2008 – 2009: Crisis and Recovery

Having attended various lectures by academics, regulators, central bankers and investors in the opening weeks of 2010, and being surprised at the diversity of views among the experts, I thought to look back at the 2008 credit crisis in a bit more detail to see what I missed. I tried to look back at the events from first principles and to avoid any biases I might have as a member of the alternatives investment industry.

Credit Markets Inverted:

Credit markets are considered normal when, to put it crudely, borrowers want to borrow more than lenders want to lend. There is no way to put it rigorously. Of course lenders want to lend but they really really want their money back and then some. When lenders are more desperate to lend than borrowers are to borrow, the credit markets are no longer normal, and all sorts of perverse phenomena arise.

Sound lending principles require the lender to know and understand the borrower, their situation, their objectives, their ability and intention to repay, structure the loan to suit the borrower and the lender and their respective objectives, monitor the loan and the borrower through the life of the loan. As long as lenders are 'reluctant' lenders, the level of diligence in the credit process will be high.

What went wrong that led to the 2008 credit crisis? Was it proprietary trading? Sub prime lending? Hedge funds or private equity? Was it LBOs? I don't think so. Some of these are symptoms but they are not the cause. I think it will be difficult to define a cause, but I also think that we can be more specific about the causes and get closer to the mechanics

of the meltdown.

How the bubble was blown:

Lenders became too willing to lend. They became more willing to lend than borrowers were to borrow. This resulted in weak lending standards and weak loan covenants. Basically, people borrowed too much because some other people lent them too much. But what made lenders behave this way?

There was demand to buy mortgages. This came from demand for mortgage backed securities which in turn came from demand for CDOs. Every link in the chain is an intermediary. There was demand for yield. There was excess demand for yield. Why?

There was insufficient supply of income bearing assets, or the yield from income bearing assets had compressed to very low levels. This was certainly true of corporate debt. Spread compression occurred across all corporate credit across all credit qualities. There was excess demand for yield. Why?

Was it that investors were allocating away from equities and commodities and towards fixed income? Certainly pension funds in the aftermath of the Dot Com induced bubble and crisis would have allocated away from risky assets towards less risk assets, or so they thought. The losses arising from equity investments from 2001 – 2002, the increasing funding deficit building at many pensions meant that pensions became desperate yield seekers.

Yield seeking investors will typically invest in sovereign as well as corporate bonds. The developed markets by running large trade and thus current account deficits, by implication ran large capital account surpluses, reflecting in most cases the recycling of surpluses. These surpluses were recycled through the purchase of sovereign securities, US treasuries. Chinese and Japanese central bank buying pressure seriously depressed yields on US treasuries keeping the yield curve very flat. This meant that investors were faced with low interest

rates across the curve so that they could not create a levered carry trade in USD alone, and they were not getting sufficient yield on their longer dated treasury bonds. Yield investors had to look elsewhere; however, many of them had restricted mandates which limited them to highly rated credit instruments.

Here is where financial innovation became an accomplice to the bubble and the beginnings of the credit crisis. Wall Street is one of the centres of human innovation.

Securitization is nothing new and can be traced to the 1970s. GNMA was one of the pioneers and issued MBS as early as 1970. By the mid 80's securitization had been adopted in other types of loans such as auto loans and credit card debt.

The period 2003 to 2007 is interesting. A general spread compression led to investors seeking yield in more complex albeit highly rated securities paying higher yields than corresponding single name credits of equivalent rating. Enter CDOs. By pooling and leveraging, CDO's achieved a sleight of hand which resulted in such securities being available to investors. The demand for such products resulted in demand for the underlying collateral ultimately leading to demand for mortgages, on the lender's side. As even CDO products experienced yield compression, the quest for yield resulted in sub-standard collateral: sub prime mortgage loans.

The quest for yield led to other cool innovations such as synthetic CDOs where the underlying collateral consisted not of bonds or loans but credit default swaps, that is, side bets on whether loans or bonds would pay or default.

A note about credit ratings agencies: Investors were at the time investing in securities awarded investment grade ratings by the credit ratings agencies. These agencies are paid by the firms that arrange the products offered to investors and not by the investors themselves. This is a flawed model of course

and anyone can see it. Nobody will fix it, however, as investors prefer free conflicted advice to paid for unbiased advice. Quite how investors could have relied on the output of these conflicted ratings agencies is remarkable.

