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How to Make a Bad Problem Worse: The US Federal Reserve's Rescue of Bear Stearns.

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Introduction

It is a long cherished goal of purely theoretical economics to specify idealised conditions in which the nominal forces of demand and supply are all that is required to create not only a functioning market environment but also a social optimum. Much ink has been spilt in this endeavour, because if the so-called market coordination problem can be resolved as a distinctly economic matter it has profound implications for the construction of social institutions. It suggests that Pareto optimality is a very real possibility and that society should opt for the purest structure of market relations imaginable in order to bring these ideal-typical conditions into being. Yet all of the most groundbreaking economics on this issue has merely shown how far we still have to go in suspending our credulity if we are to believe that a fully articulated and economically meaningful resolution to the market coordination problem is in sight.

The pioneer of this approach was the late nineteenth-century economist, Léon Walras (1984 [1954]). However, his attempts to demonstrate how demand and supply dynamics alone could at the same time produce multiple single-market equilibria ended in self-declared failure (Hahn and Solow 1995: 27). The complexity of the in-time inter-market feedback mechanisms ultimately proved fatal for his system of simultaneous equations. This led him to insert a fictitious intra-market device into his explanatory framework in an attempt to render the process of price determination conceptually tractable, albeit at the expense of altogether abstracting away the temporal dimension of real-world economic practices (Walker 1987: 767).

The receipt of Nobel Prizes notwithstanding, Kenneth Arrow and Gérard Debreu (1954) fared no better in the 1950s with their markedly more sophisticated mathematics. Their work continues to be hugely important in its own right, but still in essence it does little more than confirm, using more nuanced means, Walras's earlier failures (Weintraub 1985: 16-25). They kicked off a whole generation of studies from mathematically-oriented theoretical economists whose only findings were the solely negative ones of showing just how many qualifications had to be made to the starting assumptions if the mathematics of general equilibrium economics are to hold (Bridel and Huck 2002: 520). There is little wonder, then, that in the face of ever greater appreciation of the restrictions of the general equilibrium approach, Frank Ackerman (2002: 119) has declared its continuing death.

However, there is more going on here than merely the vitality – or otherwise – of general equilibrium economics as a progressive Lakatosian research programme. The language of the general equilibrium approach continues to provide a framework within which economists discuss the prominent public policy issues of the day. General equilibrium economics lives on most obviously when economists feel moved to advocate strategies to 'complete' the market: that is, to add new market elements between those that already exist so as to provide a more extensive market-based logic to guide the coordination of demand and supply dynamics across the entire behavioural environment. The same economists who voice their suspicions about the continued relevance of general equilibrium economics as a research programme can also, somewhat confusingly perhaps, be heard using its associated language of market completion when discussing reforms to the policy environment.

One such case in point in the context of the ongoing financial crisis is the renowned proponent of behavioural finance, Robert Shiller. Shiller (2012: 132) criticises overly mathematical approaches to economics on the grounds that such models only cohere self-referentially due to a starting behavioural assumption of symmetry of human response to extant conditions. He says that this is an unworkable assumption in practice, though, because it projects onto the market environment a level of predictability that real-world markets simply do not display. As a research programme the general equilibrium approach is entirely dependent on such an assumption, but Shiller will have none of it. He is, after all, the person who wrote *Irrational Exuberance* (2000) at least in part as an exposé of the general equilibrium models which helped to propel the tech-stock bubble of the late 1990s, as well as *The Subprime Solution* (2008) to do something similar for the housing market bubble of the mid 2000s. Bubbles, by their very nature, of course, represent the complete antithesis of symmetrical human responses to prevailing investment conditions.

Nevertheless, Shiller's preferred policy response to the ongoing crisis is still cast resolutely in the language of market completion. From his theoretical perspective the market coordination problem is fundamentally irresolvable as a matter of pure economics, but from his policy perspective it continues to provide the most reliable guide to what should happen next. Shiller wants to see "extensions in the scope of markets" so that a demand-and-supply financial system can be "expanded and democratized and humanized". Along the way he bemoans the fact that recent regulatory initiatives "developed by politicians in response to public anger have been shaped by what the public perceives as the problem, not by the contributions of visionaries" (Shiller 2012: xii, vii, xii). The visionaries in this respect, needless to say, are those whose self-declared mission is to complete the market structure and not those who work on behalf of enhanced public protection against market failures.

I use the following pages to question such a view. I do so by building upon Benjamin Braun's (2014) recent demonstration of the institution-shaping effects of what he calls the 'emergency phase' of a financial crisis. This is the period in which policy-makers are thinking no further ahead than the very short term, where the priority is simply to stabilise existing conditions and prevent the crisis from becoming even more pronounced. It produces a context in which policy-makers are prepared to be innovative, but in the process of setting aside their normal policy playbook they are also likely to change the institutional status quo with potentially path-dependent consequences for the future. I adopt Braun's argument about the significance of the emergency phase to suggest that Shiller's hopes for the future completion of financial markets are ultimately misplaced. My position is constructed on the back of an analysis of the US Federal Reserve's interventions to ensure a private sector buy-out of the failing investment bank, Bear Stearns, in the autumn of 2008.

The relatively orderly working out of Bear's accumulated mortgage securitisation losses certainly took place within an emergency phase of policy-making. It was feared at the time that an outright collapse would expose other globally-active banks to similar losses in a domino-style contagion. Existing laws were consequently interpreted extremely liberally to allow the Federal Reserve to act in ways previously deemed impermissible so as to ease the transition to an apparently more stable banking structure. However, the institutional configuration thus realised will almost certainly thwart Shiller's hopes for market completeness and the associated dispersal of market-setting power. The choices made by US policy-makers in the context of the emergency phase of the ongoing crisis have not disincentivised future subprime bubbles through subjecting every step on the road to such bubbles to the process of market coordination. Instead, they have allowed the whole of the subprime cycle to be incorporated within single financial institutions which remain too big to fail even after supposedly corrective legislation, with all the implications that this has for effective market monitoring.

