

The Legitimacy Crisis of the Economic Paradigm

Zora Kovacic¹

Institut de Ciència i Tecnologia Ambientals (ICTA)
Universitat Autònoma de Barcelona (UAB)

The financial crisis that started in 2008 is explained in terms of a series of normalisations, which pooled together prime and subprime mortgages, assets and debts, private and public debt. Such practices spread risk to the financial system as a whole and drastically reduced the information available. As a consequence, capital accumulation was achieved independently of whether the added value was real or virtual. The financial crisis illustrates the limits of normal science, that is, the dramatic simplification of the perception of the external world associated with the adoption of narratives referring to a single scale and a single dimension. Reduced diversity in the input of information combined with the inherent instability of financial markets results in the systemic presence of high uncertainty. In this situation, technical knowledge does not have the means to deal with, or control, the crisis and thus cannot guide decision making. The limits of technical knowledge can be observed in the worsening of the crisis, which is affecting the whole economic sector and leading to increasing unemployment and political delegitimation throughout Europe. This paper suggests an alternative interpretation of the financial crisis based on the insights offered by hierarchy theory. A multi-scale approach is used in order to identify the changing function of the financial sector at different scales of analysis and the transmission mechanisms through which rent-seeking practices at the individual level result in systemic instability at the societal level.

I. Introduction

This paper looks at the global financial crisis of 2008 through the insights provided by hierarchy theory. The changing role of financial intermediaries is analysed both

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at the micro level with respect to the profit maximisation rationale of banks and at the macro level with reference to the role of the financial sector in regulating monetary flows. The central tenet is that the individual and the social scales cannot be analysed using the same theoretical approach.

The sluggish response to the financial crisis can be understood in terms of a progressive loss of information, increased uncertainty and the rise of technocratic approaches to financial economics. The loss of information is a consequence of normalisation, defined as the “strenuous and devoted attempt to force nature into the conceptual boxes supplied by professional education” (Kuhn 1962, 5). Normalisation leads to a reduction in the diversity of perceptions and representations of the external world. Signals coming from the external world are forced into a uniform standard of variables with a consequent loss of relevant information. The systemic loss of relevant information increases uncertainty and makes the use of static models obsolete. Normalisation consisted of the pooling together of information on high- and low-risk borrowers first, assets and debts second, private and public debt last. The mixture of signals deprived the market and its agents of the means to deal with the crisis. This paper reinterprets the events that led to the financial crisis by opposing the systemic view of multi-scale analysis to the reductionism of normalisation.

The first section gives an overview of the events that led to the financial crisis, starting from the subprime mortgage crisis in the US, to the global financial crisis and to the sovereign debt crisis of peripheral European economies. The second section introduces the different descriptive domains used in economics, namely, microeconomics and macroeconomics. The systemic view adopted highlights the limits of the tools used by conventional economics in explaining the crisis. The third section shows how the technocratic narrative hides the uncertainties inherent in the economic system through the use of allegedly neutral mathematical and statistical models. In such a context, only the experts can deal with the crisis thanks to their specific knowledge, assumed to be valuable ‘by default’.

We argue that the financial crisis is in effect a crisis of legitimacy for technical knowledge. More and more in modern states, democratic knowledge requires a political system that can deal with epistemological relativism, that is, define what is relevant according to the diversity of perceptions present in society. The concluding remarks note that experts do not have the means or the legitimacy to guide decision making given the high uncertainty that characterises the financial system. The use of mono-scale indicators such as risk ratings deprives us of the information and tools needed to deal with the crisis.

II. What happened?

The financial crisis can be explained in terms of a series of successive normalisations, which led to a strong hegemonisation in the choice of narratives used to perceive

and represent the external world and to a progressive loss in the ability of gathering useful information and developing tools to control and monitor the financial market. By normalisation, we mean the use of quantitative representations based on uni-dimensional measurements typical of statistical models. Normalisation is a way of dealing with complexity, by reducing all relevant information to a manageable set of variables. In this simplified representation, observed phenomena are characterised according to a single defining category of observable attributes that is used to study a trend and then to predict by inference the behaviour, or probability of occurrence, of future phenomena. The progressive loss of transparency leading up to and aggravating the financial crisis is divided into three steps or mechanisms of normalisation, namely, the blurring of prime and subprime mortgages, the securitisation mechanism and the substitution of private by public debt.

What is now known as the global financial crisis started as a mortgage crisis in the US in 2007 that expanded to financial markets and took on a global dimension. The mortgage crisis started with the excessive issuing of subprime mortgages associated with the housing market. Subprime mortgages are loans that present a high risk of default because of the limited capacity of the borrower to repay the debt. The creation of subprime mortgages originally responded to the US government's initiative to provide home ownership to a larger share of the population. The Federal National Mortgage Association, commonly known as Fannie Mae, was created after the Great Depression for the very purpose of facilitating access to house mortgages to lower income families (Fannie Mae 2013). The financial crisis can hardly be attributed to this type of social policy, nor traced back to the 1940s. The proliferation of subprime mortgages is better explained as the result of the profit maximisation logic pursued by banks as rational agents at the individual scale, which is incompatible with the welfare rationale pursued by the government at the societal level.

In order to minimise risk, banks (used to) screen all potential borrowers and select candidates according to their capacity to pay back the loan. This practice limited the number of potential clients who could access financial services. The problem was solved through the issuing of subprime mortgages, that is, mortgages subject to refinancing every two or three years. Refinancing refers to the redefinition of the interest rate paid on the loan based on house prices and on financial market borrowing costs, measured by indexes such as the London Inter-Bank Offered Rate (LIBOR). That is, if the value of the purchased assets increases in the house market (due to speculation) or in the financial market (due to better conditions offered on loans), the interest paid on the mortgage is renegotiated so as to match the new conditions of the market. The ability of the borrower to repay is linked to the price of the asset, and as house prices were rising in the US, the value of the asset purchased would rise and so should the borrower's capacity to repay the loan (Gorton 2008). Since the borrower shares the gains from the housing market's appreciation, she/he has a greater incentive to keep paying the loan. However, the assets created are directly exposed to fluctuations in house prices. As happened

in the US, if the economic venture stops growing trouble sets in: once the prices of houses flattened, subprime mortgages could not be repaid.

