The role of derivatives in the credit crisis

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ABSTRACT

The paper deals with the role of derivatives in the global financial crisis. We argue that the unprecedented growth of derivatives of all kinds – mainly Credit Default Swaps, and the leverage that they imply have greatly contributed to the depth and proliferation of the financial crisis, and the transformation of the whole financial industry. The solutions proposed include the establishing of central clearing houses to diminish counterparty risk, change the regulation to induce the use of derivatives as hedging tools to reduce, not to enhance risk, tackle the compensation system of the of the financial institutions to limit bank leverage, alter the governance of rating agencies and improve derivatives accounting.

Introduction

During 2001-2007, a strong debate was held on the role on derivatives in the financial markets and in the economy. Warren Buffet famously claimed that credit derivatives were "weapons of mass destruction". Alan Greenspan's view was that credit derivatives were excellent tools to spread risk, facilitating the access of many people and businesses into credit. Alan Greenspan stated in a speech in 2004 that derivatives and other complex financial instruments have contributed "to the development of a far more flexible, efficient, and hence resilient financial system than existed just a quarter-century ago." He further stated in the same speech that "the new instruments of risk dispersion have enabled the largest and most sophisticated banks in their credit-granting role to divest themselves of much credit risk by passing it to institutions with far less leverage". (1)

By the summer of 2009, this debate seems to be over. Warren Buffet was right, Alan Greenspan, wrong. Yet, which are the specific financial and macroeconomic mechanisms by which derivatives have contributed to enhance the impact of the credit crisis? On the other hand, another question arises: have all derivative contracts been guilty on the crisis in the same magnitude? And, more importantly, can we establish some guidelines within the derivative markets in order to prevent these instruments to amplify future financial crisis?

In this paper we will be addressing these questions.

Section 1 will be looking at the intimate relations that exist between derivatives and economics, explaining how the increased use of derivatives was a determinant factor in expanding the monetary base, a synonym of credit growth, hence laying the foundations for an excessive leverage and its resulting asset price inflation that clearly contributed to the crisis by generating systemic risk.

Section 2 addresses every major derivative market's role in the credit crisis: credit default swaps (CDS), other non equity over the counter (OTC) derivatives, commodities' derivatives and equity linked derivatives.

Section 3 will explore some key recommendation for policy actors and bankers in order to prevent derivatives from becoming systemic risk enhancers in the future.

Lastly, in Section 4 we introduce our main conclusions.

Before we proceed, we define hereafter the main derivative contracts we will be writing about in this paper:

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١ Speech by Alan Greenspan on World Finance and Risk Management at Lancaster House, 25 September 2002

CDS is a type of insurance against counterparty's going bankrupt. Thus, if you hold bonds issued by Telefónica and you want to protect yourself against the possible risk of its bankruptcy, you could buy a CDS. This would mean that if Telefónica were to go into liquidation, although you would lose the value of your bond you would recoup your money through the CDS you have taken out. A CDS can also be used as a bet on a company's bankruptcy or survival. So, if in early 2008 you thought that Lehman Brothers could go bankrupt, you would just need to buy a CDS. The price of the insurance would rise as the likelihood of Lehman's bankruptcy increased, and vice versa.

A CDO (Collateralized debt obligation) is a synthetic security that is asset backed. Its value and the payments depend on the fixed income securities that are used as underlying assets. For instance a CDO can be created from a certain amount of mortgages that a bank has in its balance sheet, which are "pooled" together and later on "sliced" to be sold as different parts or tranches. Those tranches are supposed to have different risk profiles, depending on their seniority. CDO squared are simply CDOs created by "pooling" different tranches and/or types of other CDOs.

Synthetic CDOs can be built by building an investment vehicle which sells protection on different companies, by shorting CDS contracts. This strategy yields very attractive returns, at the expense of high risk if credit conditions worsen.

Colletarized loan obligations (CLOs) are CDOs with their main assets being loans, not bonds. These loans tend to come from companies acquired by the private equity industry, which are normally highly leveraged. The loans, provided by investment banks, are then packaged and sold between investors in the same way as CDOs.

Both CDS and CDO are over-the-counter (OTC) derivatives, that is to say, contracts that are traded (and privately negotiated) directly between two parties, without going through an exchange or other intermediary. Some products like swaps, forwards, exotic options are almost entirely traded over-the-counter.

Exchange-traded derivatives (ETD) are those derivatives products that are traded via specialized derivatives exchanges or other exchanges. Flow equity derivatives, such as short term futures, call and put options on indexes or stocks tend to be ETD.

ETFs are open-ended mutual funds that are mostly passively managed. They give an investor all the diversification of an index with the simplicity of holding a share. Normally ETF use derivatives (mainly futures) to buy the stocks or indexes they are supposed to replicate. ETF are traded continuously on several exchanges with dedicated market makers providing guaranteed spreads and sizes around the NAV

According to the Bank for International Settlements, within an approximate total value of OTC derivatives of USD 600 bn. at the end of 2008, the vast majority of OTC contracts were interest rate and foreign exchange derivatives, with notional values of circa USD 470 bn. There were more than USD 40 bn. in CDS contracts; OTC equity

linked represented amounts above USD 6 bn., and commodity derivatives slightly below USD 4 bn. As for ETD, options amounted to less than USD 40 bn., with futures being close to USD 20 bn., the rest being options.