In an effort to pursue such an argument the paper now proceeds in three stages. In section one I provide a brief account of the demise of Bear Stearns and of the lengths to which the US Federal Reserve was prepared to go to ward off the threat of cascading bank collapses. At this point in the emergency phase the emphasis appears to have been on the immediacy of the policy response – to be seen not only to be doing something but doing it decisively – rather than the long-term repercussions of the managed liquidation. The second section is used to explore those repercussions. In particular I will attempt to show that in the very act of saving significant elements of the US banking system from the full effects of the subprime crisis the Fed – inadvertently, one has to presume – made the future emergence of similar effects much more likely. By circumventing existing rules preventing public money from being used for lender-of-last-resort purposes in relation to investment banking firms, it provided additional mechanisms to allow the biggest banks to take the whole of the subprime cycle in-house. I reflect further on this finding in section three. It highlights the potential significance of path-dependent dynamics set in motion by policy-makers in the emergency phase. It also suggests that further incorporation of complex derivatives trading into banks' business models will undermine the standard economics justification for such instruments: namely, that by their very existence they allow for the further completion of the market structure and for the coordination of individual economic activity to take place through demand and supply dynamics alone. From this perspective the banking structure continues to look extremely fragile, despite the vast sums

of public money recently committed to its maintenance. Indeed, the contemporary fragility might itself be at least partly a function of the way in which that money was made available in the emergency phase of crisis policy-making.

The Collapse of Bear Stearns

For all of the last five years of its life Bear Stearns was consistently in the very upper echelons of the securities section of Fortune Magazine's prestigious America's Most Admired Companies rankings. Its mortgage securitisation business helped to propel it up the league table, as it increased its exposure to those markets whilst other banks shied away at the first signs of trouble in 2005 and 2006 (Bamber and Spencer 2008: 45). By the end of 2007 Bear's books contained almost \$30 billion of complicated mortgage-linked 'level three' assets associated with the subprime sector. Such assets are defined by the US Financial Accounting Standards Board as ones whose input values are fundamentally 'unobservable' (Valentine 2010: 207). In cases such as this there are no agreed principles to govern the estimate of fair value prices to be used to calculate the overall worth of the assets being carried by a firm. All that can be done in these instances is to derive a figure from a model whose parameters are themselves determined by the firm (Arnold and de Lange 2004: 758). Yet even on this basis Bear's overall balance sheet leverage was forty times the level of its equity holdings.

The level three assets on its books consisted to a very large degree of increasingly complex collateralised debt obligations (CDOs) on mortgage-backed securities (MBSs), and it was the move into mortgage securitisation more generally that accounted for the enormous expansion in the size of its balance sheet. Standard mortgage-backed securities had been traded on Wall Street since the 1980s, whereby individual residential mortgages were pooled into a single asset (Partnoy 2003: 102-6). Each asset increasingly came to be 'sliced and diced' into a variety of tranches, with probabilistic calculus being used to determine their risk/return structure. The most creditworthy mortgages were packaged together in tranches whose investment grade credit ratings meant that they were perceived to have a default risk pretty much commensurable with that of multiple-year US Treasury bonds. Their corresponding returns also consequently followed a similar pattern (Denninger 2011: 38-9). Lower grade tranches made for riskier investments, but also provided far higher returns than simple interest-bearing Treasury bonds as underlying US housing market conditions remained extremely strong throughout the early 2000s (Schwartz 2009: 142).

Increasing fault-lines were incorporated into Bear's balance sheet position the more that it branched out into collateralised debt obligations on its mortgage-backed securities (Greenberg 2010: 187). CDOs work by applying the same slicing and dicing principle used for plain vanilla MBSs to individual tranches of the MBS (Prins 2009: 58). Some of the riskier tranches of the original securitised asset – most often those of around a BBB rating – were further divided into smaller tranches displaying similar spreads of creditworthiness and risk/return characteristics to the original. The aim was to use clever financial engineering techniques within the context of an ever more complete market structure in pursuit of what Gillian Tett (2009) has aptly described as 'fool's gold'. That is, the modern alchemist's mission was to create more creditworthy assets out of the strategic repackaging of less creditworthy assets (Betz 2012: 230). At this point the market coordination problem could be solved in practice – if not yet in theory – simply by letting demand and supply dynamics determine who would buy and who would sell in an ever more complete market structure. This style of thinking found its apotheosis in the subsequent creation of CDO-squareds and CDO-cubeds, the latter being CDOs of CDOs of MBSs. Yet the underlying goal could only be attained if all tranches of all collateralised debt obligations were sold, which often left the bank initiating the deal holding the least attractive tranches either in its own name or in a subsidiary set up especially for the purpose. Bear Stearns often found itself in this position.