The creation of subprime loans can be understood in terms of normalisation, that is, a reduction of all relevant information to one single indicator. Borrowers are reduced to statistical characteristics, where “all important information can be reduced to a set of numbers and converted to quantifiable default risk” (Marglin 2011, 15). Credit insurance policies, which offered the illusion of zero risk trade, also played a role in the normalisation process, as discussed below. Following this mechanism, the only relevant variable is the capacity to repay the loan, and a variety of economic agents are classified into just two categories: prime or subprime borrowers. Since the market can now rely on default risk indicators, the identity of the borrower becomes irrelevant.² The number of potential borrowers increases at the cost of a loss of information, and of a reduction in the effectiveness of risk control mechanisms.

Subprime mortgages were financed through securitisation, that is the creation of financial derivatives from a pool of mortgages, prime and subprime. That is, banks created financial derivatives called securities to be sold to investors as a means to raise capital which in turn could be lent to borrowers. The high risk associated with subprime mortgages is thus distributed to a variety of securities and reduced to a small percentage of the new financial derivative. A laxer screening of borrowers is required, because high risk mortgages can be redistributed to a number of securities. The Mortgage Backed Securities (MBS) created are themselves subject to fluctuations in house prices. Securitisation opens new channels of transmission of risk from one market (housing) to an other (financial). MBS can be seen as risk-transferring devices (Carbó-Valverde *et al.* 2012), enhancing the asymmetries of information associated with risky assets.

Securitisation offered a great incentive to take on new risk, as this could be redistributed to different financial products. Mortgage backed securities were themselves used as collateral, that is protection against a borrower’s default, to create Collateralised Debt Obligations (CDO), a type of security backed by a variety of assets associated with different risk levels, structured in tranches so that investors are repaid in a prescribed sequence. That is, MBS were pooled together with other securities, split into different chunks and used to create a new type of security: CDO. CDOs create additional risk, as they add new transactions to the existing mortgages. “There are (at least) two layers of structured products in CDO. Information is lost because of the difficulty of penetrating to the core assets” (Gorton 2008, 62). CDO issuance tripled over the period 2005–07 (Gorton 2008). CDO were further developed into a cash flow CDO – where the mortgage is actually bought and used as debt collateral – and a synthetic CDO – where the obligation

² As opposed to microcredit, where credit is given based on the identity of the borrower, her/his community ties, neighbours’ references, and so on.

is guaranteed through Credit Default Swaps (CDS), that is, an agreement that guarantees that the seller buys back the asset in case of default.

CDS can be seen as a type of insurance against default on underlying risk, when this risk can no longer be measured. Since CDO contain different securities linked to different risk levels, instead of trying to calculate the risk associated with the new financial derivatives, CDS were created as insurance against risk. CDS transfer the risk of default from the buyer to the seller of the financial derivative in exchange for the payment of a premium (Terzi and Uluçay 2011). In the context of diminishing information due to the restructuring of financial products into new exotic products, this type of insurance became the most traded derivative. CDS came to be traded as financial products themselves. The CDS market experienced a spectacular growth from \$1 trillion in 2001 to \$54.6 trillion in 2008 (Ibid). The nature of CDS also broadens the scope of actors involved in transactions, and insurance companies come into play as well as credit-rating agencies, which determine the price of CDS. The involvement of a plurality of agents aggravates the potential for the asymmetrical bearing of risk among the different actors involved, a point which we will return to later.

We characterise the creation of new financial products as a second type of normalisation. Securitisation allows the inflation of assets through leveraging (where asset value is amplified by the increased number of transactions), independently of whether the value created is real or virtual. Loan pooling leads to a destruction of information (Carbo-Valverde *et al.* 2012). Normalisation is taken to a second step, reducing all sorts of assets and debts to pooled financial derivatives and making it impossible to distinguish real from virtual capital. After this step is taken, the composition of the financial derivatives traded becomes completely irrelevant. Additionally, the creation of CDS reduces risk itself to a tradable product.

The loss of information creates the need for rating agencies to evaluate the risk associated with the various financial products traded. The main credit-rating agencies are Standard & Poor, Moody's, and Fitch Ratings, which offer ratings on the credit quality of securities traded in markets worldwide. Ratings are based on the estimated solvency (capacity to pay back the loan) of the issuer, and are calculated based on information provided by the issuers themselves on their operations, finances, and management plans. Ratings also serve to determine the interest rate that companies pay on their debt and the price at which debt is traded (Business Week 2002). Rating agencies supposedly aggregate information on the behaviour of financial institutions, so that ratings act in financial markets in similar fashion to price in commodity markets. In a perfect competition economic model, prices ensure equilibrium between demand and supply through the market mechanism. However, the rating mechanism is not as neutral as the perfect competition price mechanism insofar as the main shareholders of rating agencies are the issuers themselves, including investment banks, hedge funds, and insurance companies.

