative with respect to stock market returns (Allen et al., 2003); agents over-weight the relevance of public information as compared to private information in forming their expectations of returns.

The fact that the result of one's decision depends on the decisions taken by others gives rise to a special sort of interdependence. Nevertheless,

interdependence in itself is not a source of fundamental uncertainty, since it may merely generate complexity in a constant, or predictability changing environment with sufficiently capable people. One has to consider organic interdependence, where the whole may be more than the sum of its parts. Organic interdependence creates fundamental uncertainty in the sense that expectations must be about other people's expectations and this spreads fundamental uncertainty. (Dequech, 2001, p. 919)

The reality of complex dynamics undermines the classical view not only as regards the assumptions of rational expectations but also because the economy is not necessarily self-stabilizing or optimal and efficient. This kind of complex system becomes prevalent when people form aspirations and future commitments, and enter into forward contracts and other arrangements with terminal dates in the future. As I have pointed out, in financial markets agents are not identical and do not act according to the rationality assumed by EMH theorists, but make
decisions on the basis of conventions and the state of confidence. In this sense, the financial system is special compared to other parts of the economic system: self-referentiality results in structural instability particularly in highly fluid contexts such as financial markets. Securities markets can generate a bubble fuelled by over-lending and over-borrowing in the credit market. In this case, markets do not perform efficiently: not only do they fail to allocate capital allocated according to returns, but the bubble eventually collapses, leading to a credit crunch and the risk of severe downturns as in the current financial crisis.

Clearly then, such complex financial systems present many threats. When aggregate beliefs cease to bear a relationship to realistic possibilities in the presence of positive feedback or positive information spillover (i.e., when a given trader is made better off if everybody else is trading on his information) severe structural discontinuity can be the result. This is in sharp contrast with most information-based asset pricing models, in which the information spillover is in fact negative (i.e., a given trader is made better off if nobody else is trading on his information). Boom and bust may be the way that dynamically complex financial markets work.

Booms and busts may characterize any kind of market in which speculation is a significant factor: the stock market, currency markets, the markets for gold and other extractive commodities, commodities futures markets, the market for long-term bonds and last but not least the real estate market.

Under conditions of dynamic complexity and fundamental uncertainty, the agent does not buy a stock, a bond or any other assets only because the intrinsic value is high relative to its price, nor only because she thinks that the market thinks it is, but because everyone thinks that the market thinks that the trend will continue. The purchase of the security is a rational decision given the conventional beliefs that prevail at this moment. During a crash, the tacit agreement has been broken and all of the agents consequently begin to sell. Now, even when the price of the asset falls far below its intrinsic value, each agent, although realizing this fact, is nevertheless forced to liquidate to avoid the risk of ending up with a worthless asset.

The break in conventions triggers a set of reactions that cause the panic to spread (see Shiller, 1995). We might, however, wonder if it is not a matter of the emergence of a new convention, according to which, when the price decline reaches a certain threshold, everyone settles his or her position. Each knows that each knows that it is necessary to withdraw or to sell, and no one is inclined to wait for confirmation because the consequences of delay can be very dangerous. Almost all market participants think that the uptrend or decline is going to continue, because it has been going on for a long time. The collective consciousness, acquired through common experience of past events, is omnipresent. Yet every agent also knows that large-scale movements stop suddenly and brutally. Each knows that the tacit agreement during the rising trend tends to persist, and agents presume, therefore, that a good deal of time remains to buy and resell at higher prices before the crash. But, in contrast with the orderly exit strategy envisaged under the EMH, the agent knows that if she has not had the time or the opportunity to resell, that things will end badly with the sudden fall in prices after the break in the convention. Thus, self-referentiality
does not lead to market efficiency as in the EMH; instead, such automatic coordination inevitably leads to financial fragility and to crisis.

4. THE ‘NORMAL’ EVOLUTION OF COMPLEX FINANCIAL SYSTEMS TOWARDS FRAGILITY

In the previous section we saw how a complex financial system is inherently unstable, a view that conflicts with the claims of the EMH but is in line with those of the Financial Instability Hypothesis. The latter views financial instability as endogenous to the system: i.e., booms and busts are the result of the internal dynamics of financial markets. In this section we shall use this approach to explain various aspects of the current sub-prime crisis.