Bear was in mortal trouble from January 2008, at which time the first rumours began to circulate in the financial press of an imminent and massive write down on its forecasted earnings due directly to difficulties in maintaining the selling price of its more complex subprime mortgage-

backed securities (*Wall Street Journal*, 29.01.08). True to the dynamics of all financial collapses, the perception that there were insufficient buyers in the market to maintain the liquidity of the balance sheet position drove away all remaining buyers at the market price, forcing the market price downwards and ramping up the liquidity problems. When trying to explain away the collapse of one of its country's most revered banks to the Basel Committee, Christopher Cox (2008), the Chair of the US Securities and Exchange Commission, said that this was the result of a self-fulfilling shortage of confidence from its counterparties and not a self-evident shortage of capital to help it to liquidate its loss-making positions. 90% of its liquidity pool was wiped out in its final three days of trading as an autonomous entity, but this was long after the death knell had already sounded (Chincarini 2012: 150). Bear entered March 2008 with all of its subprime assets still on its books, having been unable to find anyone who would take them off its hands, and it had threats of litigation hanging over the managers of now-defunct hedge funds which had been accused of misleading investors about the true scale of the riskiness of its MBS adventures. Its 'unobservable' level three asset input values were therefore confronted by the observable reality that the market was producing very different estimations of their worth to those of the firm's own models.

Bear's holdings of subprime securities could be temporarily sustained only by credit which it had secured through world money markets, and over the medium term this therefore became a problem of insufficient capital as well as insufficient counterparty confidence. Its primary investments were in asset classes in which the only private buyers were increasingly carnivorous hedge funds making offer prices at anything up to a 90% discount of the assets' book value (Muolo and Padilla 2008: 274-5). In the absence of enough capital to ride out the losses Bear's subprime assets had become, in effect, pretty much worthless, because they could not be sold at a price which would do anything other than bankrupt the company. This prompted fears amongst money market actors that Bear could not maintain sufficient liquidity in its operations to keep all its credit lines open in order to stay in business. These same fears were then transposed to the stock market. In six days of trading between March 7th and March 17th 2008, Bear's stock price fell from \$70.08 to \$4.81 a share, a staggering decline of 93% (*Wall Street Journal Europe*, 18.03.08). The Federal Reserve became increasingly concerned that a Bear default would have multiplicative effects within world money markets, causing further defaults amongst otherwise solvent banks. As a consequence, it stepped in with a rescue plan which initially involved pumping liquidity into Bear's position but, over the course of a single weekend, eventually morphed into a direct sale of the entire firm (Kelly 2010: 27).

What interests me most in this event, and what also drives my analysis in the rest of the paper, is that the rescue of Bear Stearns would appear to have protected, rather than sought to legislate against, the structure of financial innovation which had such a hand in the firm's collapse. Following his election to the Presidency, Barack Obama appointed the former Chair of the Federal Reserve, Paul Volcker, to the position of Chair of his Economic Recovery Advisory Board. Volcker used that position to talk eloquently about the need to reactivate the Glass-Steagall provisions of the 1933 Banking Act. He was interested in particular in restoring the formal divide – both in law and in practice – between investment and commercial banks. He told the UK House of Commons Treasury Committee (2010: 148) that it was acceptable to place complex trading activities “on the market where [investment banks] can innovate, expand and contract, whatever they want to do, but don't bring them within the tent of government protected commercial banks”. “If you are doing this stuff”, he said on another occasion (cited in Cassidy 2010), “you shouldn't be a commercial bank”. Reactivating the Glass-Steagall separation in the way that Volcker deemed most appropriate would have presented one way of unwinding the complex system of mortgage securitisation which led both to a heightened incidence of predatory lending in the subprime sector and the prospect of cascading defaults in the commercial banking sector which would have put depositors' savings in danger (Volcker 2010). Yet the reaction to Bear's predicament by his successors at the Fed meant that the so-called Volcker Rule was always a non-starter. Ben Bernanke's Fed team responded to the emergency conditions engulfing Bear Stearns to act in a way which guaranteed the longevity of the mortgage securitisation business whilst simultaneously further blurring the distinction between investment and commercial banking practices.

During the fateful weekend in which it decided that the firm would have to be taken over by another leading Wall Street player, the Federal Reserve first undertook a significant intervention to prepare Bear Stearns for a private sale. It cleansed Bear's balance sheet of \$30 billion of subprime securities which, in effect, were worthless, given the refusal of any private investor to buy them at their book value. Bear's balance sheet was subjected to a publicly sponsored overhaul so that its assets column might prove to be an attractive proposition to a potential purchaser at a fire-sale price (*New York Times*, 23.03.08). The Fed itself was not allowed under law to purchase a direct public stake in an investment bank, which meant that the most that it could do was facilitate a private sale. It provided JPMorgan Chase's commercial banking arm with a suitable amount of credit at generous rates in order for the deal to be closed (Waggoner 2008: 78-9). It is difficult to believe that this was consistent with the spirit of surviving Glass-Steagall provisions, but the Fed claimed that it could do this because Morgan's commercial banking arm did not fall within the legal embargo on it becoming a direct creditor to an investment bank. Bernanke signed off on a multi-billion dollar non-recourse loan to Morgan, through which the government received mortgage debt as the collateral on the cash loan, but it was allowed no call on Morgan's assets if the mortgage debt collateral failed to sufficiently recover in value to pay off the whole of the loan (Johnson 2011: 285).

Massive amounts of taxpayer money were therefore used to ensure that the outright collapse of Bear Stearns did not trigger domino effects in short-term inter-bank money markets through a direct default. Yet this did not translate into enhanced government control of the banking system. The procurement process merely involved the public appropriation of Morgan as a willing and, ultimately, a very fortunate conduit in the Fed's rescue plan. JPMorgan Chase took advantage of the Fed's eagerness to use taxpayer money as an inducement for a deal to be done to engineer a direct transfer of ownership. When the fresh injection of liquidity into Bear's trading positions via the Morgan conduit failed to overturn perceptions that Bear was on the verge of collapse, the Fed allowed itself to be persuaded to change strategy and instead facilitated Bear's direct purchase at a knockdown price by Morgan.