The London Inter-Bank Offered Rate (LIBOR) presents an interesting example of the conflict of interest that banks may face when providing information on their

estimated incurred risk. Financial indicators such as the LIBOR are used to calculate both returns on personal mortgages and on investment and pension funds. LIBOR measures banks' borrowing costs and is calculated on a daily basis, based on estimates provided by the largest 16 banks. All submissions are published, top and bottom ratings are excluded, and the index is calculated as the average of the remaining rates. Therefore, in times of crisis "all banks might be tempted to submit artificially low LIBOR estimates" (The Economist 14/04/2012). Barclays is under investigation over a scandal on rate fiddling during the peak of the 2008 crisis, where it figures as the highest average submitter. Given that financial market stability is closely linked to ratings, it is unsurprising that the former chief executive of Barclays declared that rate manipulations followed a suggestion by the Bank of England that Barclays did not always need to appear as high as they had on LIBOR (The Economist, 07/07/2012). In other words, the rating mechanism enhances the loss of transparency and the blurring of the line between the private and the public spheres.

The reduction of information implied by the use of normalised indicators such as risk and of the increased reliance on intentions-conveying ratings, opened the way to moral hazard at the micro level, ultimately leading to a market failure at the macro level. Moral hazard is a "situation in which one person makes a decision about how much risk to take, while someone else bears the cost if things go badly" (Krugman 2009). Moral hazard in this context occurs when there is asymmetric information on the amount or location of risk. In the case of the 2008 financial crisis, these variables were unknown to all the players so that moral hazard became a systemic problem. The creation of collateralised securities led to the practice known as "shadow banking" whereby credit is given with the purpose of distributing it rather than holding it until maturity (Andersen *et al.* 2011). The restructuring of loans into new securities allows banks to create new capital more rapidly, that is, before the original loans are serviced by borrowers. This in turn allows for higher leverage, that is, a higher ratio of credit to capital. The function of banks thus went from that of regulating the flow of credit to that of creating new credit (or debt). This practice is also known as originate-to-distribute (Gorton 2008), as the credit created leads to more trading, instead of being held by the issuer. New risk is diluted in a variety of products, reducing the risk of single investments but increasing the overall risk of the financial market.

A similar interpretation is offered by the principal-agent argument. The principal-agent problem describes a "potential conflict of interest between 'principals' whose resources are being deployed to some economic end and 'agents' who act on behalf of principals to carry out the deployment" (Marglin 2011, 14). The conflict of interest arises when the agent benefits from the number of transactions carried out and not from the outcome of those transactions. In the long run, financial intermediaries need to guarantee returns to their investors if they are to keep their clients, so that their interests should converge. At the micro level, financial agents responded 'rationally' to the new opportunities that arose, by exponentially increasing the number of

clients and financial products marketed. At the macro level, the loss of information deprived agents of the instruments needed to recombine diverging interests in the long term. Therefore, the principal-agent problem, or the systemic moral hazard created, are better explained as a change in descriptive domain at different time scales. According to Kalecki (1991), the economy operates in historical time, where investment decisions and actual investments do not occur simultaneously, causing imbalances in the economy. The “complexity” of the financial system (Minsky 1993) lies in its changing function at different scales of analysis at different points in time.

The trigger of the financial crisis can be traced to the collapse of Lehman Brothers. Due to the wide dissemination of subprime mortgages and of securities, the market was “awash with capital but short on liquidity” (Lapavitsas 2009, 121). In other words, financial institutions had built financial assets without having the money to repay obligations. Once the housing bubble burst, subprime loans could not be refinanced, a large amount of borrowers started systematically defaulting on their mortgages, and banks did not have the capital necessary to pay their debts. The lack of liquidity led to insolvency. Bear Sterns was the first bank to fail, and was bailed out by the US government. Fannie Mae and Freddie Mac followed suit and needed government support. With Lehman Brothers the situation changed, as the government did not rescue the bank.

After failing to sell its assets, Lehman Brothers declared bankruptcy in September 2008. Lehman Brothers had re-hypothecated many of its clients’ assets to the point where it could no longer measure the level of risk associated with its financial products. In fact, after bankruptcy, many of these assets could not be returned (Aragon and Strahan 2011), and insolvency turned into liquidity loss. The bank had to service its debts with the little capital it actually owned, which in turn diminished liquidity even further. The collapse of Lehman Brothers turned the mortgage crisis in the US into a financial crisis that went global, as it affected the equity indexes of financial markets all over the world (Bartram and Bodnar 2009). Thanks to the high ratings the bank received from rating agencies, Lehman was a big swap counterparty in the interbank market, that is, a key player connected to many international institutions. In particular, Lehman had a liquid CDS (risk insurance derivative) with low probability of default that was selling cheap on the market. The default of Lehman triggered those payments guaranteed by CDS, leading to huge losses across the financial sector on a global scale. The effect was seen with the bankruptcy of the insurance company AIG almost immediately after Lehman. Insurance companies cover events that are assumed to have independent probabilities and are not prepared for generalised losses, such as those caused by natural catastrophes. In this sense, Lehman was like a natural disaster causing generalised default on all purchasers of its CDS and triggering losses over the whole financial market.

Kindleberger and Aliber (2005) explain financial crisis as cycles of manias, defined as the exponential increase in the supply of credit in the form of real estate, stock or currency bubbles, followed by panics, due to the bursting of the bubble.

“During economic expansions investors become increasingly optimistic and more eager to pursue profit opportunities that will pay off in the distant future while lenders become less risk-averse” (Kindleberger and Aliber 2005, 12). Minsky (1992) distinguishes between hedge finance (when income flows are able to meet the financial obligations both of the principal (actual loan) and interest payments), speculative finance (when income flows are able to cover only interest payments and thus new debt has to be issued in order to meet payment commitments), and Ponzi finance (when income flows are not sufficient to fulfil either the principal or the interest payments). Financial crises are caused by a shift towards speculative and Ponzi finance, which results in increased risk. The proliferation of subprime mortgages first, and exotic financial derivatives and insurance premia successively, constituted the asset bubble. The inclusion of new borrowers led to the introduction of new levels of risk in the financial market, which was not matched by the introduction of a new regulatory framework to deal with the extra risk. The new financial products greatly contributed to the instability of financial markets, as risk was spread and redistributed to new players, new products and new markets. The increased instability can be attributed to the moral hazard implied by the new unregulated opportunities for investment and speculation.

