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The Austrian perspective on the Global Financial Crisis: A Critique[1]

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ABSTRACT

The global financial crisis (GFC) and its aftermath have not just been a challenge to mainstream economics. It has also required a response from heterodox approaches. In the following paper we explore the Austrian response. We argue that Austrians have focused primarily on the role of government intervention in creating the conditions for the GFC. This focus, however, neglects the role of private agent error. We set out the role of collateralised debt obligations and credit default swaps as part of the GFC, in order to highlight that private agent error raises several problems of consistency under an Austrian approach. The basis of private agent error is separable from the role of government intervention (specifically the role of interest rates). Furthermore, the role of private agent error is one rooted in approaches to uncertainty, prediction, and control that are antithetical to an Austrian approach. The implication is that one cannot assume that private agents will produce a spontaneous order in the absence of interference that is preferable to one in which there is intervention. A consistent Austrian approach must also recognise its own historical commitments to the institutional dynamics of an economy. However, as the GFC and its aftermath illustrate, this creates a challenge for Austrian adherents to address the problem of potentially productive regulation.

1. INTRODUCTION

IT IS WIDELY ACKNOWLEDGED that the Global Financial Crisis (GFC) and its aftermath constitute a major event, or series of events, for economics (e.g. Hodgson 2011, Lawson 2009). However, it is curious that the majority of mainstream economists have not responded to the GFC by engaging in critical engagement with interlocutors, nor by engaging in the reconsideration or rejustification of fundamentals (De Long 2011; Negru 2012).[2] That the response has been at best muted raises serious doubts about the scientific credentials of mainstream economics. It raises similar doubts concerning its vibrancy as a culture of knowledge.

It should not, however, be neglected that heterodox economics is also responding to the same economic events. As such, heterodox positions are more than sources of critique of the mainstream; they are also called upon to justify themselves in terms of these events. Part of their potential constructive contribution is to consistently and coherently draw upon their own traditions, in so far as they are relevant to contemporary circumstance. The failure to do so can be indicative of tensions within a heterodox position. In this paper we look at the Austrian response to the crisis. Here a central tension seems to be manifest.[3] A key policy commitment of Austrian economics is that of the minimal state, i.e. of a limited role for government as owner, administrator and regulator.

However, Austrian economics also incorporates a long tradition of critique of the foundations of mainstream economics; most pertinently, a repudiation of assumptions of perfect information (in various guises) that have been incorporated for mathematical convenience. Austrian economics allows for real error. In so far as error can be committed by both public and private agents, it also follows that Austrian economics is not necessarily antithetical to the regulation of markets. Markets are not just a commitment central to Austrian economics; they are also justified and thus conditional in any expression of an Austrian position. The concept of spontaneous order is one with a practical ambiguity in terms of the role of regulation. One might say that the justification needs continually to be remade in context, through substantive argument regarding the balance between agents' choices and the potentially productive role of regulation in structuring markets.[4]

What has been notable in Austrian responses to the GFC and its aftermath has been a strong emphasis on the critique of government intervention. There has been little discussion of the implications of private agents' errors. Since it is the confluence of the two that create issues for the structure of markets, one might infer that Austrian economists are neglecting an important part of their tradition because it has implications for intervention and regulation that many would rather evade. A broader analysis might well bring the tensions to the fore.

In order to highlight the way recent Austrian accounts have a particular emphasis, we begin by synthesising some common points from recent contributions. Given the contemporary focus of the subject matter many of those contributions derive from the more immediate realm of academic blogs (particularly the Mises blog) and the news media, rather than more established journal outlets. One must, therefore, acknowledge that the arguments themselves are not all fully formed, developed or expressed in ways that can necessarily be considered to be an author's definitive position. That said, it would be wrong to give the reader the impression that the material drawn upon here lacked due consideration by its authors. Much of the argument in its original form is highly sophisticated and nuanced. Our intention is not to traduce that material but rather simply to highlight that its emphases cast significant

shadows. In a following section we set out an example of an area that highlights particular tensions in terms of the issue of order, productive regulation and private agent error, that the GFC also raises. Here we consider the role of credit default swaps (CDS) and collateralised debt obligations (CDOs) as part of the GFC. Our main point is that these had the potential to be problematic in the absence of state intervention. Furthermore, this point hinges also on the role of uncertainty in our understanding of economy and this too is an area that creates tensions in Austrian economics.

Note that throughout this paper, we use phrases such as 'the Austrian point' or 'from an Austrian perspective'. We do, however, recognise that there is a great deal of range within Austrian arguments concerning the particular manifestations of theory and policy. As such, the term is heuristically convenient yet relevant, since Austrians do share a series of underlying common commitments (see, for example, Rothbard 1977; Smith 1990, 1994; Gordon 1993; Boettke 2000; Caldwell 2005, 2011).

2. Austrian arguments regarding the role of central banks in creating the crisis and resolving its aftermath

A number of common points emerge from a survey of recent Austrian arguments regarding the GFC and its aftermath. First, the overwhelming emphasis of postings and media analysis has focused on the role of government. The general context of that focus is usefully expressed by O'Driscoll (2009, p. 167): 'It is largely a myth that unregulated financial capitalism failed and new regulation is needed. Aside from health care, financial services are the most heavily regulated industry in the economy.' This point in turn is rooted in an Austrian argument regarding a dominant cause of the business cycle in the form of boom and bust, stated by Murphy (2007, no page numbers):

> According to Ludwig von Mises and his followers, the boom-bust cycle is not inherent in the free market, but is rather caused by the government's interference in the credit markets, specifically its manipulation of interest rates. The government causes the boom period when it injects new credit into the system (pushing down rates), and then the unsustainable, non-economic investment projects put into motion necessitate a bust at some future date.

A common thread that emerged in Austrian responses as the effects of the GFC manifested was to orient on inappropriate monetary policy from the Federal Reserve as a prime cause of the boom (e.g. Murphy 2008a, 2008d; Boettke and Coyne 2010; O'Driscoll 2010; Barron 2011a, 2011b). The boom was essentially 'artificial'; it was the illusion of wealth creation based on interest rates that are below a natural rate that then induces rapid overinvestment that cannot be either appropriately utilised or sustained — this is 'malinvestment' in the Hayekian (1999) sense. As Murphy puts it:

> The basic Austrian theory is that during the artificial boom, workers' labour and other resources get channelled into investment projects that aren't compatible with the overall level of real savings. Sooner or later… the unsustainable projects have to be abandoned before completion. Entrepreneurs realize they were horribly mistaken during the boom, everybody feels poorer and slashes consumption, and many workers get thrown out of jobs until the production structure can be reconfigured in the light of the revelation. (Murphy, 2008c, no page numbers).

In this context, it is not simply that interest rates set by the Federal Reserve were low in some simple cardinal sense, but rather that they were low relative to some systemic use of capital. For a variety of Austrians (e.g. Murphy 2008b; Selgin 2008; Tucker 2008) interest rates are too low when they induce changes to the supply and velocity of money in excess of real demand:

> One cannot accurately gauge the easiness of monetary policy by looking at money-stock measures alone. Instead one looks at measures that indicate the relationship between the stock of money on the one hand and the real demand for it. Or, if one prefers, its velocity. What matters isn't how rapidly the money stock grows, regardless of how one chooses to measure it, but whether it grows faster than the public's demand for real (that is, price-level adjusted) money holdings. (Selgin, 2008, no page numbers).[5]

It is in this sense that the state plays a role in unstable artificial wealth creation. Here, ultimately the role of government intervention is one that perpetuates the misallocation of capital. A core failing of mainstream approaches to policy is that they do not recognise that interventions change the structure of the economy, rather than simply manage the behaviour of economic participants in the pursuit of some definable end state. Catalan (2011, no page numbers) phrases this as:

> The main cause of recession is the fatal conceit of central bankers, including Alan Greenspan. They conduct their monetary policy following established rules, but without any consideration for the effects that changes in money can have on the underlying economy. That is, they believe they can intervene without having any repercussions on the economy, except those they want. It was bureaucrats and economists' ignorance of the true nature of markets that caused the recession.