How the bubble burst:

The instability:

As the credit markets grew out of hand, lending standards were weakened resulting in poorly structured loans being made to weak borrowers. Probabilities of default therefore rose. These were not measured by any models since models have always been based on historical data and are better suited to more symmetric risk. Credit risk is highly non-spherical.

Not only were default probabilities higher but loan to value levels were also higher. This was due to the availability of credit ironically inflating the value of the very collateral that was supporting it, and also weaker lending standards requiring less security.

I do not want to talk too much about the Shadow Banking System here. This was a lattice that evolved after Glass Steagall was repealed during the Clinton administration leaving financial institutions only Basel II to optimize around. By 2006, hedge funds, investment banks, structured investment vehicles and CDOs were a thriving part of the thriving Shadow Banking System.

The problems created by excessive indebtedness had been building from 2003 peaking in 2007 when several sub-prime lenders went bust. Since mid 2007, the mortgage crisis had been slowly unfolding. The highly visible failures such as Lehman and AIG were merely symptoms of a more fundamental weakness. The breaking point in the mortgage market was not a singular event. There obviously came a point when debt service became impossible and collateral cover had become inadequate.

One can argue that the crisis was precipitated by fatigue in the housing market. There is a more concrete phenomenon than this. As lending standards get weaker, for a given level of variability in income in the case of debt service, and for a given level of volatility in capital values in the case of collateral cover, the probability of breaching covenants gets higher. Foreclosures exert downward pressure on capital values which in turn result in further defaults.

A note about Lehman and AIG: These casualties were collateral damage. Lehman had large exposures to lower rated tranches of CDOs collateralized by mortgages. Typically, the higher rated tranches were sold to long term investors seeking liability driven investment solutions. In order to market these higher rated tranches, it is often necessary to retain the lower rated tranches in a demonstration of alignment of interest. Whether Lehman retained these exposures intentionally or whether they were retained to market the senior tranches is unclear.

Calling bank failures collateral damage is a bit much. As intermediaries in credit creation banks are accomplices to excessive indebtedness. Their multiple roles, particularly in the finance of trade also make them important as a utility. The interconnectedness of the banking system and the shadow banking system implies that some institutions are too big to fail or too interconnected to fail. Operating under this assumption is a prime example of moral hazard. The existence of a lender of last resort significantly strengthens this phenomenon.

The tipping point:

There is no distinct tipping point. However, the maximum level of safe leverage is a function of the variability of assets. For a given level of variability, increasing leverage increases the probability of insolvency. Poor lending standards increase leverage towards this point. For a given

level of level of variability of income, increasing debt burden increases the probability of delinquency. Poor lending standards increase debt burdens towards this point.

Defaulting mortgages, increasing delinquencies result in decreasing values of mortgage pools, result in decreasing values of mortgage securities, result in decreasing values of collateralized mortgage securities, result in decreasing values of investors' portfolios and ultimately to insolvency in the case of levered holders of these assets.

Secondary market effects provide a positive feedback. A positive feedback on the way down is a bad thing. Foreclosures lead to falling collateral values causing a cascade of declining values in all the securities down the chain and ultimately to investors' balance sheets.

The medium term effects:

As the solvency of banks is threatened, the LIBOR market is impaired, cost of capital surges and there is an acute retrenchment of credit leading to an acute reduction in investment and employment.

We won't delve into the bailouts that ensued in 2008 or their merits. In a crisis situation there is no good or bad rescue. There is only a rescue. What we know is that the scale of fiscal and monetary policy targeted at reviving credit markets has been unprecedented. Central banks the world over created money to fuel credit reflation and to pay for government expenditure. Fiscal policy was similarly expansionary to replace private consumption and investment. The result has been an inflation of the nominal output in each asset and goods market. Where real output has been constrained, prices have risen. This has been more true in asset markets as asset creation was capacity constrained.

Ten seconds into the future:

Fixing the system:

Let us assume that the system was flawed. We need to assume this because it is not clear if it was. It may be that the trade off for avoiding big blow ups is more frequent but smaller blow ups, or no blow ups but a reduced rate of growth and development. In the long run, a smoother path is fairer because it reduces the impact of luck in timing. Booms and busts are disruptive and introduce perverse and sub-optimal behaviour at the major inflexion points. Cycles may be acceptable. However, we cannot know ex ante if our policy or model will truly prevent busts so we should budget for some level of cyclicality. Back to the analysis, lets assume the system is flawed.