JP Morgan Chase had an offer accepted for Bear's overhauled balance sheet of just \$2 per share, funded in the first instance out of public credit. Morgan latterly increased the offer to \$9.35 per share (Waggoner 2008: 81), but when the \$2 per share deal was struck on March 17th 2008 this was only six trading days after Bear stock had been selling at in excess of \$70 per share (*Financial Times*, 07.03.08). To have made the same purchase just 14 months previously would have cost Morgan in excess of \$20 billion more than its original offer. What it actually paid, then, represents a fire-sale price of the highest order, with the Federal Reserve acting as auctioneer-in-chief.

In this way, the culmination of public intervention pushed in exactly the opposite direction to the Glass-Steagall 'wall' by further incorporating investment banking functions into the commercial banking system. The emergency phase efforts to prevent Bear from defaulting therefore amounted to further functional consolidation of the banking sector, making it more difficult to tell where investment banking functions end and where commercial banking functions begin. Glass-Steagall provisions were enacted specifically to ensure that such a situation could not arise again in the wake of the conflicts of interest which so severely disrupted standard commercial banking functions in the US in the 1920s (Peach 1975: 14). Today, Morgan must maintain liquidity in its balance sheet position if it is to be able to discharge its commercial banking responsibilities to its depositors. Yet its balance sheet has been newly enlarged through the use of the Fed's credit line to incorporate all of the remaining ostensibly uncompromised assets from Bear's failed investment banking practices. The Fed's response to Bear's subprime woes served not only to perpetuate the banking system structure which initially facilitated subprime excesses, but also more deeply to institutionalise it. The following section explores such a claim in more depth.

Realising the Subprime One-Stop Shop

The phenomenal growth of the mortgage securitisation business provided mortgage lenders with a relatively easy 'get out' card. They could originate mortgage loans whilst accepting no responsibility for the due diligence of assessing borrowers' prospects for meeting their repayment schedules, pretty much safe in the knowledge that they would not have to keep the loans on their books long enough for this to matter (Bitner 2008: 76). It is now well documented that the demand within the secondary market for the loans was sufficiently strong that they could almost always be passed on to investment banks seeking profit opportunities from underwriting mortgage-backed securities. This led to a significant rise in the incidence of 'predatory lending', circumstances in which a lender agrees to a loan but does not care whether the borrower possesses the means to make full repayment a viable proposition (Best 2010: 35). The structure of mortgage-backed securities allowed for a certain level of defaults before the value of the security fell below its purchase price. This meant that loan originators had no incentive to only sell mortgages on the primary market to people that they genuinely believed would not default.

Bear Stearns appears to have been deeply implicated in the predatory lending, not as a lender itself on the primary mortgage market, but as an active participant on the demand-side of the secondary mortgage market (Fleckenstein and Sheehan 2008: 208). It won its Fortune awards through acquiring a reputation as an astute manager of securities risk, but in this instance it loaded up its balance sheet with large quantities of unscrutinised mortgage loans via its securitisation business. The financial journalists Paul Muolo and Mathew Padilla (2008: 228-9) cite an industry insider as saying that it was standard practice for Bear to rush through a light-touch review of the mortgage loans it bought through the secondary market, and apparently only then for around one-in-five of the loans. The rest were not reviewed. It was more interested in processing high loan volumes than in distinguishing between high-quality and low-quality loans, because higher volumes allowed it to trade more on its own account in the MBSs which proved to be a lucrative source of income during the subprime bubble years (Howells and Bain 2008: 121).

Even though Bear did not originate loans in its own name as a primary mortgage lender, it did own a subprime lender (*Wall Street Journal*, 24.03.08) and it also provided warehouse credit for other subprime lenders through its links with the commercial banking sector (*Financial Times*, 20.03.08). Both of these aspects of its operations enabled it to increase the volume of mortgage loans it could purchase on the secondary market as a means of expanding its mortgage securitisation business. It could clearly expect to have first call on all loans originated by its own subsidiary, whilst it could also use its warehouse credit operations to secure guaranteed access to loans originated through reliance on its credit. In these ways Bear was able to expand significantly its mortgage securitisation business. Yet it did so to such a degree that it also had to increase its own reliance on credit secured from other lenders through short-term money market activities, otherwise it would have sacrificed the liquidity of its balance sheet position even as the good times continued to roll. The success of Bear's entire business model came to depend on the confidence of other banks in its ability to exit its MBS position at the securities' book value. In the absence of demand-side activity on the market for its securities, such confidence would be undermined and the ensuing margin calls on its loans from other banks would threaten to unravel its entire operations.

Whilst exposure to the implications of predatory lending was not really an issue for Bear when house price growth was strong, it became so as the housing market turned (vanden Heuvel 2009: 87). The number of people in the subprime sector who were in arrears on their mortgage repayments increased markedly, as did the number of outright defaults. The bonds which Bear had created as part of its subprime mortgage securitisation business immediately became a less sought after commodity as the increase in defaults eroded the price at which MBSs could be sold. Some of those remained on Bear's books in the interests of ensuring that all tranches were sold. The same was true of the CDOs it underwrote out of BBB-rated MBS tranches, and these were even more susceptible to loss of market value as the number of mortgage defaults went up. As the market price of all of these interlinked securities fell below their book value on Bear's balance sheet, its whole balance sheet position became increasingly untenable. With

other banks calling in their loans in March 2008 Bear could no longer maintain the liquidity of its operations.