In this conceptual framework, monetary policy is just one aspect of the broader ongoing problem of state intervention into markets; intervention contributes to the initial boom and thus creates the conditions of the cycle to which government policy then tries to respond — the bust. The responses, however, are almost always counterproductive. A combination of lowering

interest rates and engaging in fiscal stimulus has three adverse effects. It prolongs the death throes of inefficient businesses; it exacerbates the misallocation of capital that the bust itself originally expressed, creating the conditions for a further cycle of boom and bust; and it generates public debt, leading to the temptation to monetise that debt, involving the engineering of inflation within a new context of destabilisations and vulnerabilities (e.g. Boettke and Coyne 2010; Tucker 2011). Throughout, the state is trapped in its own cycle of seeking to solve problems that its own role creates, whilst at no time confronting the basic contradiction of its own intervention as a primary cause of the economic problems to which it responds. From an Austrian perspective, the US experience of a succession of malinvestments and misallocations of capital — dot.com expansions, housing bubbles and so forth — are multiple manifestations of a generalised problem. The GFC is simply this generalised problem on a greater scale. The Gordian solution is to withdraw the state from all periods of the cycle. Murphy (2008b, no page numbers) captures this sentiment nicely: 'none of this would have happened had the politicians left money and banking to the private sector.'

The Austrian point, of course, is not that the state should simply cease to have any role in relation to the economy. Rather, the nature of that role should be reconfigured such that the state neither replaces nor interferes in markets i.e. the state ceases to be a source of malinvestment or misallocation of capital. Put another way the state ceases to be a source of profound economic error at a systemic level. In the wake of the GFC this orientation has basic policy implications. These encompass a range of points:

1) The state and the Federal Reserve (or any other central bank) should not expand new credit in the system through interest rate reductions and expansionary liquidity procedures, such as quantitative easing (e.g. Murphy 2008a; Polleit 2011; Thornton 2011).

2) A recession should be allowed to take its 'natural' course in order that previous rounds of the misallocation of capital can be corrected, allowing resources to be effectively reallocated based on market forces (e.g. Murphy 2008a, 2010; Barron 2011a, 2011b).

3) In keeping with 2) the state should cut spending and prevent the inflationary effects of credit expansion, whilst also facilitating cuts to money wages to free up labour markets (Murphy 2011b).[6]

4) At a more systemic level the state should reconsider the role of central banking as a guarantor within the finance system, and also consider a new monetary regime - perhaps abandoning fiat money and returning to a gold standard with private institutions issuing their own currency against gold valuations (e.g. Barron 2011a, 2011b; Polleit 2011).[7]

3. Productive regulation and order: private agents and error

Clearly, there are superficial similarities between many aspects of the Austrian critique of the GFC and its aftermath and a variety of other critiques. For example, there is some similarity between the basic Austrian point that interest rates were too low, and John Taylor's critique that the Federal Funds' rate was set below that indicated by his Taylor Rule Framework in the important period between 2002 and 2005 in which the US housing boom was nurtured (Taylor 2009). Taylor's critique, however, is made in order to vindicate more appropriate intervention for the management of monetary policy. Moreover, the Taylor equations are rooted in neoclassical thinking and assume stable relations between interest rates, inflation, and output. These relations ultimately involve assumptions of regularity that translate into periodic constant conjunctions. They are about managing well-understood end states (Morgan 2009b). The focus not only invites a conflation between price stability and ongoing systemic financial stability — something flagged at the Bank of International Settlements well before the GFC (Borio and White 2004) — but also stands at odds with Catalan's (2011) previously quoted point that an underlying flaw of mainstream approaches to economic policy is that they neglect that the practice of intervention also changes the nature of the circumstances intervened in. This point, however it is subsequently translated in terms of one's specific theory and policy preferences, is essentially ontological in its significance.

One of the key framing commitments of heterodox economics is that economies are complex and changing in ways that indicate the present cannot be reduced to simple conjunctions, and where the future cannot be represented in terms of definite situations building from those conjunctions. This is as much the case for Austrian approaches as it is for Classical Keynesian approaches and heterodox Post-Keynesians — much as they may then diverge over the implications (e.g. Dow 2004, 2008; Caldwell 2011).[9] Austrian economics accepts both complexity and uncertainty as key characteristics of economy.[10] Furthermore, in so doing it accepts that the potential for error is an aspect of all economic activity (e.g. Menger 1985, p. 71). Austrians reconcile this issue based on the spontaneous order of markets. Limited information and individual elements of ignorance still produce solutions as processes through interactions based on preference and price signalling; and these are better solutions in the absence of interference.[11]

However, as we have highlighted the orientation of Austrian responses to the GFC and its aftermath has been to emphasise the role of the state i.e. to provide a critique of the role of economic intervention and management in order to argue for a reconsideration of the role of the state. Yet for the case to be fully made it must also consider the role of private agents' errors and their significance for the regulatory role of the state. To fail to provide due consideration here would be to construct a partial argument in both senses of the term. It would be to risk a farrago by drawing inconsistently on the ontologi-

cal underpinnings of an Austrian approach, in the name of a political argument disguised as a methodological one. A fuller argument from an Austrian perspective involves more than withdrawal of the state, it ought also to extend to the possibility of productively redrawing regulation. Yet the emphasis can give the impression that some 'pure' idealised form of laissez-faire is being advocated and that Austrians cannot engage in, and could have little to offer in terms of discussion of, actual institutional issues. To a certain degree this reflects basic tensions in Austrian thought (e.g. Caldwell and Böhm 1993; Fleetwood 1995). That tension, however, can at least to some degree be seen as a matter of practical ambiguity in terms of the overlap between social institutions and the role of the state in institutional terms. Caldwell acknowledges, for example, that Hayek:

> ...made it clear that he was not advocating an alternative system of pure laissez-faire. The sort of planning that Hayek favoured was a general system of rules… [But] Hayek is talking here, as was his wont, at a very general level. In *The Constitution of Liberty* and other writings, he would provide a little more detail, laying out the set of social institutions that he thought would best enable individuals to utilize their own knowledge to carry out their own plans. These institutions included a market system, in a democratic polity, with a system of well-defined, enforced, and exchangeable property rights… But what he came up with was still very general. Even so, Hayek's contribution was to stress the importance of the institutional setting, and in that regard he was way ahead of his time. For markets to work effectively, they must be embedded in a set of complementary social institutions. (2011, p. 7).

One might perhaps dispute Caldwell's claim that Hayek was 'way ahead of his time', since he was writing in the aftermath of many others who acknowledged the significance of an institutional setting. The point, however, is that Hayek did acknowledge it as significant. In terms of our focus on the GFC and its aftermath, it is the issue of private agents' errors that must also be addressed, if one is to think productively about the institutions in which markets are, and are to be, embedded. There is not the scope here to explore fully the arguments, but the issues can at least be illustrated. Consider, for example, a specific question regarding the role of private agents: In the absence of actual Federal interest rate policy (or that of the Bank of England, say) would there have been no systemic problem with collateralised debt obligations (CDOs) and credit default swaps (CDS)?[12]

3.1 A brief account of CDOs and CDS

Derivatives, of course, are not new (e.g. Miller 1986; Das 2005; Haug 2007). The prototype CDO, the collateralised mortgage obligation, was designed in 1983 for the Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac) by the investment bank First Boston Corporation (acquired by Credit

Suisse in 1990). A CDO differs from previous mortgage backed securities in that it bundles slices of such securities into tranches but then distributes the cash flow from the original securities (deriving here from the mortgage repayments by the borrowers) on the basis of priority. The losses experienced from defaults are passed through to the lower tranche first and the whole of the lowest tranche must be voided by losses before they are passed to the one above, and so on.