The first step to solving a problem is to understand the circumstances leading up to the crisis. Blame has so far been ascribed to bankers, hedge fund managers, regulators, central banks, in that order. There is a growing recognition that the public and investors were to some degree to blame. There is a growing suspicion that perhaps the general model and philosophy is broken. The poor understanding of the public, the media, even industry specific media, of one constituent of another's sphere of operation, regulators of the shadow banking industry, the shadow banking industry of investors, investors of regulators, central banks of hedge funds, is highly illuminating. If this is the quality of information and communication across the financial system, which one central planner or regulator has the information and the understanding to fix it?

Now I am going to waffle. There is no other way. I have no answers, only more questions which I hope will provide a framework for considering the future. Apologies.

As we sift through the cinders, we find not one smoking gun but a series of failures. I list them in no particular order.

Investors were not diligent or cautious enough. Why?

Banks were not diligent or cautious enough. Why?

Central banks were complacent and left interest rates too low and for too long.

Regulators acted after the fact and were ineffective. Could they have acted any other way and was this an optimal response?

Central banks acted swiftly and effectively. Is this so unquestionably a good thing?

Pension fund behaviour emerging from the 2001 recession

Global imbalances from the emergence of China as a world economic power

The rise of the shadow banking industry as a system of levers

The death of volatility post 2001 and the implications for risk capital provisioning

There will be regulatory response. Especially since the regulators took a good portion of the blame for the crisis. Also, the bailouts of 2008 required large amounts of public money which will translate into either of inflation or taxation. Taxpayers will expect to be heard. The phase of regulatory reform is upon us. The path of regulation will be driven by public opinion, politics, money and logic, in that order. The appropriate analysis of regulatory reform should therefore be approached in the same order of seniority: public opinion, politics, money and only then logic. Since public opinion is fickle, politics is often individually rational but otherwise makes no sense to society, the path of regulation is a roll of the dice. We suspect, and can see some momentum behind heavy handed regulation pandering to the cries of the public to ‘crucify them!’ Money controls politics in every capital in the world from the most capitalist to the most

socialist. The bankers will lobby the politicians and regulation will be delayed, diluted or otherwise misdirected. More inefficiency.

Yield investors such as pension funds have already been on the path of diversification into alternatives such as private equity and hedge funds. Their initial hunger for yield in the wake of the 2001 recession led to unnaturally low interest rates. If their weight of capital is sufficient, they can bring more efficiency to markets through arbitrage strategies. In a sense this was what happened from 2004 to 2007. Arbitrage strategies were the preserve of the few sophisticated investors, clubby family offices, a handful of private banks and their clients, mainly scions of Worms et Cie and their contemporaries. Until 2004. From 2004 a wall of institutional money went in search of arbitrage profits leading to market efficiency and no-arbitrage. The beauty of arbitrage is that it is eminently leveragable. Hedge funds increased leverage and capital employed from 2005 to 2008. Note the poor performance of hedge funds in 2005 coincides with a period of massive growth of unlevered assets in hedge funds before they had the opportunity to adjust their leverage up to meet the new low-arbitrage environment. Where do these institutional investors go next? The sophisticated ones will always lead and the less sophisticated will follow. The less sophisticated ones are less stable investors and likely responsible for flight of capital since they invest in fear and inadequate information. You can recognize them by the liquidity terms they demand; they are unsure and therefore need an out. Intermediaries like funds of funds are forgiven this allegation since they are hostage to the liquidity they provide their own investors.

Global imbalances built as China and India emerged as the manufacturing powerhouses of the world. The opening of China to external investment opened up a huge resource of cheap labour. Optimal planning required developed world economies to

build reliable production capacity in low cost countries. Thus capital and intellectual property was exported to China and India just as cheap goods were imported in return from these countries. This created the beginnings of the trade deficit. It is difficult to justify the argument that the Chinese save too much. The marginal propensity to consume is higher at lower incomes. The Chinese should have been saving less than the American. The pattern of expenditure is as important as the macro variables they constitute. The Chinese worker can hardly afford imports. The low cost producer can hardly afford imported inputs. They are likely to save in the form of buying a home. The amortization will be accounted for as a saving. In the US, the consumer is well described by Friedman's permanent income hypothesis. An equity bull market and rising home values led to optimism about future income. Stable credit markets and low interest rates also supported the hypothesis; until now. A feedback loop was created as the Chinese recycled their trade surplus by purchasing US treasuries effectively providing vendor financing for Chinese exports. This feedback loop will take some time to unwind but is in progress. The current account imbalance has made a significant correction and looks set to continue despite some volatility in the time series.