Due to the high integration of financial markets and the chain reaction caused by claims on CDS, it is argued that the crisis took off as a global financial crisis from the beginning (Kamin and Pounder DeMarco 2012). The devaluation of equities implied that more and more selling orders were filed, further lowering quotes for equities in a downward spiral. Once securities started losing value, purchasers rushed to sell them back to the financial market in order to minimise losses. The increase in sales further lowered the value of the assets traded. The result was a destruction of equity value of \$29 trillion between September 2008 and February 2009, equivalent to 50% of global GDP (Bartram and Bodnar 2009). Given that financial products are used mostly to finance other financial products, that is, the virtual value generated stays in the financial circuit and does not directly enter the real economy, this loss was not felt with the same magnitude in terms of GDP. Nonetheless, the loss of value did not only concern financial markets but also affected other industries, since financial assets are part of companies' balance sheets. After the collapse of Lehman Brothers, international trade declined by 30% (Dooley and Hutchison 2009). The loss in equity value forced banks to recapitalise, that is, financial institutions started restraining credit and keeping capital in order to cover for the losses in asset value. The contraction of credit forced enterprises to cut back on output and employment (Lapavitsas 2009), leading to an economic slowdown worldwide.

The high integration of financial markets and the distribution of risk to virtually all structured financial products explain why the crash of the subprime mortgage market triggered a worldwide financial crisis. The collapse of financial institutions considered “too big to fail” called for the intervention of governments, as lenders of last resort. This mechanism resulted in yet a third normalisation, where the

distinction between private and public debt was lost. “The crisis paralysed the financial system and progressively disrupted real accumulation. Central-bank intervention has been pervasive but not decisive, forcing governments to intervene to rescue banks and ameliorate the recession” (Lapavitsas 2009, 124). Four years later, the crisis turned into a sovereign debt crisis as systemic risk had been passed on to governments not prepared to support the bail out of such big institutions. Ireland in 2010, Portugal and Greece in 2011, have all received bailout packages from the European Central Bank and the International Monetary Fund as they had no access to bond markets because their spread was too high.

Ratings played a central role during the crisis, as they were “the sole source of information for marking-to-market” (Gorton 2008, 58). Rating agencies base their evaluation of private and governmental institutions on interviews, published data, balance sheets and declared intentions. This mechanism strengthens the link between economic performance and politics. Once governments start acting as implicit loan guarantees in financial markets, confidence on state bond performance comes to depend more closely on political stability and the ability to carry out and implement long term plans.

The need to maintain market confidence is not a new phenomenon. As a matter of fact, since the abolition of the gold standard, the value of national currencies has been determined by how economies are perceived internationally, rather than by the amount of trade going on (Douthwaite 2000). What distinguishes the current sovereign debt crisis is the fact that governments themselves do not have the means to measure nor locate their debt. Furthermore, within the European Monetary Union the value of the currency is established at the European level, and does not reflect the perceived trustworthiness of each individual country using it. Ratings in this context come to substitute the role previously held by national currencies.

European economies were particularly vulnerable to the crisis, as the financial sector was an important contributor to GDP, accounting for 29.3% for the EU-27 in 2010 (Eurostat 2012). Financial institutions considered “too big to fail” took on too much risk (Stiglitz 2010) and had to be rescued by governments. McKinley (2011) argues that the government bailout of Bear Sterns, the first US bank to fail in 2007, led the market to believe that other institutions, including Lehman Brothers, would also be rescued if needed. Following the bailout logic, corporate CDS (private debt) was substituted by sovereign CDS (public debt). The normalisation mechanism made possible the interchangeable use of public and private debt. Investors turned to risk-free assets, such as solvent sovereign bonds. However, as the crisis took on a dimension that was too big for governments to guarantee, the very solvency of sovereign states started to be questioned. Ratings of governments were downgraded. The financial crisis developed into yet another dimension, turning into a sovereign debt crisis.

The impact of the economic slowdown was especially felt in the European periphery, or what are known as the PIGS (Portugal, Ireland, and later Italy, Greece

and Spain). We argue that the economic crisis that PIGS are experiencing is aggravated by the single currency. The European Monetary Union (EMU) brought huge benefits to those countries that previously had to pay higher interest rates to borrow in the market (Issing 2011). EMU enabled member states to access cheap financing, thanks to the market's confidence in the new currency, without solving the underlying imbalances or fiscal deficit problems. At the same time, EMU binds different economies to a single monetary policy, so that currency devaluation and other policies that were generally used to deal with current account or fiscal account deficits could no longer be used by individual countries.

This situation can be described as the 'open-economy trilemma', that is, "countries cannot simultaneously maintain independent monetary policies, fixed exchange rates, and an open capital account" (Rodrik 2000, 180). The European Central Bank (ECB) regulates the currency, whereas fiscal policies are left to individual countries. "The fact that the peripheral euro zone countries could issue debt in their own currency appears to have allayed fears regarding currency mismatch problems as well as contagion effects; nevertheless, the consequences of the inability of the peripheral euro zone countries to exercise an independent monetary policy were ignored" (Katsimi and Moutos 2010). The boundaries imposed by the EMU aggravated the consequences of the loss of information caused by normalisation, depriving the PIGS of the means to deal with the crisis and forcing a shift of decision making to higher level players, that is the European Central Bank, the IMF and the European Union. As a consequence, the impact of the global financial crisis was distinctively different in Ireland and in the UK, for example. Whereas the UK responded with a loose monetary policy that led to a devaluation of the British pound, Ireland could not pursue an independent monetary policy and witnessed a sharp increase in sovereign debt and unemployment (Mushin 2010), eventually leading to an internal devaluation by means of prices and wages.