The statistical incidence of defaults in the original asset affects the desirability of all the tranches overall, but each successive tranche upwards is deemed a safer investment. Real CDOs are more complex, but the principle is easily illustrated.[13] If there were 3 tranches and the bottom tranche held ten per cent of the total value of the assets, the middle 40 per cent and the top 50 per cent, then ten per cent of the mortgages would have to default before the middle tranche experienced losses and 50 per cent before the top tranche. Defaults on any form of debt, and particularly mortgages, of these scales can seem diminishingly unlikely. As such, anything but the lowest tranches of CDOs could seem like a secure form of asset investment in terms of providing a steady income stream. When the CDOs are passed on, the originating organisation is freed up to lend again, whilst at the same time it need not seem *immediately* incongruous that CDO tranches might receive good credit ratings.

The prototype credit default swap emerged in the early 1990s in separate innovations at a series of banks, but is most prominently attributed to a team at J P Morgan in 1994. CDS served two initial functions. First, they enabled an organisation to pass on some of the risk of losses associated with default to a counterparty, without having also to pass on the original asset i.e. they provided a form of 'insurance' on a credit asset. The organisation is put in contact with a counterparty, who receives a periodic fee for assuming the risk; and the counterparty agrees to compensate the losses in the original asset to the sum 'insured' against.[14] Second, in so far as the risk has now been assumed by the counterparty, the organisation appears to be protected from loss and does not need to take further measures to protect its solvency against those losses.

Since banks operate on a fractional basis i.e. they lend out multiples of capital (traditionally deposits) but retain a core of capital to meet day-to-day demands (traditionally the fraction of depositors who want their money on that day) and retain additional capital (held in forms characterised by various degrees of liquidity) to meet both historically anticipated levels of losses and a further cushion against more unexpected levels of loss, then the passing on of risk to the counterparty potentially allows the organisation to reduce its retained capital *safely* and thus increase its lending activity (and forms of investment banking if it is a universal bank). This is slightly different in its implication than the circumstances of a CDO. A CDO is the sale of an income stream to another party, where the income flows from an underlying asset. A CDS insures the risk associated with the underlying asset. In both cases the

risk is what is passed on, but with a CDS one need do no more than insure the likely percentage of the original asset (lending) that could default in order for the need to retain capital to be nullified. With a CDO one looks to sell on the whole of the asset (though may find oneself retaining the lowest tranches for which there may be no market).

Ostensibly, CDOs and CDS can appear to be productive innovations in finance. The root of both CDOs and CDS is that risk is passed to another party. The underlying principle is that the likely level of default is understood even if the exact number of defaults is not. This underpins the calculation of interest payments to holders of CDOs and fees to the CDS counterparty. On the basis that default levels are well understood (and the principles of the derivatives clear) then the payments and fees can be set at levels that are attractive to holders and counterparties, whilst still making them profitable for the original organisation. In addition, the organisation able to increase the rate of turnover of its lending, or more generally, financial activity. The availability of credit in the system — mortgages, financing for investments, takeovers, credit cards and so forth — can increase, and the cost of that credit can reduce.

Again, in so far as what is occurring is the transmission of the risk of default (who will hold the losses) then the basis of the transmission is the idea that the derivatives are knowledgeably produced, the transactions in them are between adequately informed parties, and that the transactions themselves become a further information source (an adequate signalling). As such, derivatives become a market that also seems to contribute to the 'completion' of markets; hence attempts by mainstream theorists and the financial services industry to present them as contributors to efficient markets and something like a proxy for general equilibrium (see MacKenzie *et al* 2007; Morgan 2008).

3.2 CDOs, CDS and the significance of private error

We are now in a position to consider the question of whether CDOs and CDS would have been systemically problematic without Federal interest rate policy being what it was. The first thing that needs to be acknowledged here is that CDOs and CDS exist in a relation to regulation. O'Driscoll is correct to state that financial capitalism is regulated. It is, however, worth noting that the framework of regulation has so far been fractured in various ways (Davies and Green 2008). There has been a proliferation of national, regional and global bodies, a degree of discontinuity and also overlap between those bodies, a consequent degree of tension and contradiction in terms of powers, aims, strategies and practices between those bodies, and a corollary development of significant gaps in the regulatory framework as is. These are all issues an Austrian might seize upon to highlight precisely the failings of regulation. They are, however, also issues one might address as arguments for better regulation — more coordinated, comprehensive and unified, based on clearer agreed principles and practices i.e. the critique could be argued as grounds for the

desirability of effective globally orchestrated regulation (something, of course, all participating states at the November 2008 G20 agreed was an 'urgent priority', but that they subsequently pursued with something less than urgency).

Still, with an Austrian emphasis on the role of the state and regulation in mind, one can easily construct a narrative that highlights the role of poor regulation or the unintended consequences of regulation (e.g. Rothbard 1994). One could, for example, make the argument that the 1988 Basel I accord imposed particular tier 1 capital ratios on the banks, the existence of which gave the banks a specific target but also a mindset that focused on compliance with the formal terms of the doctrine, not its purpose (see Tarullo 2008, chs 2 and 3). The unintended consequence was thus to incentivise the banks to 'innovate' in ways that would ultimately subvert that purpose - where that purpose was essentially one of effective prudential measures for banking stability. Specifically, banks were motivated to think about the *precision* of risk and of ways to pass on risk. Financial instruments and securitisation, such as CDOs, thus developed in conjunction with special purpose vehicles (SPVs), and other forms of shadow banking. Many of these were 'back-stopped' by the banks (the bank either owned the SPV or guaranteed it through its role as prime broker). CDS, meanwhile, became a means to counterbalance the risk of retained assets in ways that allowed balance sheets to expand. The International Swaps and Derivatives Association lobbied hard to ensure that derivatives transactions, including the new credit derivatives, remained 'self-regulated'. The use of such derivatives, however, required an interaction with regulators. In 1996 the Federal Reserve and Office of the Comptroller of the Currency (OCC) determined that credit derivatives could be used to reduce capital reserves but set the insured sums in excess of the actual capital ratios derived from the Basel I accord and required credit derivatives to carry AAA ratings.

Thereafter, the use of CDS and CDOs grew in a context where further regulation was resisted, in conjunction with a strong lobby from the investment and universal banks, for two related reasons. First, it was resisted because of a particular representation of the institutional context. The Fed and the SEC, for example, consistently resisted attempts to address derivatives in general because they were represented as specific instruments constructed by skilled financial architects and traded between knowledgeable parties. Furthermore, Warren Buffett and George Soros's warnings notwithstanding, the dominant position was that they were a developing beneficial contributor to a market economy. This is despite the fact that there had been periodic systemic problems created or augmented by them — a mortgage-based CDO related crash in 1994, Long Term Capital Management in 1998 and so on. Derivatives in general were represented as simultaneously an aspect of modern integrated economies and as a sophisticated solution to issues created by those economies — including capital markets.[15]

From a positive point of view, derivatives allowed businesses to hedge

against exchange rate effects, oil price changes and so forth; allowed firms to insure against losses; allowed other financial organisations to highlight market 'distortions' through arbitrage, leading to the closure of such distortions; allowed financial organisations to highlight the underlying weakness of some market participants through shorting — incentivising those firms to address their internal problems or hastening their demise, leading to a reallocation of resources; and allowed financial organisations to transmit risk and increase the scale and velocity of lending in the system.