Volatility is a very interesting quantity. It tends to spike and fade. Its one of those few series where an inverted chart is immediately recognized as an inverted chart. Here is where I really waffle. As a measure of risk, it is not a very good one. There are a whole host of micro technical reasons why an investor is more concerned with the shape of a distribution than merely its second moment. An investor is therefore concerned about all the even moments of a distribution. Only under the assumption of normality does the second moment together with the first, fully characterised the distribution. Risk is a very complex concept that can hardly be characterised by a single measure. But now lets waffle. It seems that dynamic systems have a fairly stable quantity of

risk that doesn’t go away. As volatility falls, it stores up the potential for discontinuous or gap risk. Why? Complacency seems to be the waffly answer. If investors focus on volatility as the sole or primary measure of risk, they must add exposure as volatility falls. As exogenous risk falls, investors would attempt to keep their risk exposure constant by adding exposure, usually through leverage. This probably also explains why volatility tends to spike and fade. Leverage is added up until the point where volatility results in negative or zero equity. At this point investors reduce leverage, an act which precipitates further downside volatility, further destroying equity and triggers more selling.

Capital adequacy is a framework in banking regulation require banks to hold capital to ensure their solvency under the variability of their risky assets. The capital ratio is a single number that hopes to characterise factors in credit such as character, cash flow, conditions, capital and cash flow. Focus reduce complexity at the expense of granularity. One of the criticisms of the Basel II framework for capital provisioning is that it is pro cyclical, a criticism that has gained validity in the 2008 crisis. While the Spanish economy has acutely underperformed its counterparts in the Eurozone, Banco de Espana’s dynamic provisioning framework has arguably led to a more robust Spanish banking system. Basel II, however, results in less capital being required the longer a bull market lasts. This supports the storage or accumulation of gap risk concept that results in the spike and fade phenomenon exhibited by volatility time series. Dynamic provisioning is not a panacea. It still requires econometric estimation of past cycles in determining a forecast default rate. Models are not always robust and can result in over provisioning (and thus higher cost of capital) and to a lesser extent under provisioning. Be that as it may, if sufficient numbers of banks apply some sort of counter-cyclical provisioning, and if the econometric models forecasts are

taken in the context of how wrong they can be, a degree of safety can be had which does not over-provide for losses to the extent that there is a long term secular impact on cost of capital.

More interesting than all these micro issues is the question why investors were over confident and not cautious enough. For investors, either information was inadequate or misleading. If it was misleading, regulation needs to be reformed to improve transparency and clarity in the financial system. If it was inadequate, one has to ask why an investor would risk capital under insufficient information. Transparency and clarity in the financial system certainly needs to be addressed. One can argue that investors should put a premium on transparency and clarity and thus provide a market solution. If they did not, then reference the analysis for the case where information was inadequate. Transparency and clarity should be encouraged or imposed by regulators on financial markets so that financial institutions have to provide a certain level of disclosure on a standardized basis in a format that is clear and not misleading. Arguably this is already covered by the law, in particular under the concept of misrepresentation under contract law. Standardization and format are simple concepts but can be difficult to implement given the level of complexity of financial products and instruments. However, the level of complexity and the inability to report in a particular format is already a signalling device to investors.

If investors operated under inadequate information or if inadequate information was not priced then it is likely that investor sophistication is the issue. Investors require education. This certainly should apply at the retail level. If we teach basic skills in schools, we should teach people how to manage basic household finances. This is no different from hunter gatherer teaching the basic management of resources. Any education beyond this probably needs to be paid for by the investor much as an aspiring surgeon needs to pay to acquire

those particular skills. We still need to teach our children language and basic mathematics. This part sounds particularly waffly but is probably more important than any other initiative.

As interesting is the question why banks were over confident and not cautious enough. Risk compensation and risk homeostasis can explain some of the behaviour of banks. Compensation design is another significant factor. Compensation schemes in banks offer considerable optionality to the agent (employee). The reward for success is a share of profit and the price of failure is unemployment. Risk compensation and homeostasis result from the implementation of Basel II, the increased awareness and publication of financial stability reports, and the existence of a lender of last resort. Depositors and shareholders were complicit in their complacency likely for the same reasons. The existence of a lender of last resort and the idea that an institution can be to big to fail contribute to moral hazard and complacency.