To understand the recent financial turmoil, an initial point to make is that one of the most important aspects of the US economy in the 1980s and 1990s was the increasing role played by institutional investors and money managers. That is, the financial markets in the US were not driven primarily by masses of individual investors (as was the case in Keynes’s day) or even by a few major professional stock market investors or investment bankers. It is no accident that Minsky labeled the post-1980 period the era of ‘money management capitalism’. Money managers now play a dominant role in the economy; corporate executives no longer operate with the autonomy that they had enjoyed in aftermath of the Second World War, since they are under intense pressure from money managers to drive up the short-term stock market valuation of their firms. Money managers exert this pressure through their control of pension and mutual funds, venture capital funds, private equity funds and, of course, hedge funds.

The consolidation of market power in the hands of the money managers has been driven by a huge process of financial liberalization, deregulation and reduced supervision that for nearly 30 years has characterized the EMH-inspired economic policy of the United States. These policies have encouraged two important structural changes in the financial system: securitization and globalization. Securitization involves pooling illiquid assets (mortgages, car loans, student loans) and issuing securities representing an interest in the pool. Financial globalization is the process of internationalization in both the funds and the assets of the funds, and has characterized the latest stage of capitalism.

By the early 1980s, financial market innovations were taking a lot of business away from the banks (Chick, 2008). Allowing for diversification of risk, these innovations, in the form of issued securities collateralized by pooled loans, eliminate the advantage the banks had previously held. Through these new instruments the institutional investors and money managers steadily eroded the banks’ share of assets and liabilities, since pension, insurance and hedge funds provided new and alternative sources of funds; banks were thus driven to become more ‘market oriented’ (Wray, 2008, 2009). At the same time, lenders ‘became more and more creative and enticed new and increasingly less creditworthy homebuyers into the market with exotic mortgages, such as “interest only” loans and “option adjustable rate” mortgages’ (Whalen, 2008, p. 12). These
structural changes have generated systemic problems. Increasing competition has encouraged fund managers to take on excessive risk given returns, and since similar models were widely used, the models themselves drove sophisticated, complex and globalized financial markets, within the US and without.

Combining these institutional and structural aspects of money manager capitalism with the ones discussed in Section 2, it is possible to derive new insights concerning the current financial turmoil. Group dynamics can in fact account for both the over-lending (by institutional investors, banks and other financial institutions) and over-borrowing (by households and firms) that occurred in the decade and a half that preceded the 2008 collapse. They can also account for the boom in the real estate and equities markets that drove the US financial system towards fragility and then to crisis.

As for the over-lending process, even though—from the microeconomic perspective—no financial institution alone was sufficient to generate a lending boom, this might have come about as a consequence of the actions of lenders who, in a context of complex dynamics ‘hunt in herds’. In other words, financial institutions (i.e., money managers) in the US adapted their behavior regarding the granting of loans to that of the others because, in this way, they had less to lose in terms of their reputation (cf. Azariadis, 1981; Keynes, 1936, [1937] 1973): taking a conservative or contrarian position as a bubble builds up should in fact result in performance unfavorable to peers (see Section 3 above), which might have affected the money managers’ employment and compensation. Given that the decisions of bankers are influenced by their beliefs and that their decisions constitute ‘signals’ for their peers, any improvement or deterioration in the ‘state of confidence’ (i.e., the state of credit) can spread rapidly throughout the whole system.

Over-indebtedness may in fact be fuelled by an excessive supply of available funds. In practice, a rightward shift in the supply of funds curve causes a shift in demand in the same direction: over-borrowing by households and firms plays a passive role in the process. This may explain why the US economy generated a boom and a real estate bubble. An improvement in the ‘state of credit’ increased the value of capital goods and other real assets, but this in turn led to an easing of credit constraints, with pro-cyclical effects. 7

A combination of the aforementioned elements led to an increase in the number of ‘Ponzi financial units’ during the US sub-prime boom, and then to an increase in overall financial fragility among lending institutions, households and purchasers of mortgage-backed securities. 8 That is, lenders provided funds to Ponzi borrowers (through sub-prime mortgage contracts) only because of a generally held confidence that housing values would continue to increase. Demand for housing was both a cause and effect of the fast expanding shadow banking system. Financial innovations facilitated the funding of ever-riskier mortgage loans at higher levels of leverage; this in turn helped drive the housing bubble as the availability of credit encouraged higher home prices. Furthermore, rising real estate values encouraged further issues of mortgage backed securities and especially sub-prime mortgage derivatives within the US and without.