This positive point of view is easily read from a mainstream economic perspective. However, it can also be read from an Austrian perspective. Private agents develop market practices. Those practices become part of markets as processes. They contribute to them as spontaneous orders. Austrians do not deny that private agents make errors. However, the underlying Austrian position is that a major context of error is state intervention i.e. the regulatory frame; and that private agents within markets respond to their own error through interactions that provide better solutions in the absence of interference. The combination, however, begs the issue of whether the dominant problem is state (or any authority) intervention in general. It may be that part of the problem is the specific characteristics of some particular form of intervention and this may be just one issue among many. It may be that private agents' practices are problematic; and can be problematic in a way that can be separated from the problem of regulation. Furthermore, it may be that private agents do not respond to their own errors in ways that will provide better solutions in the absence of interference. The role of CDOs and CDS can be used to illustrate these issues.

Here it is important to understand a second reason why further regulation of derivatives was resisted. That reason is the particular understanding of derivatives. They are a means of not just offsetting future uncertainty, but they operate on the basis that the parameters of future variation are understood i.e. that there is a probabilistic range that can be adequately modelled for the purposes of pricing and valuation. This is potentially problematic from an Austrian perspective. Private agents are producing tools and practices within the economy that are rooted in models whose broad approach to uncertainty, information and the future is antithetical to Austrian (and heterodox in general) insights. The basis of the modelling approach is particularly important as an issue for the role of CDS and CDOs in the GFC.

Taleb's critique of statistical method in its various relations to capital markets, much of it based on insights from Mandelbrot, is now well known (e.g. Haug and Taleb 2009). One reason why the production and sale of CDOs grew rapidly from the late 1990s was that there was a growth in computer power, allowing the rapid modelling and pricing of tranches. A production line of CDOs with ever increasing numbers of tranches became possible. The common preferred model was then based on David Li's Gaussian Copula approach (e.g. Li 2000). This was based on precisely the principles that Taleb and others

critiqued. A normal distribution was assumed in which sudden shifts to high levels of defaults were deemed to be statistically highly unlikely, to the point that they could be practically excluded. Increasing levels of default based on some changing underlying factor that the historical data could not represent simply, were assumed away. Essentially, the pricing model was based on the assumption that stable patterns existed and that whatever had happened in the past remained a good indicator of what would happen in the future.[17]

Given that the past was based on a housing market unaffected by the introduction of innovations such as CDOs, there is a quite specific fallacy here.[18] That fallacy, moreover, was rooted in a broader series of fallacies: the fallacy that the institutions of a market and its internal practices remain stable; and that outcomes thus remain both well understood on this basis and probabilistically conducive to adequate anticipation. This, in turn, entails the fallacy that one can orient on the relative regularity or patterning of events (the number of defaults and historical trends) without due consideration that regularity is not its own explanation. Even a relatively stable trend within an order has a complex of underlying conditions that maintain it and can confound it.

The important point here is that the underlying problems of the construction of CDOs were not sufficiently well understood on a market-wide basis. This is not to suggest that no one understood the basic flaws in the modelling procedure, or that no one spotted there were specific institutional and widespread practical changes occurring in housing markets that were not being priced into CDOs or taken into account in providing their credit ratings. At a general level many heterodox critiques of statistical method in economic applications give an insight that ought to have helped flag the specific flaw in the construction (e.g. Lawson 1997, pp. 71-85).[19] More specifically, Taleb was a consistent critic and some of the early originators of the computer models used for the production line of CDOs became concerned that the model was flawed. And, of course, several hedge funds, and some within investment banks, came at the problem from the other end — housing markets were clearly changing, but the pricing of CDOs was not. An expanded housing market included more participants who had received mortgages based on 'thin Ficos' (limited information credit scorings), and who were mortgaging and remortgaging using adjustable rate mortgages (ARM) with initial short-period low interest rates, and where the borrower was not prime (extending from Alt-A to sub-prime).[20]

CDO construction, however, allowed borrowing based on these characteristics to be spliced into a security that produced similar overall averages of credit scorings to previous CDOs. Further, the CDOs approach to defaults failed to pick up the basic institutional change, that debt had become an acceptable income stream accessed through remortgaging, and that housing markets were expanding absolute levels of debt and levels of leverage far beyond sub-prime (and within a more consumption-oriented economy).[21] As

debt increased, debt servicing problems were being created in new circumstances where all participants would be more interest rate sensitive. Housing markets in the US were ripe for an unprecedented regional and national fall in prices, creating a feedback loop in which defaults would be widespread and escalating.[22] Tranching would, therefore, be no protection for investors in CDOs and the very basis of the credit rating of the tranches would be revealed as flawed. As such, and as Michael Lewis's engaging narrative (2010) sets out, John Paulson and variety of others began to buy CDS on CDOs. Such CDS only became available when AIG in particular was persuaded to take on this business and act as the 'insuring' counterparty.

Paulson and others, of course, did not own the CDOs they were taking out CDS on, and this is an additional speculative aspect of the practice of credit derivatives. CDS can effectively be used as a way of shorting an asset one does not own. This brings into question any ostensible insurance role.[23] Further, once it was understood that the problem was with the internal construction of CDOs, this minority of speculators realised they did not have to restrict themselves to taking out CDS on the lowest tranches of CDOs or on related vulnerable securities such as further CDOs constructed out of the lowest tranches of previous CDOs (CDO^2), which the originators had initially been unable to sell.[24] They could take out a CDS on the upper tranches with the highest credit rating and thus lowest cost of insurance per sum insured, because these too were vulnerable to default. That vulnerability was not understood by the particular counterparty or more generally in financial markets where the demand for CDOs lay.[25]

Clearly, one cannot reduce the GFC simply to a problem with the internal construction of CDOs and the related role of CDS. The GFC has multiple underlying causes manifesting in different ways in different states. These include, but are not restricted to, the growth of consumption-based economies and the structuring of key elements of economic growth around construction and property, falling average incomes as a proportion of GDP in key consumption-based economies, growing levels of public and private debt and corollary current account asymmetries or imbalances between trading nations, and within dynamics of the flow and accumulation of currency reserves, *and* a low interest rate regime in some economies that both fostered debt behaviours and motivated the flow of capital into forms of investment (e.g. Minsky 1982; Kindleberger and Aliber 2005), finance, and financial organisations that claimed to be able to produce returns in excess of those low interest rates (e,g. Wade 2009). The point, however, is that this is a causal complex and that the role of the state is only one aspect of it. It remains the case that other aspects could be systemically problematic without, in the Austrian emphasis, interest rate policy being what it was.

It may be the case that the adoption of Basel I gave a particular incentive for banks to seek to make the concept of risk more precise, and for them increasingly to seek ways to change the way they approached the provision

and transfer of lending. However, once the concept of risk had been made more precise, it did not require a low interest rate environment for this to produce effects. The understanding that risk is quantifiable and that risk can be passed on whilst retained capital can be calibrated in terms of precision creates two effects. Financial organisations have shareholders, partners or investors who desire returns and can look elsewhere for those returns. The potential for precision creates a competitive pressure for financial organisations to utilise the tools of 'risk management' in order to optimise returns by maximising the velocity and absolute levels of lending (extending their leverage and motivating them to push beyond deposits into wholesale markets to access further funds), whilst also minimising the 'safe' levels of retained capital. It also creates the potential for a new institutional context for further financial innovation, based on the insights of precision in terms of risk.