The crisis in subprime mortgage business became a generalised credit crunch affecting all elements of the US banking system because of the way in which the biggest banks sought to take the subprime cycle in-house. In so doing, they enacted business models which would have been in clear contravention of Glass-Steagall provisions had the divorce of investment and commercial banking survived the Gramm-Leach-Bliley Act of 1999. Many of the small local subprime originators who sparked the selling frenzy of high credit risk mortgages between 2002 and 2006 were set up specifically to operate in a context still defined by the Glass-Steagall 'wall'. They were non-banks, devoid of the depository institutions traditionally associated with the commercial banking sector (Roubini and Mihm 2011: 80). Their lack of depositors' money meant that they had insufficient credit holdings of their own to cover the loan value of the mortgages they were originating. This pushed them directly into cooperation with commercial banks in order to gain access to the warehouse lending which allowed them to sustain their subprime business (Bitner 2008: 106). Warehouse lending typically took the form of multi-million dollar credit lines which capitalised significant numbers of high credit risk mortgages en masse.

When the subprime mortgage business showed itself to be successful the larger national mortgage lenders entered the fray. They diversified into the already profitable subprime sector and sought to enhance that profit rate by using their existing market power (Ramirez 2013: 79). These firms were large enough to have their own commercial bank affiliates – strictly speaking illegal under Glass-Steagall provisions – ready and waiting to provide them with warehouse loans at cut-price rates (Kolb 2010: 75). This gave the large national mortgage lenders a competitive advantage over the small local subprime lenders on every mortgage deal made in that sector. It also enabled them to exploit the use of commercial banking affiliates specifically to multiply the volume of subprime mortgages on their books. The ability of the large national lenders to increase volume on smaller margins transformed the primary market in subprime mortgages, incentivising the use of brokers who fell outside federal supervisory mechanisms to lower the cost to the lender of originating individual mortgages. It also transformed the secondary market in subprime mortgages, making possible bolder and more complex strategies of securitisation amongst Wall Street's investment banking community (Cohan 2009: 306). The CDO revolution would not have been possible in the absence of these changes to the underlying market structure.

Balance sheet positions across the US banking system could have remained immune from exposure to the excessive subprime borrowing which the banking system facilitated had each of the steps in the subprime cycle been kept functionally distinct from one another. However, this was not how the subprime business model evolved in the period of the house price bubble between 2002 and 2006. The combination of house price growth and easy mortgage credit led to a refinancing boom, which in turn created highly profitable secondary markets for trading mortgage-backed securities (Gramlich 2007: 61). These markets provided incentives for the most highly capitalised actors in the business to try to take the whole of the subprime cycle in-house, thus reducing the fees that otherwise had to be paid to intermediaries in the cycle and limiting the profits that had to be shared with other firms. The aim during the golden period of subprime was to cut out as many of the other intermediaries as possible in order to create a 'department store' subprime structure. This was exactly the sort of one-stop shop which Glass-Steagall provisions outlawed.

Take the example of Countrywide, the largest provider of residential mortgages by volume in the US throughout the house price bubble years. Countrywide purchased a bank with depository institutions in 1999 to provide itself with the easy commercial bank credit which enabled it to become the country's largest mortgage lender (Muolo and Padilla 2008: 141). It also created its own capital markets group to provide investment banking functions to the rest of the firm without needing to go out of house. This allowed it to securitise its own subprime mortgages in an attempt to benefit from excluding Wall Street investment banks from its subprime cycle. As Muolo and Padilla (2008: 124) put it, "Countrywide had a Wall Street firm inside its own walls: itself". Due diligence became more difficult to guarantee, though, when Countrywide acted as its own commercial banking credit provider so as to ensure that its internal investment banking unit had sufficient loans to bundle together to underwrite potentially profitable mortgage-

backed securities.

Moreover, it was not only originally non-bank institutions playing this game. Investment banks, specialists in all forms of mortgage securitisation, also tried to take the whole of the subprime cycle in-house during the 2002-2006 bubble period. Muolo and Padilla (2008: 223) write of the way in which most of the major US investment banks “created a beginning-to-end subprime mortgage factory” within themselves. Bear Stearns had been the first to buy its own firm – EMC Mortgage – specialising in the purchase of delinquent mortgage loans for the purpose of securitisation (Muolo and Padilla 2008: 191-2, 237-8). From here it was only a small step to originating subprime mortgages when the house price bubble made this a profitable strategy from 2002. Bear created two hedge funds which held large quantities of the subprime mortgage-backed securities that it had underwritten (Waggoner 2008: 71-3). The hedge funds’ ‘two and twenty’ strategy of fees plus retained profits provided the firm with significant cash holdings during the funds’ successful years (Mezrich 2005: 82). These could then be used to capitalise commercial banking credit lines, which in turn could ensure that the volume of subprime lending generated by Bear increased, as well as that Bear could use that volume to expand its own subprime mortgage securitisation business. The key to understanding its eventual difficulties is located in the ease with which it was able to take so many parts of the subprime cycle in-house.

What is surprising from this perspective, then, is how the rescue plan for Bear Stearns put together by the Federal Reserve contained no legal safeguards against the resurrection of one-stop shop subprime MBS structures. Indeed, looking specifically at the contents of that plan, it is impossible to conclude anything other than that it points in exactly the opposite direction. It continues not only to legitimate, but also to provide extra impetus for the banking sector structure which allowed firms to reconfigure themselves as departmental stores for the subprime cycle in the first place. Folding Bear’s remaining investment banking functions into JPMorgan Chase’s commercial banking credit functions allows for the reproduction of the one-stop shop subprime banking business model which Glass-Steagall provisions regulated out of existence for three generations. Moreover, using massive amounts of public money to do so appears to represent official endorsement of post-Glass-Steagall structures. There should consequently be little surprise that the policy response since 2008 has increasingly come to be seen as a waste of a good crisis.