As pointed out by Perez (2009), the two boom and bust episodes of the turn of the century—the internet mania and crash of the 1990s (which we may call the major technology bubbles, or MTB,
for short) and the easy liquidity boom and bust of the 2000s (ELB)—are two distinct components of a single endogenous structural phenomenon since they are strongly connected and interrelated: they must be viewed in the context of ‘long waves’ rather than as isolated episodes.

5. FROM THE US CREDIT CRUNCH TO THE INTERNATIONAL FINANCIAL CRISIS

The process of over-indebtedness described in Section 4 essentially hinges on the complex dynamics of the financial system along with the institutional and structural characteristics of current financial capitalism. During the boom of sub-prime loan contracts, the financial structure of the banks and other institutions became particularly fragile in the US, increasing the risk of a credit crunch and of a systemic financial crisis. The weight of this growing risk resulted in a rise in the cost of credit in the post-boom phases. The banks and institutional money funds intensified their monitoring activities with a consequent increase in agency costs and collateral requirements due to the increased risk faced by lenders. This happened as soon as the payment obligations increased at a higher rate than the expected future cash flow; the financial institutions came to believe that the new financial structure had deteriorated too much. In other words, they deemed the increase in leverage excessive and then pushed to reverse the situation. To the extent that the contracts made in the past were financed with short-term loans, the evolution of the financing costs had a negative impact on the value of these contracts when the time came to refinance them. The worsening of the ‘state of credit’ led to a drop in production, a drop in employment and a decline in the value of collateral (houses and equipment). Financial institutions raised lending standards, causing households and businesses to deleverage. Moreover, on account of the information asymmetry, the interest rate rise further worsened the ‘quality’ of the patrimonial assets of the banks which, once the rate considered optimal was exceeded, decided to ration the credit: this drove investment, income and employment down even further (Whalen, 2008).

At this point, as the credit available to the private sectors was rationed or the conditions on which they could get access to credit became more onerous, households and firms were forced to liquidate their financial assets, or even to sell their real assets (houses and equipment) in order to meet their obligations. Alternatively, they could have attenuated the problems by offering additional collateral to their creditors. However, during the credit crunch the sale of capital goods and real estate triggered a further collapse in the price of these assets, and so not only provoked a drop in the patrimonial value of collateral assets themselves but, through the effect on asset prices, caused a further drop in the internal net worth of households and firms in real terms. Such a situation increased the risk of a debt-deflation process (see Fisher, 1933; Sau, 2005). As is well known, the credit crunch also negatively influenced the stock market; the resulting negative impact on aggregate consumption and aggregate investment further aggravated the drop in income and employment.
The failure of Lehman Brothers on September 15, 2008, undermined investors’ confidence and was interpreted as a sign that the entire financial system was in danger; consequently, many believed that it was time to call for loans to be repaid, thereby triggering a self-fulfilling systemic crisis. The latter further aggravated the negative impact on the real variables. The erosion of lenders' confidence and the heightened sense of fundamental uncertainty set off a withdrawal of capital from financial institutions, even from those that were still sound from the point of view of their balance sheets. This caused a big drop in loans and thus, through the multiplier, in deposits, weakening the balance sheets of other banks and driving some of them into insolvency.

This sequence of events in a complex financial system is in line with the financial instability hypothesis. The huge wave of defaults on the part of homeowners, highly leveraged mortgage-backed lenders, and holders of mortgage-backed securities was partly due to panic; but it was also due to recognition that precarious borrowing had woven its way into the entire system—indeed into the global financial system—and nobody really knew where the greatest dangers lay (see Wray, 2008). According to this analysis, panic phenomena originating, once again, in a situation of complex dynamics and organic interdependence can explain the effect of contagion and propagation that occurred in the case of the US. The effect was even more disastrous because the prominent role of the inter-bank market caused a chain reaction within the area and also among the banks in the other countries.

The bankruptcies of several banks and financial institutions in the US—eventually brought to a stop by lender-of-last-resort action on the part of the Federal Reserve System—meant a drastic reduction in firms’ access to credit. But the absence of bank financing led to ‘equity rationing’ for many of them due to the effect of the negative signal or because they were able to secure direct sources of financing only on onerous terms: the information spillovers (within individual countries) can therefore offer a plausible explanation of why the effects of the bank crisis were so devastating on the stock market inside the US. Group dynamics also had a strong impact on other countries because of the possibility that financial instability in the US could be transmitted to others countries with similar institutional characteristics as regards the financial system and by means of a change in the global state of confidence (see Sau, 2003).