Section 1

> Many people argue that derivatives reduce systemic problems, in that participants who can't bear certain risks are able to transfer them to stronger hands. These people believe that derivatives act to stabilize the economy, facilitate trade, and eliminate bumps for individual participants.
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> On a micro level, what they say is often true. I believe, however, that the macro picture is dangerous and getting more so. Large amounts of risk, particularly credit risk, have become concentrated in the hands of relatively few derivatives dealers, who in addition trade extensively with one other. The troubles of one could quickly infect the others. On top of that, these dealers are owed huge amounts by non-dealer counter-parties. Some of these counter-parties are linked in ways that could cause them to run into a problem because of a single event, such as the implosion of the telecom industry. Linkage, when it suddenly surfaces, can trigger serious systemic problems.
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> In our view, however, derivatives are financial weapons of mass destruction, carrying dangers that, while now latent, are potentially lethal.

--Warren Buffet, letter to the shareholders of Berkshire Hathaway, 2002

These words were written five years before the credit crisis erupted. Indeed, the collapse of Long Term Capital Management in 1998, driven by the excessive leverage it employed through derivatives prompted the FED to organize a rescue, since these derivative positions had produced a level of systemic risk that made bankruptcy a much worse option than an organized rescue such as the Fed orchestrated after the collapse.

If risks had been so clearly identified as early as 1998 and 2002, why policy makers refused to take actions to prevent the systemic risks that the growth of derivatives was bringing? Behavioural finance has a lot to say in this answer, as incentive mechanisms prevented traders, bankers, regulators and politicians from acting when it was still possible to do so.

Despite his statements, even Warren Buffet entered into derivatives market. Berkshire as of March 31, 2009 had USD 13.85 billion of paper losses on derivatives, according to Reuters[(2)]. For the first three months of 2009, the operating earnings of the company, which exclude investment and derivatives gains and losses, were USD 1,705 bn. This means that by the end of March 2008, Berkshire Hathaway faced a loss from its

2 Reuters, May 8, 2009

derivatives contracts that wiped out the operating earnings for the two previous years. However, Mr. Buffett stated that those derivatives are used for hedging and would be held to maturity.

Fitch estimates that in July 2009, five firms hold 80% of derivatives risk and 96% of credit derivatives:

> About 80% of the derivative assets and liabilities carried on the balance sheets of 100 companies reviewed by Fitch were held by five banks: JP Morgan Chase, Bank of America, Goldman Sachs, Citigroup, and Morgan Stanley. Those five banks also account for more than 96% of the companies' exposure to credit derivatives.[3]

This tell us how vastly concentrated is the modern financial world. Those financial institutions are a systemic risk that was waiting to happen and hold the modern financial system a hostage. If one of these five firms fails, that would create a perfect storm that could cause the meltdown of the modern financial system, something which leads to moral hazard and even greater accumulation of risk among these five firms.

These figures illustrate how derivatives have contributed to introduce systemic instability to global macroeconomics: on one hand derivatives are a rapid way to create liquidity; this liquidity contributed to increase the inflation of every asset class: equities, bonds, housing, and commodities; on the other it has generated a systemic risk concentrated in the hands of only a few financial institutions.

Derivatives allow the spreading of risk and provide access to liquidity to virtually everyone, not just professional investors. As mortgages are being packaged and distributed to investors, then liquidity is made available to a single house purchaser. As derivatives allow the securitization of credit card loans, of student loans, of car loans… then liquidity is also available to virtually every consumer, and as that risk is being packaged and sold to international investors, theoretically the benefits of risk diversification allowed for more liquidity to become available for these consumers. This phenomenon reached its peak in the 2001-2007 years, exactly the years in which world trade was increasing with the integration of China, the ASEAN and former Soviet States into the international trade flows. This allowed the access of goods manufactured by lower paid workers based in these countries to Western consumers, generating a downward pressure in consumer prices that kept official inflation rates from rising to levels which could become worrisome to central bankers. This scenario of high growth low inflation was defined as "goldilocks", and it prevented the Fed or the ECB from pursuing a more aggressive monetary policy by raising rates during the 2004-2005 period.

3 David M. Katz - CFO.com, July 24, 2009

However, the key question to address on the impact on derivatives on macroeconomics stay on how derivatives contributed to exacerbate asset price inflation. Derivatives, through Colletarised Debt Obligations (CDO) allowed many Americans the possibility to buy and own houses at affordable prices. This possibility was open to every social class. Lower class Americans obtained financing through subprime mortgages, which risks, pooled and sold, were tranched in different pools of risks according to investors' appetite, so that the riskiest tranche would bear the first losses on the investment if the mortgages were not paid back. This scheme worked under two assumptions: i) house prices do not come down, and ii) house prices in different US states are uncorrelated. Middle class Americans obtained financing from the two Government Sponsored Entities, (GSE), Fannie Mae and Freddie Mac, and those entities packaged these mortgages into bonds with derivatives embedded and sold them to international investors. Higher class Americans obtained mortgages through jumbo loans which were also sold to institutional investors using derivatives. Those Americans who were not willing to offer information on their personal details did obtain financing through "Alternative A" mortgages, which were also packaged and sold using derivatives. The result of this huge level of liquidity being available though derivatives to finance house purchases was real estate inflation. As houses were used as collateral for the payment of the mortgages, once house prices became inflated, financial stability was threatened.