Greece entered the EMU with a higher budget deficit than that posed by the Maastricht Treaty as the limit. Thanks to its imminent entrance into the Euro zone and the market's consequent belief in the realignment of European economies through the monetary union, its government had access to cheap financing, and it temporarily eased its debt and was accepted into the EMU. The entrance into the monetary union allowed for a temporary alignment of the ratings of member states and normalised borrowing conditions. The blurring of information in favour of ratings on intentions and expected market stability undermined the capacity of the peripheral European economies to react to financial crises from the start. Greece's economy was characterised by excessively large public spending and an almost exclusive reliance on the tourism sector as a source of revenue. It follows that government borrowing sustained economic growth, without an increased productive capacity and even without any adjustments in public spending. "In 2009, Greece hit a budget deficit – the difference between state spending and tax receipts – equivalent to 15 per cent of GDP, bringing total government debt levels to €300 billion, the equivalent of 127 per cent of GDP" (Mullan 2011). The financial

crisis and the consequent crisis of confidence in financial instruments precipitated the country's ability to borrow on financial markets and destroyed its means to repay its debt.

Another example is given by the Spanish case. Spain witnessed a housing bubble similar to that of the US, and a similarly spectacular spike in house prices led to increased lending by banks, expecting high returns on investment. The liquidity need of banks led to increased loan securitisation (the second normalisation) as a way to raise more funds, resulting in an increased issuance of asset backed securities from 3 billion Euros in 2008 to 16 billion Euros in 2009 (Carbó-Valverde *et al.* 2012). Construction and real-estate loans accounted for 43% of GDP in 2009 (IMF 2012). The financial crisis made it impossible for real estate companies to pay back their loans. Insolvent real estate agents thus had to give away unsold property to the banks, which were thus exposed to losses in real estate value themselves and started restraining credit. Additionally, Spain was particularly vulnerable to the contraction of credit caused by the crisis as a high share of investment was funded from abroad. Once the crisis started, this inflow of money stopped and aggravated the domestic recession. The dimension of the crisis forced the government to step in and rescue the "too big to fail" players, turning private debt into a sovereign debt crisis (the third normalisation) and coming to rely exclusively on ratings to overcome the complete loss of information.

III. Multiple descriptive domains

Economics as a discipline is composed of two descriptive domains, microeconomics and macroeconomics. A descriptive domain is a particular description of the system determined by a specific "choice of mapping only a certain set of its qualities/properties" (Giampietro 2002, 247). In other words, the numerical assessment used to describe a system reflects not only the characteristics of the system but also the goals and beliefs of the analyst, which explain the apparently arbitrary choice of mapping in a certain way only certain characteristics considered more relevant than others (Ibid).

Microeconomics looks at the individual scale, and is concerned with end-means utility maximisation with relation to consumers and profit maximisation with relation to firms in a context of modest scarcity (Gravelle and Rees 2004). The analyst believes that human behaviour can be described, and modelled, in terms of rationality. Microeconomics simulates the exercise of a psychologist, albeit with a very narrow understanding of cognitive processes (Kahneman and Tversky 1982): it describes human behaviour in terms of rationality and measures utility, risk aversion, and preferences. Macroeconomics deals with a different scale of analysis, looking at the national level, and is concerned with the "structure, performance and behaviour of the economy as a whole" (Snowdon and Vane 2005, 1). Macroeconomics resembles more an accounting exercise, it tackles the

question of how to characterise and measure the size of the economy defined through various expected aggregate balances: trade balance, fiscal balance, equilibrium employment and so on.

Macroeconomics measures the system as a whole and is concerned with aggregate output and employment, while microeconomics describes the workings of the sub-systems, that is, the individual consumer and firm through allocation, production and distribution. The two descriptive domains deal with non-equivalent scales, and need an analytical framework that can move across different scales and relate them to each other. Economic theory, however, does not deal with the change of scales and uses the same theory for both micro and macro analysis (Solow 2003). This inconsistency has been characterised as ‘theoretical schizophrenia’ (Greewald and Stiglitz 1987; Snowden and Vane 2005). Keynes’s attempt to introduce a different descriptive domain for macroeconomics was successively reduced to the application of micro theory to macro analysis through the neoclassical synthesis of Keynes, resulting in the IS-LM model. “Keynesian macroeconomics and orthodox neoclassical microeconomics integrated about as well as oil and water” (Snowdon and Vane 2005, 21), precisely because they deal with non-equivalent descriptive domains.

Successive developments resulted in the New Classical approach, attempting to adapt macroeconomics to micro foundations, and New Keynesian theories, trying to adapt micro to macro economics. Both schools of thought neglect the issue of scale altogether by reducing the analysis to one dimension: micro for the New Classics and macro for the New Keynesians.

The reductionism of the social to the aggregate of individuals fails to describe social relations, structures, power, conflicts and meanings (Fine 2002) and fails to acknowledge the incommensurability between the two descriptive domains. Condorcet and Arrow both contributed to showing the difficulties and theoretical challenges involved in modelling social behaviour as an aggregate of individuals. The Condorcet paradox demonstrates how collective decisions do not always result in consistent preference ordering (Munda 2005), so that at the societal level it makes more sense to talk about procedural rather than substantive rationality (see Simon 1978). Arrow’s impossibility theorem demonstrates that social preferences cannot be defined without violating transitivity or non-dictatorship and speaks of “a ‘democratic paralysis’, a failure to act due not to a desire for inaction but to an inability to agree on proper action” (Nath 1969, 136). Notwithstanding the impossibility of defining the social optimum, social welfare theory assumes that individual preferences determine the socially optimal allocation of resources through the market mechanism.