There appears to be a genuine sense amongst political commentators that the scale of public interventions to prop up the ailing banking sector marks a decisive break with past regulatory practice. Yet, on my reading of events at least, such a sense is almost entirely misguided. The further incorporation of investment and commercial banking functions into one-stop shops signals renewed faith in the possibility of successful banking self-regulation, even at the same time as public discourse has focused on the need for banks to put their house in order. The scale of the money being thrown at the banking sector is not on its own what is most remarkable from my perspective. It is the extent to which taxpayers are being required to finance an intervention which does so little – and perhaps even nothing – to reassert public authority over banking regulation. This is not to say that nothing will change in terms of policy detail, only that these changes currently seem likely to be circumscribed by a continued preference for a model of self-regulation. I turn in the final section to ask what this all means from the perspective of economists’ theories about market completeness.

Mortgage Securitisation and Market Completeness

Much will depend on the credit rating agencies if the subprime MBS cycle is ever to regain the momentum it displayed during the most recent bubble. At the very least, their decisions to award investment grade status to various MBS assets provided a green light for many banks mistakenly to discount downside risk and consequently to overload their balance sheets with exposure to the more exotic forms of mortgage securitisation instrument (Sinclair 2010: 102). After all, creating a CDO of a BBB-rated MBS does nothing to make it more likely that the original mortgage loans will continue to be repaid, and it is on this latter basis alone that the underlying risk/return structure of the security is founded. Nonetheless, some smart financial engineering

and some even more savvy underwriter self-promotion seems to have been all that was required to persuade credit rating agencies to upgrade BBB-rated MBS tranches into something rather better. This was even often to something as good as a AAA-rated CDO of an MBS (Tett 2009: 93-4). Investors will often use the credit rating agencies' opinions as a substitute for the much more expensive and time-consuming process of determining the price they should be prepared to pay for an asset. This shortcut becomes even more tempting when faced with the prospect of stress-testing the prices of MBS CDOs, where the computational capacity has yet to be developed to discover in timely fashion all the possible permutations of serial correlation of default risk on the underlying mortgage repayment schedules (Wigan 2010: 116). It is extremely important in this scenario, then, just how often the credit rating agencies were prepared to award MBSs and their derivatives an investment grade rating.

Looking at the historical data, it appears to be usual for mortgages to outperform ten-year Treasury securities in terms of the return to the investor by about two percentage points per annum (Waggoner 2008: 31). The differential return reflects the higher default risk associated with mortgage repayments, because individual homeowners might always find that their personal financial circumstances change so dramatically that they can no longer meet their repayment obligations, but the US government is most unlikely ever to find itself in the same situation. It is this essential difference between the two risk/return structures that originally provided investment banks with an opportunity to make money out of bringing to the market securities written against outstanding mortgage repayments. The securities emit a sense of value to investors only to the extent to which they can be judged relative to the benchmark provided by Treasury bills. The fact that the credit rating agencies often gave MBSs and their derivatives the same AAA rating it was usual for Treasury bills to have helps to explain why investors piled in apparently so indiscriminately to the subprime MBS market. They knew that the additional default risk on mortgage repayments meant that they typically traded 200 basis points higher than Treasury bills, but here were the credit rating agencies telling them that the risk/return structures of the two securities were basically the same and that therefore the additional 200 basis point return could be pocketed as a free gift.

Lloyd Blankfein, CEO of Goldman Sachs, has bemoaned the fact that banks such as his "let the growth and complexity in new [MBS] instruments outstrip ... the operational capacity to manage them" (cited in Jenkins 2009). Private financial institutions were therefore faced with a dilemma. On the one hand, they could have admitted that ever more convoluted mortgage securitisation instruments were impossible to value thoroughly and therefore waved goodbye to the promise of the free gift apparently on offer in MBS markets. On the other hand, they could have continued to exploit the additional 200 basis point return on MBS instruments and accepted as real some sort of proxy valuing technique. Not all investors chose the latter option because crowd dynamics never operate to an unlimited degree in financial markets. In general, though, this is how the industry aligned itself in response to the different potential paths with which it was faced. The proxy valuing technique of choice tended to be David Li's Gaussian copula model. It is a moot point whether it was selected because it most accurately captured the structure of the underlying markets or because it most accurately captured what investors needed to believe the structure of the underlying markets to be if they were to convince themselves of the soundness of their investments. Either way, the formula appears to have had significant performative effects (Clarke 2012: 274-5).

The novelty of Li's Gaussian copula formula lies solely in its application (Li 2000). Its internal content is well known in mathematical circles, in which it is used to describe a fairly standard curve (Dunbar 2011: 93). Before Li, though, nobody had thought that the curve could act in turn as a valid approximation of what had previously seemed to be the intractable problem of default correlation in financial markets (Cossin 2009: 19). By applying probabilistic reasoning to the question of how one mortgage repayment schedule might be linked to another, those who followed in Li's footsteps reduced the subprime mortgage securitisation market to an apparently 'normal' state in which events are heavily attracted around an average set of circumstances which act as a stability point. The Gaussian copula formula thus replaces what has always been known about securities markets showing signs of distress – that is, that risks of default are serially correlated – with a means of visualising the mortgage securitisation market in which

the manifestation of serial correlation is simply assumed away. Instead, every homeowner is allocated a fully autonomous spot on a scatterplot which is heavily clustered around an average position. The only sense in which these spots join up is when drawing on the curve that represents the prevailing distribution of default risk. Whether or not any other person is faced with broader contextual circumstances which increase the likelihood of them being unable to meet their repayments is irrelevant to the presumed stability of the curve. Each homeowner is allocated their individual position on the scatterplot relative to their own credit history, and this is assumed to be a matter of personal attributes and not wider market mechanics. In this way the very image of a securities market being vulnerable to distress begins to fade from view.