On the other hand derivatives allowed both Hedge Funds and Private Equity to obtain huge levels of liquidity. Hedge Funds play investment views through derivatives, and much of the financing they obtain (they tend to use a leverage ratio of 3-4 units of debt per unit of equity) is normally obtained through the prime brokerage division of a major investment bank, institution which also facilitates the trading and clearing of the derivatives the hedge fund enters into. As for Private Equity, this industry normally acquires businesses and changes the capital structure of the target firms by employing very high levels of leverage, debt to EBIDTA ratios above 5 and 6 times were common before the crisis. Investment banks would provide the financing for these acquisitions, and would soon package these loans into CLOs, which were then sold into institutional investors. Such was the need to win market share within private equity that many of these loans were "convenant lite", ie. very limited restrictions were placed upon the company's financials (leverage ratios) to keep the loan from being called back. This liquidity helped the private equity industry to accomplish the largest leveraged buy outs in history, generating very dangerous levels of leverage in some companies, as we saw with the case of Chrysler. This behaviour increased systemic risk, both at a company level and at a banking level.

Soon, the liquidity facilitated by derivatives also traduced into other asset price inflations. Equities had their run from 2003 to 2006. Exchange traded funds (ETF) allowed retail investors to trade stocks and indexes they were not trading before, as ETFs could use derivatives (mainly futures) to invest in the stocks of the indexes they were representing. Furthermore, through the use of warrants, retail and institutional investors could lever up their bets in stocks many times by buying call options or selling

put options if they thought the prices would move up, or by buying put options or selling call options if they thought the price would go down.

Economic bonanza, yield hungry investors and the popularity of Credit Default Swaps (CDS) resulted in ballooning price of corporate bonds, which risk spreads reached extremely low levels versus their correspondent government bonds. Commodities prices also skyrocketed, helped by extraordinary demand from emerging economies, but retail and institutional investors were also offered the possibility to invest into this asset class by the popularity of certificates, known as Commodity Exchange Traded Funds (CETF) which would replicate the price movement of certain commodities, mainly by investing in the futures of these commodities. With this innovation, a humble Japanese saver could be investing into gold, oil or even platinum with very limited amount of money.

This enormous liquidity even reached emerging market bonds. In the autumn of 2006 money invested in emerging market bonds offered a return just 1.3% above that on money invested in US government bonds. How can we explain how countries where common sense ought to tell us there is a risk of default can obtain finance with such a small increment on that paid by the US government, which has never failed to pay its debt? The answer lies in excess liquidity contributed by the diffusion of derivatives. When the money supply is normal, assets are assigned prices that are rational, in the sense that there are notable differences between the return on emerging-market debt (where there is a bigger risk of default) and US debt. If the money supply keeps expanding (i.e. money is cheap) once "rational" prices have been reached, this will keep driving the financial market to search for better returns. The problems start when the search is based only on returns and not on a calibration of the risk of the assets, as this is the point at which the seeds of a financial crisis start to be sown. Something similar happened when billions and billions of dollars poured into subprime mortgages in the US. Once the bubble had burst everyone agreed that it made no sense to have put so much money into mortgages which had such a big risk of default, but very few people had been able to predict events before the crisis exploded.

Readers will be able to guess for themselves what the common nexus linking all these factors is. This nexus, namely liquidity and the lack of it, is what explains how all these decisions came together in a dangerous alignment of the stars. Market confidence plays a crucial role in the transition from an excess of liquidity to a shortage of it. A minor event, such as the default on a series of subprime mortgages in February 2007, was enough to cause this change in confidence, which then brought down the whole house of cards built on excess liquidity.

These ideas are not new. Indeed, they were formulated in the US in the nineteen seventies by a neo-Keynesian economist called Hyman Minsky. Minsky put forward the "financial instability hypothesis", which states that in a world in which there is confidence in the effectiveness of the central bank and its ability to control inflation, banks will react to this confidence by expanding their credit portfolios. This expansion

leads to an increase in the price of real assets in which the money provided by the bank ends up being invested (mainly property). The increasing price of these assets, together with the money supply, will lead to a reduction in defaults, which will create more incentives for banks to expand the volume of loans, again leading to greater increases in asset prices, increased liquidity and lower default rates. This leads to a vicious circle in which loans are given without distinguishing the risk, such that it only comes to light when an event such as a default on series of mortgages causes market panic, and this in turn causes the opposite phenomenon to that just described: there is an almost complete freeze on new loans, which in turn leads to an economic crisis, a drop in asset prices, increased default and tighter restrictions on bank lending. In other words, commercial banks do not smooth out economic cycles but aggravate them. According to Minsky, from this fact it can be inferred that when conducting economic policy it is necessary to study how to avoid this threat. Minsky's arguments did not meet with widespread acceptance. However, the extraordinary liquidity situation between 2004 and 2006 that was facilitated by the widespread use of derivatives led certain leading economists (including Martin Wolf, chief economist at the Financial Times, and George Magnus, economics advisor to UBS), to rescue Minsky from oblivion and warn of the risk faced by the financial system on which economic expansion had relied.