The failure of the banks and financial institutions and the process of disintermediation were therefore particularly important, for they were what led first to information destruction and then to coordination failure. The latter would inexorably lead, in the absence of international lender of last resort activity and large-scale deficit spending policies, to the risk of collapse for the global economic and financial system.

6. CONCLUSIONS

The aim of this paper was to contrast the Efficient Markets Hypothesis with Minsky’s Financial Instability Hypothesis, taking into account the role of fundamental uncertainty and organic
interdependence driven by the dynamic complexity of financial markets. This approach may indeed generate analytical tools to account for the crisis through processes endogenous to contemporary economics.

The leading theoretical approaches in finance and in macroeconomics have proven unable either to anticipate or account for the causes and effects of such phenomena. In order to gain a more thorough understanding of what has happened in the current financial crisis it is necessary to elaborate a new approach that takes account of the role of complexity in the financial system. Group dynamics can fuel speculative bubbles in asset markets and propel overreactions in both the lenders' and borrowers' attitudes toward risk. These in turn can lead to financial fragility and instability following a variety of complex dynamics.

A complex financial system is in fact inherently unstable: in the absence of adequate economic policy, boom and bust phenomena in the financial markets fuelled by credit booms and busts can generate endogenous instability and systemic crises, as in the case of the US sub-prime crisis. It follows that financial instability and crises are not merely isolated events caused by exogenous shocks, but are inevitable and recurring features of financial capitalism that need to be managed through the implementation of appropriate economic policies.

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Notes

1 This point is controversial particularly in the Post-Keynesian literature. Paul Davidson (1994, 1996), for example, does not believe the study of complexity in capital markets enriches Keynesian analysis. The controversy remains open and is beyond the scope of the present paper.

2 The association of financial crisis with boom and bust phenomena in the financial markets, fuelled by credit booms and crunches, has a long tradition; in addition to the writings of Minsky (1977, 1982), which are the focus of the present paper, other key contributions in this tradition have been made by Mitchell (1913), Fisher (1933) and Kindleberger (1978).
With regard to functional efficiency, EMH, once again, stresses the existence of a complete set of markets and the presence of a secondary perfect resale market.

Self-referential rationality, or cognitive rationality, has in fact been discussed at length in the behavioral finance literature (see, for example, Shleifer, 2000).

Rosser (2005) notes that the MIT physicist Seth Lloyd identified about 45 different definitions of ‘complex systems’ from various disciplines (although most of these are not useful for economics).

For discussions of how herd behavior may lead to unstable expectation formation, which causes the market to oscillate between chaotically rising bull markets and chaotically declining bear markets, see Banerjee (1992), Bikhchandani et al. (1992), Day & Huang (1990), and Farmer & Sharen (2002). Keynes (1936, pp. 144–145) noted that during a boom, over-indebtedness is linked to the attitude towards risk of both lenders and borrowers: ‘two types of risk affect the volume of investment which have not commonly been distinguished but which it is important to distinguish. The first is the entrepreneur’s or borrower’s risk and arises out of doubts in his own mind as to the probability of his actually earning the prospective yield for which he hopes. If a man is venturing his own money, this is the only risk which is relevant. But where a system of borrowing and lending exists, by which I mean the granting of loans with margin of real or personal security, a second type of risk is relevant which we may call the lender’s risk. This may be due either to moral hazard, i.e. voluntary default or other mean of escape, possibly lawful, from the fulfilment of the obligation, or to the possible insufficiency of margin of security, i.e. involuntary default due to the disappointment of expectation. ... During a boom the popular estimation of the magnitude of both these risks, both borrower’s risk and lender’s risk, is apt to become unusually and imprudently low.’ (Our emphasis.) During a market bust the effects are the opposite of those described above.

As Kregel (1998, p. 2), paraphrasing George Soros, notes: ‘in financial markets based on expectations of future values, the very act of lending may change expectations and thus the “fair” value of the collateral used to secure the loan. This suggests a positive relation between the value of the collateral and the value of the loan it secures — lending may strengthen the firm and thus the bank.’

The terms ‘Ponzi finance’ and ‘Ponzi financial units’ were coined by Minsky (1982). A Ponzi scheme is a good example of a positive-feedback system: its output (profit) is fed back to the input (new investors) causing rapid movement toward collapse.
REFERENCES