Overlooking values and decisions taken at the individual level also fails to explain the emergence of properties at the social level (Prigogine 1986). Simon’s parable of the watchmakers offers a great example of how the different assembly procedures (at the micro level) adopted by two watchmakers produced watches of the same quality (at the macro level) but ultimately led one of the watchmakers

to go out of business (Simon 1962). Similarly, an analysis of the financial crisis at the macro level may overlook the effect of greed and corruption and of the disappearance of social values such as guilt and shame at the individual level in the name of profit maximisation, which supposedly translates into wealth creation for society as a whole.

The theoretical gap is difficult to overcome because micro and macroeconomics deal with different scales of analysis. Individual behaviour and social behaviour cannot be compared or measured using the same tools. Viewing the social as a system implies that the whole is more than the sum of its parts, that is, the interactions among the parts determine the properties of the whole (Simon 1962). In the social context, the individual's rationality is influenced by a variety of factors ranging from reciprocity, to reflexivity, solidarity, competition, and etc. (Polanyi 1957; Singer 2002). The problem of how to move across non-equivalent descriptive domains, when moving from the micro to the macro scale, is simply ignored by methodology. Basing macroeconomics on micro foundations results in an accounting exercise precisely because it does not recognise 'society' as a different concept from the sum of 'individuals' and proceeds to add up and balance aggregate savings and aggregate investments, imports and exports, government spending and taxes. The economy is treated like a black box: what happens inside the economy is irrelevant, so long as inputs come out as outputs at the other end of the line. Adapting microeconomics to macro theory, on the other hand, ignores the implications on a large scale of moral hazard and asymmetric information.

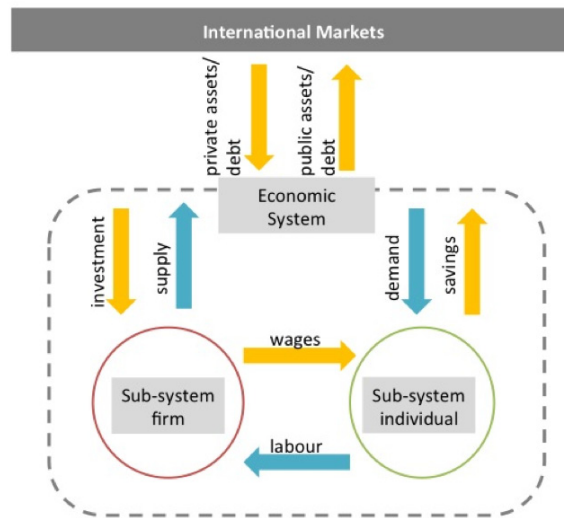
The challenge consists in the impossibility of representing a complex object in simplified terms without losing relevant information (Giampietro *et al.* 2011). If we accept this point, the definition of what is to be considered relevant depends on the goal of the analysis. In other words, pre-existing value judgements determine the scope and goal of the analysis, which is thus subject-dependent. Different subjects will describe the observed system differently, gather different information and conduct different analyses according to their perspective. Therefore, the existence of a plurality of relevant narratives useful to describe reality reflects the existence of a plurality of legitimate perspectives found among social actors.

The critical point is to decide who has the power to impose a set of useful narratives. The choice of a relevant narrative determines the useful perceptions to be taken into account when generating models or indicators. In the context of the global financial crisis, the dominant narrative has been that of maximisation of financial capital, which led to the financialisation of both private and public assets and to a monologic accounting of value. This hegemonic narrative is based on a reductionist representation of reality, based solely on risk indicators, which led to a drastic reduction of information and deprived financial actors of the means to deal with the crisis.

An alternative interpretation can be drawn from hierarchy theory. A hierarchical system is a system composed of interrelated subsystems, which interact in a non simple way (Simon 1962). The economic system can be understood as a hierarchical

system, composed of the macroeconomic system and its interrelated subsystems at the micro level: economic agents, firms, banks, insurance companies, etc (Figure 1). The individual and firm sub-systems exchange labour and wages, and they interact with the whole economic system through demand and supply (flows of goods and services) and savings and investments (monetary flows). The economy also relates to the international financial market through monetary flows.

Figure 1. The economy as a hierarchical system



Within the narrative of economic analysis, the crisis can be analysed at two levels. At the micro level banks (this term is loosely used to refer to financial institutions in general) started lending money to risky borrowers. If the borrower does not repay her/his loan, the bank loses money. As a protection against default risk, banks charge interest on loans, so that the overhead they gain through those borrowers that honour their debt covers the money lost through the borrowers who default. At the same time, the bank borrows from investors in order to finance its loans. Investors gain a share of the interest earned on loans, which depends on the length of the contract and the risk involved. Higher interest is paid on riskier assets. The investor may lose on a high risk operation. Through this mechanism a higher default risk is passed on to the investor. The bank acts as a rational profit maximising agent.

Normalisation deprives the banking system of the information needed to set interest rates against estimated risk and it can no longer act as a rational agent. The main problem is that normalisation implies reductionism and does not deal with multiple scales. Both moral hazard and the principal-agent problem arise as the result of asymmetric information, which in turn affects the ability of the agent to act “rationally” at different scales of analysis. Diluting risk may be a rational choice at the individual level (from the point of view of the financial agent) but it causes widespread instability at the market level (from the point of view of the financial

sector). Once information loss becomes a systemic problem, the size and location of risk and uncertainty are unknown to all agents and individual rationality does not suffice to stir the market.