Unfortunately no policy maker took any prevention to avert the disaster that was being shaped, a disaster of liquidity that had been clearly exacerbated from Minsky's times by the spread of derivatives.

Section 2

The risks embedded in Credit Default Swaps

In corporate finance it is widely assumed that the starting point for the valuation of a company is the risk free rate. Hence, if the US 10 year bond stands let's say at 3.5%, this rate shall be the starting point to which different risk premium will be added to obtain a meaningful discount rate at which the present value of the cash flows generated by a company could be calculated.

With the appearance of credit default swaps, a totally new horizon emerges which needs to be embedded into corporate finance valuation. For instance, if the CDS to protect a potential default from a US Government bond stands at 0.5% (50 basis points), then it would make sense that the real risk free rate at which the cost of capital of a company should begin to be calculated would stay at 4% (3.5% plus 0.5%).

Yet, let us raise one question: if the US Government defaults, would our counterpart in the CDS contract be able to honour its commitment to pay us the amount we agreed to protect in the case of the default? In other words, which institution would have a healthy balance sheet to honour commitments if an event such as default of the US Government is taking place on earth?

This dilemma places the central question behind the real value of derivatives: the points and the events which make the real value of derivatives differ from their theoretical value. The implications of these differentials in systemic risk of the financial sector are considerable. And the eventual transformation of derivatives into credit availability for consumers and companies, if not taken with care, can become lethal.

For the sake of clarity let us make clear several starting points referring to derivatives:

Notional value stands for the amount of the contract being underwritten between to parties entering into a derivative agreement. If party A wishes to protect USD 10 million of bonds of company C from default, and to do so A enters into a CDS agreement with company B by paying it an annual premium of USD 100,000 this will mean that the physical transaction will be just 1% of the notional amount. This clarification is important, as people only exaggerate the economic importance of derivatives by focusing on notional amounts, not trade amounts.

Yet, the relationship between underlying assets and the derivatives being traded on those assets should never be left out of sight. There are in the world corporate bonds with an approximate value outstanding of USD 5 trillion. In early 2007, the notional amount of CDS written on corporate debt was circa USD 50 trillions (it stands below 30 trillions today). This means that the relationship between the underlying asset and the derivative is 1 to 10. Let us suppose that due to the fact that company C is starting to have problems, the price of the bonds of this company fell down. There are USD 1 bn. in such bonds, and USD 10 bn. in their corresponding credit derivatives. Theoretically, the price of the bonds of company C should come down as a result of its financial troubles. Yet, due to the fact that an impressive amount of derivatives linked to these bonds need to be settled, it could occur that in reality, the price of these bonds go up as demand to hold the underlying asset in order to settle the derivative could produce such an irrational move.

Now let us assume that we live in a world without credit derivatives. Company A holds USD 10 million of bonds of company C. As company C moves into financial distress, the price of these bonds comes down. As A wants to secure the maximum recovery out of this asset as possible, A will work with shareholders and other creditors of company C in order to prevent its bankruptcy and to make sure C becomes viable in the mid term it will facilitate a new business plan to secure the survival of the company. In this negotiation both shareholders and debt holders need to make sacrifices, which tend to be more severe for shareholders to take into account the riskier nature of their claims to the company's assets. Let us imagine that as result of these negotiations a new C is created and debt holders have agreed to a write off of 20% of the face value of their bonds. The final result will be that company A will have lost 2 millions, and will be entitled to receive USD 8 million of its initial USD 10 million investment.

Now, let us complicate the scenario by introducing CDSs. As company A holds both the bonds worth USD 10 million of company C and the protection from default of these bonds by the CDS contracts it has purchased. The CDS contract establish that company A will be entitled to receive a payment of USD 10 million if a bankruptcy of company C occurs. As company C enters into financial difficulties, the risk and reward equation for company A has completely changed from the previous case, as in the present circumstances, company A will be incentivised not to avoid but to promote the bankruptcy of A, as this will be the only way how A will be able to recover its investment.

The rules of the game have changed, and as the incentive mechanisms have changed, the attitude of A will also evolve towards one (seeking bankruptcy of C) that will certainly increase systemic risk. As a result of the transaction, company B will honour its commitment with A by paying USD 10 million in exchange of company A's bonds in company C, and will try to find any residual value that it could be extracted from these bonds if in the liquidation of the company if such an event there are assets left to the bond holders.

When financiers and economists try to predict corporate bankruptcies during recessions, they often look into history and find relevant data of bankruptcies in difficult moments. That is how we find that corporate defaults in the 2001-2002 and 1992-1993 crisis stood above 10%. 15% is now deemed to be the potential bankruptcy rate we could be expecting between corporations during the current crisis. Yet, in those two past crises CDS were almost no existent. The current notional value of CDS contracts of USD 26 billion could trigger bankruptcies that could well stand above historic rates, just as a result of the incentive mechanisms above described linked to the trigger event being associated with the bankruptcy of a company. The recent case of the bankruptcy of GM is a good illustration of this situation[4].