The precision of risk management within a competitive environment can thus create an underlying vulnerability within the finance system. This vulnerability has multiple forms. It is often noted that the trigger for the GFC was the collapse of Lehman Brothers — not one of the large universal banks one might as an archetype describe as 'too big to fail'. Lehman could only be a trigger because of the way banking had changed over the previous two decades. Securities were constructed, sold and bought and used in a variety of ways across the finance system in a trans-nationally integrated way. Integration also extended to derivatives, equities and debt markets. The pathways of connectivity in general and risk dispersion in particular could also be pathways of contagion.

Here, the problems identified with CDOs and CDS are simply manifestations of an underlying problem, where the very idea of private agent error is reconfigured in finance markets in a way that is itself profoundly erroneous. CDOs and CDS were based on the understandings that securities and derivatives are knowledgeably produced, the transactions in them are between adequately informed parties, and that the transactions themselves become a further information source (an adequate signalling): they are about stabilising uncertainty and transforming it into certain ranges (probability sets). This approach can have some traction for a period of time if the underlying conditions remain stable and conducive to relatively regular trends. But this is subject to the possibility of unanticipated changes that are not modelled and confound the very assumptions that sustain the approach to risk. Further, the very approach to risk invites risky behaviour. It does not require a particular interest rate for this to be the case, merely a particular understanding of the concept of risk in terms of precision.

The point we would emphasise is that this concept of risk can be separated from the specific issue of interest rates. It resides in private agents' understandings and practices. The institutional framework of finance, including both the role of central banks in general and the policies of central banks in particular, are not irrelevant; but they are not necessarily the only or most

relevant. It does not require a particular central bank interest rate for the concept of risk to be translated into increasing levels of lending, which increase the levels of debt in any given economy — CDOs (and related securities such as Collateralised Loan Obligations used in private equity finance; Morgan 2009a) and CDS invite this behaviour based on their effects on the cost of credit. From an Austrian point of view they are, therefore, conducive to the misallocation of capital based on the potential for available credit to expand rapidly. The question then becomes how private agents respond to this basis for error. This raises the issue of what kind of error is actually being recognised.

Ultimately, it is an error to think that error can be tamed. Paul Wilmott founder of the international diploma in quantitative finance at Oxford University and an editor at the *International Journal of Theoretical and Applied Finance* is one of the few who fall broadly within the category of mainstream economics (in terms of methods) to have addressed directly issues arising from the GFC. In January 2009 he and Emanuel Derman issued a 'Financial modeller's manifesto' in which they state (Derman and Wilmott 2009, no page numbers):

> You can hardly find a better example of confusedly elegant modelling than models of CDOs. The CDO research papers apply abstract probability theory to the price co-movements of thousands of mortgages. The relationships between so many mortgages can be vastly complex. The modellers, having built up their fantastical theory, need to make it useable; they resort to sweeping under the model's rug all unknown dynamics; with the dirt ignored, all that's left is a single number, called the default correlation. From the sublime to the elegantly ridiculous: all uncertainty is reduced to a single parameter that, when entered into the model by a trader, produces a CDO value. This over-reliance on probability and statistics is a severe limitation. Statistics is shallow description, quite unlike the deeper cause and effect of physics, and can't easily capture the complex dynamics of default. Models are at bottom tools for approximate thinking; they serve to transform your intuition about the future into a price for a security today. It's easier to think intuitively about future housing prices, default rates and default correlations than it is about CDO prices. CDO models turn your guess about future housing prices, mortgage default rates and a simplistic default correlation into the model's output: a current CDO price. Our experience in the financial arena has taught us to be very humble in applying mathematics to markets, and to be extremely wary of ambitious theories, which are in the end trying to model human behaviour. We like simplicity, but we like to remember that it is our models that are simple, not the world. Unfortunately, the teachers of finance haven't learned these lessons.

Models may not be the world but they have had profound real world impacts. They have been part of the errors made by many financial organisations. It is important to bear in mind that the majority of large banks were not simply

sources of systemic problems, that they themselves were able to evade because of their more sophisticated understanding of products and instruments such as CDOs and CDS. The transmission of risk, based on a clear understanding of risk, ultimately did not protect them. It was not just financial organisations beyond the originators of CDOs who were affected. The originators also bought CDOs, and other similar securities, and used them as forms of investment for income, as forms of capital, and as collateral on their own borrowing. They also acted as prime brokers for hedge funds and SIVs and SPVs that were highly leveraged, and that specialised in these securities. It is not credible to think that they did this because of moral hazard — because they knew that a financial crisis was coming they would be rescued from by the state. No one invokes disaster because they think a life raft may appear. It is far more credible that they too failed in large part to fully apprehend the basic problems inherent in the securities.

Citigroup, for example, increased the value of CDOs it produced by 300 per cent between 2003 and 2005, to $20.1 billion. In 2006 this increased again to $40.9 billion and in 2007 production peaked at $49.3 billion (and Citi was the largest issuer in that year at a time when the US housing market had *already* begun to turn). Citi consistently retained CDOs, continued to backstop SPVs and SIVs to which they were transferred and also bought CDOs from other issuers to hold.[26] Similarly, the collapse of AIG is not a tale of simple ignorance but rather of knowledgeable ignorance. AIG Financial Products (AIGFP) was created in 1987 in conjunction with the derivatives specialist Howard Sosin. It was developed as a specialist sub-unit using AIG's AAA credit rating status as a guarantor for derivatives trades in which AIGFP acted as the fee-receiving counterparty.

Joseph Cassano became head of AIGFP in 2001. Cassano was not a 'quant' but an administrator with a degree in political science. He was thus more reliant than his predecessors on the technical advice of his subordinates and more focused on the general trends. The key indicator for Cassano would have been revenues. There was a catastrophic failure of risk control (i.e. the monitoring function) in AIGFP. It took PriceWaterhouseCooper to identify a 'material weakness' in the way AIGFP valued its CDS, resulting in a 2007 fourth quarter $11.1 billion writedown within the sub-unit's business, leading to a $5.29 billion fourth quarter loss for AIG (against full-year profits of $6.2 billion). That writedown exposed the undercapitalisation of AIG in relation to its CDS business. Capitalisation became an issue precisely because CDOs were not, in the end, knowledgeably produced and, as such, the CDS could not be between adequately informed parties, since the basis of information was itself distorted - irrespective of the other issues that also arise here (such as the distortion of perspective created by bonuses and so forth). AIG was an accident waiting to happen in September 2008.[27]

4. By way of Conclusion: The challenge of productive regulation and spontaneous order

The point we want to emphasise here is that private agent error was rooted in an understanding of risk which had a particular knowledge form that affected the construction of securities and derivatives. That knowledge form involved a basic attitude towards the capacity to control uncertainty. The very attempt to do this helped to create the GFC. The role of central banks and of the state may not be irrelevant, but the issue arises whether banking and finance would be improved by the absence of intervention by the state to construct institutions and organisations. For this to be so, it would need to be established that the ongoing patterning of financial markets was one in which the spontaneous order responded positively to its own errors.

However, there is a tension here. A key aspect of order is the role of knowledge — specifically economics. Economics does not just provide a source of legitimacy for practices in finance; it also provides the basic concepts for policy tools (such as the Taylor rule) and the schemata for many forms of financial instruments, trades and strategies (Black-Scholes and so forth). One might, therefore, argue that one source of 'bad' regulation and of bad policy intervention is also shared by private finance; that is, an approach to the possibility of the control of uncertainty. Austrian economics has a great deal to say about problems of uncertainty. Yet, in so far as the problem of uncertainty extends to the very approach to uncertainty embedded in the finance system, an Austrian position would seemingly need to address the challenge that the ongoing ordering of spontaneous order may be problematic.[28] Specifically, the ordering principles may undermine any claim that private agent interactions in the absence of interference will provide better solutions.