Debate is still ongoing as to whether Li was basically right apart from underestimating the fatness of his distribution's tail. Yet this is besides the point from my perspective. It is much more relevant, I suggest, that the introduction of the Gaussian copula formula provided two different ways of visualising the market environment. One refers to the actual MBS market, in which fortunes were to be won and lost as real money – or at least its equivalent in the balance sheet bottom line – was staked on predicting the next price movement in the context of serial correlation of mortgage repayments (Watson 2008: 292). The other refers to a purely hypothetical 'market' expressed by the formula's mathematical equations, in which the predictability of price movements made it possible to hedge every eventuality through the construction of a suitable synthetic asset. The source of so much of the financial system's recent difficulties is located in the fact that too many banks began to act on the assumption that the actual MBS market had come to take on the properties of the hypothetical Gaussian copula 'market'. Recast in this manner, it is fairly easy to see why the MBS market could be viewed by investors as a money-making machine. The Gaussian copula 'market' – and all of the errors of visualisation involved in its translation to the actual MBS market – became fundamental to the value ascribed to the securities in both the underwriting process and the credit rating agencies' rating process (MacKenzie 2009: 179).

There are consequently ample reasons to follow Chris Clarke (2012: 271-2) and conclude that the broader mortgage securitisation market was performed, at least to some extent, through the visualisation techniques made possible by Li's Gaussian copula formula. Such visualisation techniques held out the promise of a future where the gaps between individual markets would be effectively filled in by trading synthetic assets of increasing complexity, so that this aspect of the economy would require no regulation beyond demand and supply dynamics. This is the logic that underpinned all resistance within US politics to a more formal structure of restrictive legislation to govern derivatives trading, most notably by the man who came between Volcker and Bernanke as Chair of the Federal Reserve, Alan Greenspan (Barak 2012: 52). Yet note that there is no economic means being posited here to explain how the MBS market can be rendered complete in a way that resolves the market coordination problem. The only mechanism of that sort in play is the purely mathematical content of Li's Gaussian copula formula. However, the starting assumptions which allow his mathematics to work abstract very clearly from the primary economic fact of the serial correlation of mortgage repayment schedules.

The market coordination problem remained unresolved in the build-up to the subprime crisis, then, and, as I have tried to argue here, it continues to remain so following the Federal Reserve's rescue act at Bear Stearns. The Fed's decision to allow Morgan to take Bear's MBS structured investment positions onto its books does not help to turn the actual MBS market into something that begins to look like the hypothetical 'market' of the Gaussian copula formula. Indeed, by setting a precedent which enables the largest banks to move the whole of the subprime cycle in-house it actually pushes in the opposite direction. It allows private financial firms to substitute for the completed market structure envisioned in pure economic theory and, as economists have long known, the firm and the market are by no means synonymous. Indeed, there is a strong line of argument to suggest that they should be seen as being in tension with one another.

In what is now widely – and rightly – seen to be a classic paper from the 'Years of High Theory' in economics (Shackle 1983), Ronald Coase (1937) addressed the issue of why the firm exists. He asked the question in the context of an increasing realignment of economic theory around the question of allocative efficiency, knowing that if the market was indeed the perfect foresight mechanism posited by the theory then it should always be capable of allocating available

resources efficiently (Swedberg 2003: 80). Yet this seemed to be contradicted not only by the enhanced centrality of the corporation to the organisation of modern economic systems, but also by its very existence. From the perspective of the economic theory of the day there was no explanation of why the firm exists, because at best it can only ever duplicate the price discovery functions of the market at each of the separate stages of the production process. More likely, moreover, the development of internal structures of resource allocation within the corporation creates bureaucratic impulses which mean that the firm fails to match the market's efficiency. Coase's (1937: 392) answer was that modern production processes often entailed the imposition of significant transactions costs if every stage was to be contracted out to market arrangements, and that the organisational structure of the firm was consequently likely to have a cost advantage (Foss 2009: 84).

Translating Coase's theory of the firm to make it speak specifically to the concerns of my paper, the reason why the firm exists is both a reflection of the absence of market completeness and a further barrier preventing such a situation from ever developing. The largest US banks wanted to create subprime securitisation one-stop shops of their own during the bubble years precisely because this was seen as the most effective way of restricting their exposure to transactions costs. Their MBS underwriting businesses were provided with an in-built advantage the more that they could get their own subsidiaries to capitalise and originate the initial mortgage agreements. Relying on the market to do likewise was simply too expensive, because in anything other than the most extreme bubble conditions it would have raised the stakes of appropriate due diligence tests for each individual mortgage agreement. This is the light in which it is necessary to view the Fed's decision to suspend the spirit of its own mission statement in allowing commercial banks to use public guarantees to take substantial investment banking positions onto their balance sheets. That decision was about seeking systemic stability for the banking industry in the deliberate frustration of market completeness.