Another misconception stands on the value creation or even value destruction generated by derivatives. If company C defaults, B will have to pay A 10 million USD, hence generating a transfer or value from C to B. Yet, if as a result of this commitment and similar others occurring at the same time company B is unable to fulfil its commitments, then B will enter into bankruptcy, generating not only a loss for A, but for all the creditors of institution B. This notion implies that it is critical to understand correlations between the different risks protected through derivatives being sold by company B, as if correlation is high, an extreme event (called in academic literature as a "black swan") can produce a very sharp increase in obligations due to company B, which, if unable to pay, would produce a bankruptcy that can generate other related losses and more trigger events… a vicious circle of systemic risk has started.

4 "CDS investors hold the cards as groups try to exchange debt", Financial Times, July 23rd, 2009.

On the other hand it could be the case that company A has cut down its exposure to C by selling to a new party, D, the bonds it held on C and sold CDS on company C that party D in the same amount as it had bought from company B, hence netting the initial exposure it had to zero. The result is that out of USD 10 million of bonds in company B, USD 20 million of CDS contracts have been created between A and B, and A and D. Theoretically, A should be free from any risks occurring in company C. Yet, if both companies B and C default, which could be the outcome? Even though company A theoretical risk is zero, in practice it could lose USD 10 million dollars, as company A will have to pay the USD 10 million it promised to pay under the CDS it sold to the third party, whereas company B cannot honour its commitment to company A to pay USD 10 million due for the CDS that A bought from B. This is another key element of systemic risk that should be considered. Put AIG as company B and you will immediately understand why the US Government rescued the US insurance company.

To solve part of this problem, "trade compressions" are being taken. Market makers of CDS exchange information and try to reduce systemic risk by, in cases such as the one described on the above paragraph, eliminating A from the CDS relationships, hence bringing down USD 10 million out of CDS contracts. This explains why the notional amount of CDS, which stood at USD 57 at the beginning of 2007, stands now at below USD 28 bn (of which below 16 bn. correspond to single names and below USD 12 bn. to indexes, where traders buy protection against a default of a pool of names).

After the collapse of Bear Stearns two years ago, 17 banks that handled about 90 per cent of trading in credit derivatives agreed to follow steps including tearing up trades that offset each other to help reduce day-to-day payments, bank staff paperwork and potential for error. The tear-ups do not reduce the actual amount of default and market risk outstanding, but may reduce the amount of capital commercial banks are required to hold against the trades on their books.

In summary, are CDS weapons of mass destruction? Up to now, these derivative have not had a central clearing house, they have counterparty risk (such as AIG), that can become systemic (USD 55 trillion, in notional value in 2007, the size of the world's GDP), their trigger event is bankruptcy, hence if you hold a CDS you want to make sure the company goes bust, not the opposite (when you have a bond you try to rescue the company). All these are reasons to support the view that CDS were in fact weapons of mass destruction and clearly contributed to enhance the severity of the financial crisis.

Asset backed securities: CDO, CLO

The securitization played crucial role in the formation of the housing bubble and the credit crisis that we have witnessed in the past couple of years. It wasn't meant to be like that. The synthetic structures like collateralized debt obligations (CDO) and all other variables – CDO squared, CLOs etc. were supposed to spread the risk among investors. The rating agencies were judging these structured products with models with questionable assumptions (based on just a few years of historical data), for example that the house prices would never fall, which proved to be dead wrong. This gave the investors false security and allowed them to accumulate even greater risks. As all these structures were OTC the level of systemic risk proved lethal.

Implications of ETFs and their use of futures to trade commodities

According to Barclays Global Investors[5], the Global ETF industry peaked in mid-2008, when it held asset worth approximately USD 805 bn. This coincided precisely with the peak of the commodity bubble, including the oil. The flow of funds to the ETFs continues as opposed to the conventional asset managers, despite the sharp decline of the prices of almost all asset classes.

The remarkable boom and bust of the commodity market that we saw in 2008 was in fact partially caused by the rapid growth of the commodity ETFs. The spike in the price of oil that reached a record high of nearly USD 150 and then its fall to USD 30, the tripling of the price of rice in a matter or months, all of these partially had to do with the speculation with commodity derivatives. As one retail investor acquires an oil ETF, the bank managing the ETF will be buying the corresponding number of futures in the oil curve.

The main flaw with those ETFs, based on commodity futures is that they are open-ended funds, which invest in the assets that are closed-ended (due to regulations or liquidity). From that contradiction come many of the issues with the commodity based derivatives and ETFs. Many experts say that the reason for the distortions in the commodity prices and especially oil is the huge number and size of the ETFs that track the markets and compare them to Ponzi/Madoff scheme.

Let's take for example an ABC Oil ETF that is being funded by a proliferation of new retail investors looking to diversify into "alternative investments", such as commodities. If the market is in contango (which is the normal situation with the commodities) and the investors simply use buy-and-hold strategy, every time the fund rolls-over its positions, their cost rises because of the higher priced deferred contract.

As a conclusion, even though asset prices in the long term should reflect fundamental values, in the short term large disequilibrium of demand (excess liquidity) can

5 Barclays Global Investors report, July 2009

generate asset bubbles, such as in commodities, which can have very negative systemic implications.

OTC Equity linked derivatives

As retail investors were acquiring exposure to let's say the movement of the SP 500 through a Lehman Brothers certificate, these investors were incurring not only in SP risk, but also in counterparty risk with Lehman Brothers. The reason is the OTC structure of these certificates.