The complaint that central banks, notably the Fed, kept interest rates too low for too long is a valid one, but the point is subtler. While the Fed kept rates well below that suggested by the Taylor Rule, the BoE and the ECB did not. The unanswerable and to me most interesting question is, what would equilibrium short term rates be had there been no prescription from central banks. To answer this, central banks would have to avoid signalling interest rates to the economy. One could argue that, at the margin, inflationary pressures would debase the current stock of money leading to higher equilibrium interest rates while disinflationary pressures would inflate the current stock of money leading to lower interest rates. Unfortunately there is not theoretical support for this as for every model that supports it, there is an equal and opposite one that refutes it. Such is the dismal science. One can argue against activist interest rate policy on the grounds of ‘first do no harm’. The instability of

dynamic systems, the probability that any sort of policy is pro-cyclical, that the information available to a central planner (that is what a central bank is when it is setting interest rates) is inadequate and that the market is a better processor of such information. So the complaint that the Fed kept rates too low for too long can be generalized to the complaine that the Fed sets interest rates at all. Perhaps we should rethink the whole raison d'etre of a central bank.

Where do we go from here:

Let's look at the general level of debt in the US economy. The periods of major expansion of household balance sheets in recent times occurred in the mid to late 1980's slowing only in the recession of the early 1990's. From 2001, household debt as a percentage of GDP accelerates again, no doubt on the back of easy credit and low interest rates. The acceleration goes all the way through 2008 and falls off in 2009. Similar patterns are seen across corporate and business debt to GDP ratios. In the case of mortgage debt, the acceleration from 2000 is quite pronounced and accelerates well above trend to peak in 2008. Corporate debt, however, while exhibiting the same general trends does not exceed trend growth rates and from 2000 to 2009 stays below trend. Corporate indebtedness also exhibits less autocorrelation and thus less trending and momentum than household or mortgage debt. Federal debt to GDP is actually trending down from 1952 to 1979 only accelerating in the early 1980's to peak a decade later. From 1995 Federal debt to GDP falls through to 2000 when it begins to pick up again. In 2008, it spikes of course as the some proportion of private sector debt is transferred to the public sector and emergency fiscal measures take effect. From these patterns it seems that private debt will decline or grow below trend in the coming years while public debt has already grown above trend in compensation and will likely remain above trend for some time. This analysis is flawed since it is inconceivable that debt to GDP can grow indefinitely without bound. At some

stage, trend rates must flatten, and the level of specialization and credit creation must plateau. But it does confirm the transfer of debt from private to public balance sheets, and gives us some idea of magnitude and periodicity. A 3 to 5 year period of credit retrenchment is likely. As for the Federal debt, that can and has stayed above trend for more extended periods. The public sector is a very poor CFO, seems to be the message.

Corporate earnings were boosted in 2009 by a combination of inventory restocking and cost cutting. Quantitative easing and deficit fiscal spending helped certain sectors such as infrastructure and the auto industry grow top line at above trend rates. History teaches us that recoveries don't follow a straight line and that oscillations can be expected as the global economy adjusts to a new reality.

Credit will no longer be so readily available and will be rationed. Cost of capital will rise despite the efforts of central banks to distort prices. Excess capacity still persists in many quarters such as the auto industry and the real estate industry. Most credit dependent industries will suffer from this overhang and until the capacity is removed there will be no sustainable recovery.

Interest rates will likely be kept lower for longer. Inflation fighting remains a concern but below trend growth and unemployment are likely to be the political expedients. This is likely to store up inflationary pressures or fuel another asset bubble somewhere in the world but may not be as effective in tackling unemployment as hoped. Bull market employment conditions resulted in individual undersupply and collective overemployment in the labour market, conditions which may not return for some time.

Asian central banks will continue to finance the current account deficit, albeit a shrinking one. Global imbalances will likely unwind with the China US trade position moving

towards balance, with associated implications for the currencies and interest rates, those less subject to central bank interference that is.

Basically, the global economy has healed itself and has found a new (dynamic) equilibrium. Business as usual, pre 2003, cycles included. Anticlimax.