Austrian economists accept that the economy is complex and subject to uncertainty. They criticise mainstream economists who seek to theorise and model the economy based on mathematical approaches that reduce to fixed relations between elements. They criticise the claim that one can predict and control an economy based on such theories and models. However, they have been relatively silent on the way that private agents have and continue to produce tools and practices that follow in the same way. Here, one could argue that regulation might be one way to reshape the institutional practices and use of tools by private agents.

One source of productive regulation might begin from recognising the limits of modelling, of precision and prediction, and of control. It might seek to control the control of uncertainty i.e. create institutions, regulations, and interventions that acknowledge the need for prudential measures to be imposed upon the system; and to do so in ways that accept that prudence begins from the limits of foresight and the limits of precision in risk, because of the instability of any given order.[29] This would be compatible with Hayek's argument that the economist can and ought to seek out broad patterns in the economy.[30] It would, however, create problems in terms of the spontaneity of

order and the role of the state. From an Austrian perspective, these too would have to be addressed — and they are not simple issues of conceptual clarification.

A finance system already exists. One of the key arguments made in regard of finance in comparison to other areas of economy has been that it is different. Finance is integrated into all other aspects of the economy.[31] The fundamental issue has never been that any given organisation has been 'too big to fail' (although they have), but rather that the system is too inter-connected within itself to be allowed to fail in any significant part, *and* then also too integrated into the rest of economy to be allowed to fail systemically. Ironically, this is both the greatest argument for transformation of the finance system and the greatest inertia and impediment to any actual attempt to do so.

Consider the question: if you were designing a finance system from scratch would you want it to look like the present one? The answer is surely an indefatigable no. As many have argued across the political and theoretical spectrum, the current system has woven and blurred together basic and important social functions with dysfunctional, dangerous, and systemically self-serving practices. The fact that the answer is no is important, but not because it automatically creates an argument for designing a system from scratch. Rather it is a reminder that the refusal to undertake profound reform of the current system does not begin from any argument that the current system is *the* best or even good, but rather from the argument that changing it profoundly or rapidly is dangerous. This is an argument, for example, that is used and abused by lobbyists at various levels of discourse. Curiously, however, the implicit argument is actually about the unintended consequences of piecemeal changes to a complex integrated system. Aspects of the system are claimed to be functional in some technically precise way; changing them is deemed to have knock-on effects to other aspects of the system or function that a narrow reform focus has not considered. Alternatively, broader changes are opposed as pointless and/or exacerbating current problems in exchange for dubious long term positive effects. In either case, the terrible weight of the current system is the point of departure — and the events of mid-September 2008 an unspoken reminder.

Here, an extreme reading of an Austrian position in which the state simply withdrew would be highly problematic. Withdrawal would not be the state doing nothing. It would constitute rapid and profound change and raise the problem of unintended consequences. That, given the role of finance, could be catastrophic. Any realistic Austrian approach to the finance system would have to be a managed reform of the system. It would have to consider the problem of damage limitation in the short term and also what rules, roles and institutional practices might best suit the finance system in the long term. One cannot assume that appropriate ones will simply arise, unless one assumes away the institutional significance of the past and present — which is something that a consistent Austrian approach cannot do. One cannot assume the appropriate practices etc. will arise unless one assumes that private agents will respond

effectively in the absence of interference. Though this is an open question, it is one for which there is not a great deal of empirical support for the Austrian position, at least in terms of the knowledge forms that now dominate in finance. It is also worth noting that the existence of any kind of regulatory framework for finance at all, has not been a case of emergence ex nihilo. Rather, a sense of the collective need for regulation is a historical product of the repeated failures of the system and its private institutional forms. These are points of concern in addition to any focus one might want to explore in terms of the specifics of various Austrian critiques of aspects of the finance system. For example, the claim that central banks will engineer inflation in the aftermath of a bust is difficult to reconcile with the contemporary dominance of an inflation-phobic monetary orthodoxy within the major central banks.

The main point, however, is that if one can analyse the system in order to manage its reform from the point of view of withdrawal, then one can also think it possible and desirable to manage the system in some ongoing sense of redrawing. In terms of redrawing regulation, an Austrian position faces the challenge of a blurring between the role of social and state institutions in regard of any future order. It is important to bear in mind here that current calls for reform of finance focusing on separations, deleveraging, reduction in scales of activity, the introduction of safety buffers on capital, and the availability of more information, typically reduce to arguments about how to make the system simpler. This in turn resides in a basic insight that simpler may mean more stable, more easily understood, and more easily tracked (or predictable in the ordinary language sense).[34] An ongoing issue is precisely that key private participants do not have individual rationales for achieving this systemic outcome. One can consider this a market failure or a failure of markets, but it is a reality that must be confronted. In confronting it one must also acknowledge that it is states (or at least their populations if not their captured political parties) that have the strongest and most persistent motive to achieve a systemic outcome of simplicity in the name of potential stability. It is the tax base that, in the last instance, reluctantly guarantees the finance system in any given political entity.

What simplicity will be remains contestable: monopoly can be simple but not necessarily desirable; competitive markets can, in principle, be simply structured. The important point, however, is that a case needs to be made regarding the potentially productive role of the state in relation to that structure. This would be a practical fulfilment of Koppl's (2006) point, that an Austrian approach can become part of a newly invigorated post-orthodox and new 'heterodox mainstream'. The case would provide a broader and fuller Austrian response to the GFC and forestall criticism that some 'pure' idealised form of laissez-faire is being advocated; and that Austrians have little to offer in terms of discussion of actual institutional issues. It would, for example, be more consistent in terms of Boettke and Storr's (2002) concept of 'multiple embeddedness', where there are various potential integrations between the

social, the economic and the polity. Any concrete response, however, raises the interesting possibility of a degree of Austrian apostasy. That apostasy may be in terms of policy and institutional formation through regulation, but it might be more consistent in other ways related to uncertainty. Fundamental uncertainty is an ever-present possibility. It is in this sense that Galbraith's quip (there are two kinds of economists, those who don't know what will happen, and those who don't know that they don't know) resonates. The reality of uncertainty is, however, also a product of the institutions in terms of which any given economic order emerges. Any specific regulation holds out the possibility of creating an institutional basis for individual action. Whether in fact that institution contributes to a potentially more stable system is conditional and thus ultimately empirical.

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ENDNOTES

1. Department of Economics, Strategy, Marketing and Enterprise, Anglia Ruskin University. Email: Ioana.Negru@anglia.ac.uk. The authors are grateful to Geoff Hodgson and Steve Fleetwood for the provision of materials and Steve Fleetwood, Walter Block, Randall Holcombe and Roger Jeynes for additional comments. Thanks also to the two anonymous referees who made a number of useful suggestions for additional points of analysis.

2. Specifically, through 2008 and into 2011 there had been little mainstream reflection on whether economics requires fundamental reconstruction, and how this might be achieved A few have changed their views on aspects of economics because of the crisis, but the main institutional outlets (organisations and journals) have not considered systematically the possibility that the GFC has exposed profound methodological and theoretical problems. There is, however, some recognition that 1) a collective 'failure of the imagination' occurred that affected the understanding of systemic risk and thus undermined forecasting (e.g. Besley and Hennessy, 2009) 2) that some macroeconomic assumptions characteristic of mainstream economics ought to be reconsidered. The limited nature of the response is epitomised by Ben Bernanke's (2010) Princeton public lecture: 'Some observers have suggested the need for an overhaul of economics as a discipline, arguing that much of the research in macroeconomics and finance in recent decades has been of little value or even counterproductive. Although economists have much to learn from this crisis, as I will discuss, I think that calls for a radical reworking of the field go too far. In particular, it seems to me that current critiques of economics sometimes conflate three overlapping yet separate enterprises, which, for the purposes of my remarks today, I will call economic science, economic engineering, and economic management. *Economic science* concerns itself primarily with theoretical and empirical generalizations about the behavior of individuals, institutions, markets, and national economies. Most academic research falls in this category. *Economic engineering* is about the design and analysis of frameworks for achieving specific economic objectives… *Economic management* involves the operation of economic frameworks in real time… the recent financial crisis was more a failure of economic engineering and economic management than of what I have called economic science.'