The operational risk that exists there for the market participants is enormous, because of the lack of a clearing house and the counterparty risk. Additionally, the OTC derivatives pose unsuitably high amounts of risk for small or inexperienced investors and have huge notional value of more than hundreds of trillions of USD.

As one of these major houses such as Lehman Brothers fells down, the damage inflicted upon millions of investors (mainly through the distribution of these certificates through private banking networks) was remarkable. In turn, private banks distributed these high risk structures as their cost was high, hence they obtained important kick backs from the originators (Lehman Brothers), exposing a very clear conflict of interest between their advisory function to wealthy individuals and their incentive scheme.

There is an interesting issue with the OTC options trading. Many experts note that it vastly influences the futures, options and stock markets. Barron's[6] notes that many investment banks transfer their risk from creating these custom options to options market makers at exchanges. The latter then trade future contracts, which liquidity influenced the stock markets.

The role of index future in quantitative selling

As stated above, the many of the quant models that were used in from investment banks to rating agencies, relied on assumptions that were proved to be wrong. Quantitative funds were programmed so that if certain value at risk levels were reached due to falls in the stock market, then the machines would start selling futures on the market to mitigate that market risk. Yet no quant model foresaw the possibility that all the machines would be selling futures at the same time. August 2007 something extraordinary happened – events that were supposed to happen once in every 100 years occurred various times in the terms on couple of days. The volatility spiked to unseen levels and that caused enormous disruptions. The so called "black swans" had a particularly devastating effect because of the high leverage that hedge funds, investment banks etc. had. The wealth destruction produced in these funds was a vital factor in

6 Barron's, June 2, 2007

destroying investor's confidence, prompting the asset allocation towards government bonds, favoring the liquidity trap and killing private investment.

Sadly enough, exactly the same story had occurred in October 1987, a financial crisis mainly enhanced by the selling of futures by quant models all at the same time. Again, we perceive that financial markets do not learn from historical lessons.

Section 3

Key recommendation for policy actors and bankers in order to prevent derivatives from becoming systemic risk enhancers in the future

Tackle employee compensation

The truth is, risk tolerance is antithetical to successful investing. When people aren't afraid of risk, they'll accept risk without being compensated for doing so… and risk compensation will disappear.

Imagine you are an employee in the fixed-income division of Lehman Brothers in New York. Your job is to grant bridging loans to US mortgage agencies specialising in subprime lending. These agencies repay their bridging loans by selling your bank the mortgages they have granted. You package all these mortgages into a bond issue specially created for this purpose with derivatives embedded. As the mortgages are drawn from right across the United States, geographical risk is minimised. Thus, there might be a drop in the property market in Los Angeles, but this would be offset by a boom in Atlanta, for instance. After all, it is inconceivable that the value of homes could fall all over the US fall at the same time. The company with which the mortgages have been deposited issues bonds whose payment is backed up by these same mortgages, and institutional investors in the EU and worldwide buy the bonds on account of the guarantees they offer (the mortgages are backed up by property) and their high returns. In the process of granting bridging loans, buying subprime mortgages, packaging and reselling them to institutional investors (a process known as securitisation), your bank obtains a good return (they have been given an AAA rating, the highest possible, by the rating agencies, and despite their very low risk, offer returns 1% above those of US treasury bills).

You are paid a fixed salary of 125,000 dollars, plus a bonus that depends on the amount of business you help to generate for your bank. During 2005 your bank rewarded you with a bonus four times your salary (500,000 dollars) to ensure your loyalty to the firm and avoid your working for a rival bank in such a profitable business line. You are currently (second half of 2006) preparing the purchase and securitisation of a billion dollars' worth of subprime mortgages granted during the first half of the year. You are aware that there is a lot of abuse taking place in the way these mortgages are being allocated, as when they are sold to third-party investors (many of whom are international), mortgage agencies do not worry about only giving mortgages to good risks, but are granting mortgages on a massive scale without concerning themselves

about borrowers' credit quality. However, your job consists of buying these mortgages and reselling them (a process which takes around three months). This would only be a problem if this risk you know exists were detected during the three months the billion dollars is on Lehman Brothers' balance sheet. If you warn of the risk and cancel the transaction the most likely outcome is that you will not get a bonus, as all your business this year is concentrated in this transaction. If it goes ahead, the size of the deal is such that you estimate your bonus could be as much as 800,000 dollars, payable at the end of December. What will you decide to do?

Current remuneration systems have led to employees taking high risk positions without taking into account the consequences for investors, shareholders, and in the final instance, tax payers. Proprietary traders involved with the use of derivatives received a sizeable share of their income in the form of variable bonuses. Thus, the more profitable the trader's transactions on behalf of the bank, the bigger the bonus. Most traders took high risk positions through the use of risk enhancement derivatives, as risk was associated with returns on trades and therefore with an increase in their bonus. If the deal turned out well, the financial reward would be significant. And if it did not, the trader would lose his bonus, or at worst, be sacked and receive a generous severance payment. What lesson has been learned? Short-term objectives aimed at earning a bonus are harmful to the bank's management policy, to the extent that they put its solvency in jeopardy. Let's assume that branch managers set our variable remuneration according to the number of mortgages granted. With this requirement we would most likely concentrate our efforts on winning new customers, and would probably be less concerned about their future solvency, as, in Keynes's words, "in the long term we are all dead."