At the macro level, the banking system stabilises monetary flows. Banks lend money to firms and collect savings from capital owners, investors and the labour force. At equilibrium, aggregate savings equal aggregate investments. Different economic theories disagree on the direction of causality between aggregate savings and aggregate investments. In neoclassical economics, the banking system lends what they have as assets, so that savings determine investments. According to Keynes, investments finance productive activities and thus generate jobs, so that investments determine savings (Verdon 1994). Either way, banks serve as regulators of the flow of money channelling funds from savings to investors. Financialisation (i.e. the conversion of all sorts of funds to financial assets) is a way to boost investment artificially, independently from assets, by treating mortgages, salaries, pension funds, and insurance premia as savings. Investments no longer serve to boost productive activity but are re-injected into the financial system through the ascending passage from MBS to CDO to CDS illustrated above. In engaging in financialisation, the bank stops acting as a stabiliser of economic flows, starts fuelling an upward spiral of virtual accumulation aimed at self-inflation and the system goes bust.

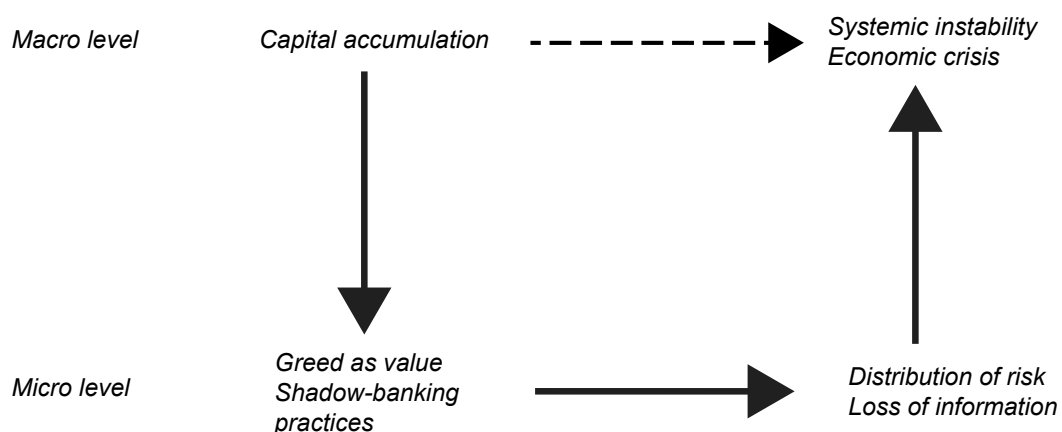
The changing function of the financial sector at different levels of analysis can be explained through the concept of 'holon' (Koestler 1969). "A holon is a whole made of smaller parts (e.g. a human being is made up of organs, tissues, cells, atoms) and at the same time it is a part of a larger whole (an individual human being is part of a household, a community, a country, the global economy)" (Giampietro 2002, 251). Therefore, the descriptive domain used to describe a holon has to be adjusted – in terms of pre-analytical choice of space and time domain – according to the function of the holon we want to study. When observed at different scales, the same system can be perceived as interacting with its context in different ways under different identities (Giampietro *et al.* 2006). At the micro level, banks act as profit maximising economic agents, whereas at the macro level financial intermediaries plays a role in stabilizing the flow of capital. The function of financial institutions changes depending on the scale of analysis adopted. Therefore, the stability of the financial sector cannot be left to the (supposedly self-regulating) interactions of financial agents at the individual scale. The economic narrative and models used to describe the crisis (looking for a single identity of the system) fail to capture the different functions that the financial sector plays at different scales.

The fallacy of dealing with non-equivalent descriptive domains helps explain why economists cannot agree on what caused the financial crisis (Lo 2012). Debt was introduced into the economy at the micro level, as individual mortgages, as individual securities, as individual insurance claims. At a larger scale, the system is infected with different types of debt referring to different economic activities controlled by different economic agents, but the characteristics and location of this

debt is now unknown. There is no control over what happened inside the black box. The blurring of different scales of analysis is a consequence of a series of normalisations that deprived the economic narrative of the means to generate a meaningful representation of the financial crisis.

The acknowledgement of the existence of different hierarchical scales within the economic system sheds light on the emerging properties (instability) of the system as a whole in relation to the interactions among its parts (blurring of information and dispersion of risk). Minsky's financial instability hypothesis hinges precisely on the fallacy of composition at the macro level of risky choices at the micro level (1993). Instability in the system derives from the fact that money is endogenous, that is, it is created "as a result of meeting the 'needs of trade'. When firms wish to invest they call upon the banks to borrow the required funds, and in the process money is created" (Arestis 1996, 22). The interaction between scales can be described through a transmission mechanism that has as its basis the narrative of capital accumulation as the "common good" to be achieved, which translates in the legitimating of values such as greed and practices such as shadow-banking at the individual level. Economic growth has gone from being a means, providing society with better living standards, to an end in itself. Within this discourse, a growing economy becomes the "goal to which human labour and lifestyles must adapt" (Porter *et al.* 1980, 17) and rent-seeking behaviours come to be seen as rational and socially acceptable. Unregulated banking practices created a wide range of financial derivatives that distributed risk to the financial market as a whole while destroying information. As a consequence, at the macro level the system becomes unstable. The transmission mechanism across different scales is represented by figure 2.

Figure 2. Transmission mechanism (Adapted from Bunge 2000)



IV. The crisis of the economic narrative

The irreducible uncertainty that characterises modern economies created a new language, which conveys intentions rather than accurate information. The new language is that of insurance risk, of bond spreads, of differentials between declared intentions to borrow and to lend. The concept of risk has become prominent in public discourse (Lapavitsas 2009). The spread, for example, is a measure of the difference between a bank's, or a government's, borrowing costs and interest rate on lending, the latter being set so as to cover the estimated default risk of borrowing. As risk increases, so does the spread in order to gather enough capital through interest rates to cover higher borrowing costs. Interestingly, the technical language of investment banking has been adopted by the mass media. Italian, Portuguese and Spanish newspapers started using the term "spread", in English, in order to evaluate the performance of the government vis-a-vis the market. However, no definition of spread is presented. It is simply assumed that the layman understands the language of finance, or else that the media just pass the parcel on, without unwrapping it for the readers in an attempt to explain the inexplicable.