One of the more remarkable political aspects of the crisis has been the surrounding public quietism (Crouch 2011; Mirowski 2013). Many changes have been imposed on everyday economic life which, before the event, might well have been expected to be met with concerted resistance. But those effects have yet to materialise. The reason is to be found within the political system and the lack of clear alternatives on offer there. However, Braun's (2014) notion of the potential path-dependency of policy-making in the emergency phase also suggests that not much is likely to have happened had there been unambiguously articulated alternatives to mobilise around. Even if the public mood could have been generated for bringing banks decisively to heel for their previous excesses, the Fed's emergency phase interventions in the spring of 2008 could well have created a situation in which the horse has already bolted. It makes less sense than before to contemplate a future divorce of investment and commercial banking now that billions of dollars of public money have already been used to fold imploding investment banking functions into the structure of commercial banking. The commercial banking structure – which is built upon depositors' savings, of course – has been appropriated by the Fed as a safe haven for investment banking practices which in turn are prone to speculative bubbles. As Coase's theory of the firm suggests, this moves the banking structure even further away from the pure economics dream of market completion.

Conclusion

There were, of course, multiple originating points for the subprime crisis. At heart, though, they all revolve around changing lending practices which were triggered by allowing non-bank institutions to take on banking functions within commercial lending markets. The competition between non-banks and banks for the same mortgage business prompted each to expand their lending operations to people who would conventionally be assumed to be poor credit risks. The perception of risk was temporarily mitigated as investment banks underwrote securities constructed from bundles of subprime mortgages, selling some tranches of the securities to their commercial clients and keeping others for trading on their own accounts. The markets for such securities quickly became liquid, creating impressive profit opportunities for the firm underwriting the securities. The result was that investment banks increasingly offered

inducements to lenders in the form of guaranteed warehouse credit to increase their volume of subprime lending, whilst commercial banks sustained the impression of a healthy balance sheet position by purchasing significant quantities of apparently high performance mortgage-backed securities. The business models of non-bank institutions, investment banks and commercial banks thus became increasingly dependent on each other's ability to sustain an ever expanding cycle of subprime lending.

Dependence latterly became full-scale integration as the Fed used the commercial banking arm of JPMorgan Chase as a conduit for the publicly sponsored rescue of Bear Stearns. Taxpayer money was appropriated to cleanse Bear's books of its worst performing mortgage-based liabilities, allowing Morgan to accept only its untainted assets, which it paid for at firesale prices through a non-recourse loan in which all risk fell on the public (*Business Week*, 31.03.08). This decision enhanced the formal incorporation of investment and commercial banking practices within the same firm and, therefore, within a single business model overseen by a single structure of line management. The system of checks and balances for the US banking system introduced in the Banking Act of 1933 was finally and, it seems, irrevocably dissolved in this one decision.

So, what does this all mean for the commonly heard argument that mortgage securitisation must be restarted, only this time in a more foolproof manner? What implications does it have for the goals of those, like Shiller, who wish to see the financial market structure increasingly completed in the belief that this is the route to both its increased democratisation and its increased stability? My analysis has provided precious little comfort for anybody who retains the general equilibrium economics faith in market completeness, whether formally within that particular research programme or less formally in using the language of plugging the gaps between existing markets. The structure of the mortgage securitisation business simply does not permit such a solution in the aftermath of the Fed's emergency phase decision-making. The path dependencies set free by facilitating commercial bank incorporation of investment banking positions are incompatible with the genuine rearticulation of the objectives and practices of finance. Yet, perhaps even more importantly, there is no reason to believe that the future would be one of democratic, stable finance even if a structured change of this nature could be brought into being. The economic rationale on which the language of market completeness relies is generically flawed.

The problem with Shiller's reasoning merely echoes the problem with general equilibrium economics as a whole. There is an elegance to the underlying propositions which has inspired generations of economists to want to believe that they are true. Yet the elegance resides solely in the mathematical formulae through which the models are expressed, and the willingness to believe must therefore also be situated at that level. The mathematical relationships have struck out way in advance of any corroborating evidence, as anyone with even a passing familiarity with the general equilibrium equations of Arrow and Debreu will know only too well. Opening the pages of Debreu's (1959) *Theory of Value* will reveal that the words that one would typically expect to be used to describe verifiable patterns of everyday economic behaviour are almost entirely replaced by mathematical expressions. There simply is no genuinely economic solution on hand to the market coordination problem (Watson 2005: 157). One is left in the uncomfortable position of having to assume that real-world markets emerge in a manner that can be perfectly captured in mathematical form if any solution at all is to be posited.

It is in the mathematics alone that gaps can be filled within real-world market structures to produce overall market completeness. This, at heart, is the major difficulty with the ever more ubiquitous rise of derivative instruments (Bryan and Rafferty 2006: 35). They were all imagined in the first instance in mathematical form and were designed to work in the world of mathematics. They were then brought into existence in an attempt to perform their underlying mathematical functions (MacKenzie 2006: 73), but in a much less clear cut and much less predictable economic world (Maurer 2002: 22). Neither the mortgage-backed securities nor the collateralised debt obligations constructed around them were flawed in strict mathematical terms: the Gaussian copula formula is robust at the level of abstraction at which its relationships can be expected to operate. The difficulties come in assuming that actual MBS and CDO markets will function in a directly analogous manner to the hypothetical Gaussian copula 'market'. Instinct suggests that this is highly unlikely to ever be the case except in temporary moments of extreme serendipity,

This is a sobering thought, given that the stability of the MBS and MBS derivatives markets was always dependent on a freak alignment of observable prices with Gaussian copula prices. It is perhaps especially so now that emergency phase decision-making has allowed the subprime cycle to be taken in-house. This has broken – perhaps once-and-for-all – the link between the market (as mechanism for real-world price discovery) and ‘market’ (as guide to the mathematically-correct structure of prices).

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