The situations of risk linked to derivatives to which institutions have found themselves exposed in order for employees to earn bigger bonuses have been excessive, leading even to some institutions going bankrupt. To avoid this happening again in the future, various institutions have proposed a list of best practice for employee remuneration. These standards try to align compensation policy with the institution's risk-management policy. What are the compensation practices to avoid?

1. Calculating remuneration based on the income reported by employees without taking into account additional considerations regarding their risk;

2. Referencing employees' bonuses solely to the year's earnings, without taking into account earnings in subsequent periods;

3. Increasing the ratio of variable to fixed income;

4. Paying the whole bonus in cash – it is advisable to employ a mixed remuneration policy, using share option plans or shares in the company, so as to increase employees' commitment; Variable remuneration, for example in the form of restricted shares (shares which cannot be sold until a given number of years have passed) is useful as a way of aligning employees' decisions so they are good for the company over the medium term;

5. Inadequate separation of front office and back office tasks.

As a conclusion, this section has left it clear the perils of employee compensation linked to short term objectives and the risks associated with the embedded derivatives. Those institutions which have the balance sheet to become systemic threats should be monitored in their incentive schemes in order to avoid the concentration of high risk positions derived from the compensation scheme. This is specially applicable to the proprietary traders which can use derivatives to increase the short term risk and return of the positions, what can result in a dangerous dilemma of we win you lose, as we have seen the last two years. As quite often derivatives are hard to value, a lot of subjectivity can be employed to determine high valuations resulting in high bonuses. If derivatives are being employed not to hedge risk but to take risky investment views, then compensation should be linked to mid term outcome of these positions, and not linked to year end estimated value of these positions. As derivative positions tend not to be as liquid as cash positions, linking retribution to mid term performance of these positions, and ideally to the final closing of the position, might reduce the incentive to aggressively acquire risk through derivatives and subjectively value these positions in the short term.

Change the governance of rating agencies to prevent global contagion

Paradoxically the first victim of the US subprime crisis was a German bank, IKB, in late July 2007. Germany is a country of savers, with no property bubble, and yet it took a direct hit from the crisis. The contagion mechanisms made it vulnerable. However, the effect of contagion is relatively simple.

Through CDS and CDO, packaged into collateralised debt obligations, numerous European institutions bought exposure to US subprime risks. The reason was simple: an AAA grade investment in a German bond paid considerably less than an investment in a AAA subprime mortgage security with embedded derivatives. For the treasurer of a bank like IKB whose goal it was to maximise the profitability of the bank's portfolio, and whose bonus probably depended on it, when choosing between two AAA investments he would tend to choose the one offering the highest return, even though in the back of his mind he might be aware that the real risk was greater than that suggested by the AAA rating.

Many readers have probably been wondering how it is possible that prestigious agencies such as Moody's, Standard and Poor's or FITCH IBCA, were offering top credit ratings (AAA, which is similar in quality to Germany's or the US's national debt) to packages of high risk mortgages with complex derivatives embedded. Before explaining how this was possible it is worth pointing out that credit rating agencies operate in near-monopoly situation, as central banks, when they lend money to commercial banks, demand assets with the highest rating from the three rating agencies as collateral. This means the market is virtually closed to new competitors. This lack of competition explains in part how the agencies have made such high profile mistakes on occasions, such as when rating Enron's or Parmalat's bonds (which they judged to be investment grade until the day the bankruptcy was announced). The agencies have always appealed

to freedom of expression (as if they were newspapers) to defend themselves against the collateral damage their mistakes have caused in the financial system or the economy. At the same time, it is worth highlighting that the rating agencies are paid by the issuer. Thus, if France Telecom wants Moody's to issue a rating of its bonds, it would be France Telecom that pays Moody's, leading to a clear conflict of interest.

To tackle this problem, we propose that Central Banks do accept as collateral for financing to the commercial banks paper rated by agencies different that the top three, as this situation creates an oligopoly that distorts the market, create inefficiencies and enhances systemic risk.

The current crisis clearly showed that the models that the rating agencies use to rate the derivatives instruments have serious flaws and should be revised. The assumptions such as the house prices would never fall or relying on simple risk models like VaR, that does not take into account rare events have given investors false security and undermined rating agency's credibility. Hence, we believe it is a good idea that ratings assigned to structures backed by derivatives are rated using a rating scale different to the standard ones. This is justified by the fact that there is a long history of data of bonds and insolvencies, but data is very limited when looking at derivatives and their performance. A different scale would allow investors to look twice into structures before purchasing them, and would also make investors think twice before outsourcing their job of looking into the structure risks before taking the decision to purchase it.

Finally, rating agencies should reach governance standards similar to those applied by large auditing firms after the Sarbanes Oxley legislation, including prevention and eventual disclosure of consulting services, peer revaluation of ratings, oversight of activities and a clear conflict of interest public policy.