The emerging technocratic discourse is based on two underlying assumptions: that the country's interests coincide with the interests of big financial corporations, the "too big to fail" players, and the assumption that technocrats are apolitical agents, pursuing the common good. The experts, in this case represented by the financial sector, no longer respond to socially defined goals. Economic growth is assumed to be valid independently from the social context. Technocratic governments are representative of this tendency, and are portrayed as neutral caretakers taking the role of the elected governments while politicians reach a settlement. Brown (2009) talks of monologic accounting, defined as a situation where pre-given values centred on the need of finance capital are assumed to benefit everyone, regardless of their political standpoint. Funtowicz and Ravetz (1991) explain this process as a hegemonisation of narratives. The privileged position of technicians comes from the conception of science as a uniquely privileged vehicle to truth (Demeritt 2001), or, like Icarus's wings, capable of carrying society in a sphere that is "free from chance, prejudice, and arbitrariness" (Ezrahi 1990, 3). Expert knowledge is seen as a depoliticised, neutral tool, which is divorced from social reasons and reads as a 'view from nowhere' (Brown 2009).

The formalisation and mathematisation of economics, and of financial economics in particular, "as manifested in the transition from political economy to economics, [has led] to an almost brand-new scientific body totally detached from its historical and social setting" (Fine and Milonakis 2011, 11). The rise of technicians is evident in the tendency of the financial sector to hire physics and mathematics graduates (Ibid). Fine and Milonakis (2011) argue that, as a result, economics is "useless but true", that is, mathematically valid but void of any practical relevance.

The subordination of real to fictitious capital (Fine and Milonakis 2011) has increased capitalisation, reduced liquidity and transformed all sources of

revenue – from salaries, to pensions, insurance funds, and so on – into financial products. That is, purchasing power went from being based on income to being guaranteed by investment banks based on expected future income. This process has come to be known as financialisation (Lapavitsas 2009; Fine and Milonakis 2011). The consequence was a drastic drop in personal savings in the 2000s (Lapavitsas 2009). By turning all sorts of capital, real and fictitious, into financial products, the fact that banks were lending money they did not have and borrowing capital they could not pay back went unnoticed. The reductionism of finance proved extremely useful for this disguise.

The use of mono-scale and mono-dimensional models ties the analysis to a static description. A model can be thought of as the formalisation of a given perception of the observer (Rosen 1985). The analyst defines which variables are relevant to the model (how to encode relevant attributes of the observed system) according to her/his pre-analytical understanding of causality. Technical knowledge also requires pre-analytical choices over the definition of relevance (what should be observed and how) that are normative in nature and undermine its supposed neutrality. Semantic choices define the direction of causality and the categories used to build the model (Giampietro 2002). The argument over the direction of causality between investments and savings is precisely a result of the clash between different narratives using semantically closed categories. The models used are unable to explain investments as independent from savings, and to recognise them as a tool used to inflate national accounts.

V. Conclusion

We have argued that the crisis spread because of a distribution of risk from individual assets to the whole financial system, due to the decomposition and restructuring of debt into a variety of financial products. The financial crisis affected the real economy due to the vanishing distinction between assets and debts first, enabled by securitisation; and between private and public debt secondly, due to the increasing overlap between political and financial interests. “The crisis paralysed the financial system and progressively disrupted real accumulation” (Lapavitsas 2009). The scattering of risk to the whole of the financial market set the basis for the rapid contagion of the crisis to markets on a global scale and ultimately required government intervention to restore confidence in the market itself.

The persistence of the European sovereign debt crisis and the lack of confidence in financial markets go beyond the problem of risk management. It questions the legitimacy of technicians and experts to guide decision making in the presence of uncertainty. Normal science is “predicated on the assumption that the scientific community knows what the world is like” (Kuhn 1962, 5). However, as the financial crisis clearly demonstrates, the use of numerical ratings and indicators “creates an illusion of a degree of precision that in many cases is not supported by the input

data” (VDI 2000, 29). Irreducible uncertainty means that experts cannot know how to manage and steer the crisis.

Hierarchy theory offers some insights that can help us move beyond the reductionist paradigm. In particular, this paper uses the concept of holon to stress the importance of considering multiple scales in the analysis of economic systems and the changing function of financial intermediaries across scales. Such analysis highlights the emergence of a systemic instability at the macro level caused by the rational response of banks to the opportunities for speculation offered by exotic financial derivatives at the micro level. That is, the interactions between the parts (i.e. the reduction of risk by distributing it to various financial products) led to a non-linear transmission of risk and loss of information that ultimately deprived the system as a whole of the means to solve the crisis.

In the context of irreducible uncertainty and in the presence of a plurality of different legitimate values (Funtowicz and Ravetz 1991, 1993), technical knowledge cannot supply an objective, or ‘correct’, solution to the problem, as in a puzzle-solving exercise (Kuhn 1962). The goal of the analysis becomes that of guaranteeing the quality of the process instead of the quest for truth. Quality stems from the “effectiveness, in light of human cognitive powers and limitations, of the *procedures* used to choose actions” under uncertainty (Simon 1978, 9, original italics). In other words, acknowledging the incommensurability of non-equivalent descriptive domains shifts the source of legitimacy from the most performing narrative (Lyotard 1979) to a plurality of narratives capable of dealing with complexity. The failure of the conceptual instruments used by the economic paradigm, especially normalised risk indicators, suggests that there is a need for quality control of quantitative indicators to be used for governance by opening the debate to new narratives and analytical tools.

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