3. For a useful discussion of tensions in Austrian economics see Caldwell and Böhm 1993.

4. This is broadly in keeping with Barry Smith's position on the underlying philosophical arguments for Austrian economics (1990, 1994, 1996).

5. Selgin's comments derive from a thread responding to Henderson and Hummel's 2008 Cato paper in which they argue that Fed interest rates were not to blame for the housing bubble.

6. Classical Keynesians and Austrians differ quite markedly in their views here. For Keynesians fiscal caution is actually reckless in recession. For Austrians, recession weakens unions, industry special interests and so forth and this is a source of economic strength in the abstract (wages can fall and so forth enabling growth); Austrians then take an interest in the notion of contraction as expansion.

7. This is one of the more contentious aspects of policy debate within Austrian circles — see Block 1999.

8. Alan Greenspan's defence of policy in relation to the Taylor Rule has consistently been that 1) it was one tool at the disposal of the FOMC and the emphasis was always on discretion 2) that the model itself was applied if one took into account additional sources such as unrecognised productivity growth and also the role of other economies — particularly China (Greenspan 2009).

9. For example, Austrians tend to argue that, *contra* Keynes, wages are not 'sticky downwards' and that in the absence of government intervention they would adjust as part of the spontaneous order of markets. Involuntary unemployment is thus primarily created by unions and government welfare payments (Murphy 2011a, 2011b). Note the issue of the significance of conjunction is not unequivocal. For example, Lawson (1997, pp. 113-127) argues that Menger's approach accepts that idealised assumptions are unrealistic, but also seeks to justify forms of idealisation in the construction of theory in order to validate a focus on exact relations or strict event regularities. Lawson does, however, acknowledge that Menger intuited and was groping towards the insight that sciences (including economics) seek to articulate transfactual tendencies based on the structured powers of things, rather than their repeated (isolated) outcomes. Lawson and other realists argue that heterodox positions share a rejection of mainstream economics because it lacks such an approach to ontology, but they themselves can often fail to recognise they are united by the common realist insights that are then inconsistently argued. See also Lawson 2003. Austrians are in any case not Positivists as economists in the sense explored by Caldwell (1994). Moreover, if one takes any of the areas of substantive development of theory by Austrians, one readily recognises its rejection of regularity, certainty and quantification of the future for empirical economics — Mises' critique of cardinal measures of utility (1953(1912) ,1949), for example — its relation to Alan Sweezy's 1934 critique and Rothbard's later defence.

10. For a discussion of uncertainty as the necessary corollary of economics in terms of considerations of time, see Wiseman 1953, pp. 121-123.

11. Hayek concisely states the issues for the economist in his 1978 Mises memorial lecture: 'The chief insight gained by modern economists is that the market is essentially an ordering mechanism, growing up without anybody wholly understanding it, that

enables us to utilize widely dispersed information about the significance of circumstances of which we are mostly ignorant. However, the various planners (and not only the planners in the socialist camp) and dirigists have still not yet grasped this…If the chief problem of economic decisions is one of coping with the inevitable ignorance, the task of a science of economics trying to explain the joint effects of hundreds of thousands of such decisions on men in many different positions has to deal with an ignorance as it were, of a second order of magnitude because the explaining economist does not even know what all the acting people know; he has to provide an explanation without knowing the determining facts, not even knowing what the individual members in the economic system know about these facts…If the market really achieves a utilization of more information than any participant in this market process possesses, the outcome must depend on more particular facts than the scientific observer can insert into his tentative hypothesis which is intended to explain the whole process…I still believe that this is the only approach which is entitled to regard itself as scientific. Being scientific involves in this connection a frank admission of how limited our powers of prediction really are. It still does lead to some falsifiable predictions, namely what sorts of events are possible in a given situation and which are not. It is, in this sense, an empirical theory even though it consists largely, but not entirely, of propositions which are self-evident once they are stated.' (Hayek 1978)

12. Miller provides a fascinating example of early recognition of the issue of a potential arms race between regulators and 'innovators'. Das provides a comprehensive technical account of various forms of derivatives and Haug a technical critique.

13. CDOs are split into 4 debt classes; in descending order: senior, mezzanine, junior/subordinate, and equity ('toxic'). The credit rating is based on a computer simulation that calculates the likely default levels in the underlying asset. The key terms are diversification and correlation. The more 'diversified' the portfolio, the smaller the assumed (simulated) likelihood of losses. Extreme events (widespread losses across a diversified portfolio, historically very low losses across a diversified portfolio), based on a normal distribution, are assumed to be unlikely on the basis of the diversification, and the 'correlation' or link between losses is assumed to be small and assumed to be constant. Ratings agencies when analysing CDOs typically follow the same approach. A senior class tranche then benefits from an actuality of low correlation, whilst an equity tranche can benefit from an actuality of high correlation (if it is lower than the expected level of losses — indicating a skew in outcomes that does not conform to the original assumption of a normal distribution).

14. Though CDS can serve an insurance function they have not been formally designated an insurance contract, subject to insurance regulation. They have been financial market instruments based on a market contract (see Morgan 2008; Glass 2009). The contract defines a reference entity that involves a reference obligation (the original agreement to fulfil some terms - payment on a bond etc). Given 'credit events' are then defined within the contract for which the counterparty is obligated to make payment. In return the counterparty receives a 'charge' or fee. The contract may also require collateral to be posted by the counterparty and the level of collateral may then vary based on specified events in relation to the reference entity and its obligations. However, the main providers of CDS — the mono-line insurers, such as Ambac or MBIA, and others such as AIG — tended to be exempt from posting collateral whilst they retained their own AAA credit rating. Since CDS are over-the-counter (OTC) products not typically vested in an exchange, and are not subject to state regulation as a form of insurance,

then there has been no central organisation automatically responsible for the posting of collateral and for oversight of the scales and functioning of collateral management in the system as a whole; or for particular organisations like AIG within that system. The ISDA provided a general template contract for members and along with the Bank for International Settlements provided aggregate statistics for derivatives in general and for specific classes.

15. Here, in the US at least, the views of Alan Greenspan and Robert Rubin (then Treasury Secretary) prevailed. The counter-discourse was largely marginalised: Charles Bowsher at the General Accounting Office testified in the Congressional hearings regarding the 1994 crash that the use of derivatives based on opaque OTC transactions held out the possibility of undercapitalised counterparties being unable to fulfil contracts, and that there were basic feedback loop potentials. Brooksley Born, chair of the Federal Commodity Futures Trading Commission (CFTC, 1996-1999), also, and for similar reasons, argued during her tenure that OTC credit derivatives should be overseen by the CFTC (and ideally brought onto an exchange where the scale of transactions could be monitored and the solvency of parties be both confirmed and controlled). Arthur Levitt at the SEC, Greenspan at the Federal Reserve and Robert Rubin at the Treasury all opposed the move. The LTCM crisis then occurred in 1998, yet the Federal Reserve and Treasury continued to oppose oversight for OTC credit derivatives and Born resigned. See Born 1998; Rubin *et al* 1998. Greenspan's position is neatly summarised in his 1998 testimony to the Committee on Banking and Financial Services:

> Counterparties in the OTC markets can easily recognize the risks to which they would be exposed by failing to make their own independent valuations of their transactions, whose economic and credit terms may differ in significant respects. Moreover, they usually have access to other, often more reliable or more relevant sources of information. Hence, any price distortions in particular transactions could not affect other buyers or sellers of the underlying asset. Professional counterparties to privately negotiated contracts also have demonstrated their ability to protect themselves from losses from fraud and counterparty insolvencies. They have managed credit risks quite effectively through careful evaluation of counterparties, the setting of internal credit limits, and judicious use of netting and collateral agreements.

The President's Working Group on Financial Markets (including Greenspan, Levitt and Larry Summers) proposed a legal clarification of the status of derivatives but not a demand that OTC derivatives be transferred to an exchange or that, for credit derivatives, collateral issues be tightened. The subsequent Commodity Futures Modernization Act (CFMA) in 2000 both confirmed that OTC derivatives would remain beyond the oversight of the CFTC and SEC and that they would be legally enforceable contracts. Greenspan continued to maintain thereafter that derivatives markets were still developing and that they exhibited information efficiencies that meant they required no further regulation — a position he only began to acknowledge was 'flawed' following the GFC. OTC credit derivatives eventually came under the remit of the Office of Risk Assessment (ORA) in conjunction with the SEC in 2004. This was not oversight as such but a form of monitoring as part of the general duties of the ORA to highlight potential sources of financial instability. The ORA was chronically understaffed and essentially blind to the specific mechanics of what occurred in OTC derivatives markets — whose scale grew through the decade. According to the Bank of International Settlements (BIS 2009) there were CDS contracts with a notional value of approximately $57 trillion within a total derivatives market of $516 trillion to approximately $660 trillion (depending on the measure) at the end of 2007. Global GDP in 2007 was only around $70 trillion.

16. Moody's data indicate the issuing of CDOs in the US grew rapidly from 1996, exceeding $50 billion in 1998. Total issuance of CDOs and CLOs in 2006 was approximately $600 billion on a global basis.

17. Though it should be noted that not all models were historical in the same way, or based on a single way of calculating correlation — they did, however, all have the same basic defect.

18. Essentially that the US housing market is diversified and that a normal distribution can be applied with low and constant correlation.

19. One should not forget the foresight of economists such as Nouriel Roubini and Steve Keen here either.

20. The very fact that ARM based mortgages were increasing in prevalence at a time when the Federal Funds rate was low and the cost of a traditional fixed rate mortgage was low ought to have been a warning indicator.

21. Refinancing to access housing equity and exploit low interest rates on ARM rose to $250 billion by the mid-2000s in the US.

22. This was a likely outcome of the basic assumption that housing wealth was a one-way bet. But to be a one-way bet house prices must continue to rise. It can still seem reasonable to participate in this market as a house buyer even if you are aware that house prices are rising rapidly in ways that seem somehow nonsensical. If house prices are increasing by 50% on a 5 year basis, one might say this is unsustainable. Equally, however, one might think of oneself as a smart investor if one buys a house for $100,000 with 90% financing (and thus an equity stake of $10,000) and sells it 5 years later for $150,000.

23. Various authors have noted the mismatch between the total value of CDS and the total issue of given potentially insurable assets in order to highlight the speculative uses of CDS. One might note, for example, that the total value of original assets such as corporate bonds in 2007 was around $20 trillion; far less than CDS contracts at $57 trillion.

24. This extends also to 'synthetic CDOs' which are a product constructed out of CDS of existing CDOs.

25. This is not to suggest that there was not also a spectrum of activities that extended from the reckless to the morally dubious and, ultimately, to the legally questionable that occurred within finance. These are issues that have been raised in relation to the selling of mortgages, the construction and sale of CDOs, and the conflict of interest that might arise in terms of acting as both an agent and counterparty in transactions for derivatives and financial instruments. Here, for example, an individual investment bank may act in a rational way to insure itself by hedging. but also highlight the potential for conflict of interest and systemic-wide consequences. Goldman Sachs, for example, produced CDOs and synthetic CDOs, which were then also insured by AIG. As market valuations of CDOs began to fall AIG's counterparties, including Goldman could, based on contract specifics of CDS, demand collateral be posted to establish that any manifesting defaults could be covered by the insurer. Given that previously AIG tended to be exempt from posting collateral based on its AAA status, this was potentially devastating since AIG simply had not generated the capital reserves — and

given the scales of CDS issuing probably could not. Knowing the scales of collateral to be posted, the banks also had a motive to hedge against the undercapitalisation of the insurer and thus take out CDS on the insurer — effectively shorting them. This makes sense to the bank but is systemically dangerous in its feedback effects and also creates possibilities for deliberate destabilising activity: large investment banks can aggressively reduce the mark-to-market valuation of CDO tranches, effectively requiring the insurer to post more collateral to the point where they default on the contract and the CDS taken out on the insurer pays out. The Federal Financial Crisis Inquiry Commission (FCIC), for example, has investigated whether Goldman helped precipitate the failure of AIG through this practice.

26. As of November 2007 Citi had 7 SIVs with assets of around $80 billion and on December 14th announced that it was bringing $49 billion of those assets onto its balance sheet. Citi was forced to make a writedown of over $60 billion on its assets in 2008 and still had over $20 billion in mortgage related securities on its books in the fourth quarter.

27. See for example, the Congressional Oversight Panel (COP) report June 2010.

28. Specifically, the evolution of the system involves financial innovation whose learning is pathological i.e. a spontaneous order emerges that is an erroneous response to the failure of order because it perpetuates the basic sources of error that contributed both to the construction and destruction of the former order. It is worth noting also that Hayek, Marshall and Keynes all agree that the evolution of order is about adaption and the basis of adaption is not necessarily (in fact unlikely to be) an ethical principle — the good and the fit are not the same.

29. The context of argument here would be that if private errors occur and finance is not like other forms of business — it is integrated into all other forms and underpins society — then in so far as the capacity for finance to fail is not prevented by the absence of regulation (the emergent spontaneous order) because social institutions are not sources of perfect information, one cannot simply argue 'let the market solve its own problems' because they are everyone's problems — catastrophic macro problems. As such one cannot evade the issue of the possibility of a) regulation to prevent problems and/or b) regulation to administer such problems. The issue becomes rather the extent of those and whether any basic tension related to the misallocation of capital is a necessary compromise. Here it may be the case that the role of the state is one trapped in the contradiction that it is perpetually responding to economic problems of which it is a cause. But in terms of multiple causation and relative problems of context there may be more to the case for productive regulation than this.

30. Once Hayek rejected the concept of equilibrium he began to associate order with a degree of patterning or stability in expectations that also extends to basic insights and understandings of the nature of patterns for the economist. See, for example, Hayek 1978, p. 184 and, 1937, p. 34.

31. It is the capillary of capitalism.

32. See for example Paul Volker's speech to the Future of Finance conference in Sussex, December 2009, in which he claimed that the ATM was the main constructive financial innovation in the last 25 years.

36. These are also issues of power and influence and the dependency of the economy and the political system on finance. Finance now dominates corporate US interests — it provides around 40 per cent of corporate profits (compared to less than 20 per cent prior to the mid-1980s). This has multiple effects - it is a transfer of wealth and potential from other sectors, it is a source of shareholder value factors and it is a source of wealth for lobbying and a source of tax revenue to ensure lobbying has an ear in government.

37. This is not to suggest that the concept of simplicity is unproblematic. As many systems modellers note, one can construct a dynamic interactive system from a few simple relations (subject to iterative feedbacks) and the overall system then becomes 'chaotic'. The point we would emphasise is more mundane: it can only be a gain if one can actually understand the principles by which a system operates and the specifics of the tools and practices that are allowed within it. They should not be inscrutable or beyond oversight.

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