Establishing of clearing houses to reduce systemic risk

A solution the problem of concentration of derivatives position in a few major banks might be the establishment of a clearing house. George Soros in his book *The New Paradigm for Financial Markets: The Credit Crisis of 2008 and what It means*, talks about the importance of the establishment of a clearing house for CDS in order to stabilize the markets (pages 145-146):

> One specific measure that could help relieve the credit crisis is the establishment of a clearing house or exchange for credit default swaps. Forty-five trillion dollars worth of contracts are outstanding and those who hold the contracts do not know whether their counterparties have adequately protected themselves. If and when defaults occur some of the counterparties are likely to prove unable to fulfill their obligations. This prospect overhangs the market like a Damocles Sword that is bound to fall, but not yet. It must have played a role in the Fed's decision not to allow Bear Sterns to fail. There is much to be gained by establishing a clearing house or exchange with a sound capital structure and

strict margin Some Policy Recommendations 145 requirements to which all existing and future contracts would have to be submitted.

The advantages of moving over the counter (OTC) derivatives towards an exchange traded system with a central clearing would stand at,

a) Lower systemic risk, as guarantees would be asked for as the risk embedded into every derivative changes, hence moving the bilateral trades into a centralized system which assures the fulfillment of the contracts, as it occurs in the stock market,

b) More representative price fixation closer to the truth, as prices derived from over the counter transactions tend to be more difficult to obtain, and its frequency and quality, questionable.

c) Standardization of the contracts should occur as a consequence of the movement into a central clearer, hence cutting down systemic risk and facilitating the eventual melt down of a financial institution without creating a huge legal mess, as it occurred with the debacle of Lehman Brothers, which had written very different CDS contracts with many counterparties, many of these contracts being 30 pages long each with specific clauses and different trigger events.

d) Clarity on the final ownership of the ultimate bearer of the risk and rewards of derivative contracts, cancelling cross trades, hence contributing to reduce systemic risk.

e) Reduction in the number of systemic institutions needed to be bailed out in the event of a crisis, as Governments would just need to make sure that these central counterparty clearers stand alive.

Re think derivatives accounting

There is so much that's false and nutty in modern investing practice and modern investment banking. If you just reduced the nonsense, that's a goal you should reasonably hope for.

To sketch out the implications for accounting, let's start by looking again at the case of Bear Stearns. Confirmation of the rumours about Bear Stearns' solvency came with the presentation of its annual report in March 2007. The central topic highlighted by the report was that marking the bank's assets to market so as to recognise them at their fair value would mean a loss (the drop in value of an asset is reflected on the accounts as a loss which results in an immediate reduction in equity) which would put the bank on the verge of bankruptcy. But how had this come to pass?

Accounting standards were harmonised by applying International Financial Reporting Standards. International Standard no. 39 establishes the valuation standards for financial instruments, this rules the valuation of derivatives. This standard classifies

financial instruments according to their nature (tradable investments, investments in the portfolio of assets held until maturity, loans, etc.) and assigns different valuation methods accordingly.

The various different types of financial assets, and specially relevant are derivative based structure assets, a bank may hold on its portfolio, which as we have just mentioned relates to their nature and intended purpose, are the following: first of all, it is worth mentioning those which in accounting terms are called trading assets. Assets of this type are bought by the bank with a view to obtaining a short-term return. The accounting rules indicate that they should be valued at market prices, and changes in their value reflected in their valuation. Imagine, for example, that our institution purchases a hundred call options on Repsol shares at the start of the year. When the bank buys the options it will include the one hundred Repsol options bought at 25 euros a share on its balance sheet as financial assets. The balancing item at time zero is the cash paid. However, what happens eleven months later when each Repsol call option is worth just 15 euros? The standard in this case is clear: the loss of value represented by Repsol's falling share option must be reflected on the institution's balance sheet, with a reduction in the value of the asset and a loss will be registered in the profit and loss account.

A second category of asset includes those assets deemed to be available for sale. These are referred to as assets held for sale. How do these assets differ from trading assets? As the standard says, the difference lies in the purpose for which they were bought. If we go back to the previous example, but assuming that in this second case our institution buys the Repsol options without aiming for a short-term return, but a strategic investment in Repsol. Thus the options are held on the bank's portfolio with no immediate prospect of their being sold. What are the accounting consequences of their being included in this new category? Although the accounting rules again oblige us to recognise the asset (i.e. the options) at market value, the impact of the loss of value is not charged against the profit and loss account but against other balance sheet accounts. The aim is to avoid harming the earnings if there is no prospect of the asset's being realised in the near term.

According to the standard, the bank's investment strategy decides whether a financial asset is classified in one accounting category or another. This means that with a short-term model the earnings account is more sensitive to variations in asset values.

The third category of assets comprises assets held to maturity. Let's assume that on this occasion the institution's portfolio managers decide to invest in a CDO with the intention of holding the structure to maturity. The valuation is different from that allowed by the standard in the other two categories. The CDO could be valued at their historic cost, with a discount for the effect of time.

The way market value is treated takes on special importance in this accounting contrivance. In many cases, particularly in that of over the counter (OTC) derivatives directly traded between two firms or counterparties, assigning a market value is no

straightforward matter, as there is no organised market for these products. Thus calculations of their value are affected by numerous subjective factors. This has led to a play on words among some theorists, who have asked "how fair is fair value?"

The credit crisis has demonstrated that in the context of a profound financial crisis, such as that which has been taking place over the last few months, market values are not always a faithful reflection of the underlying economic reality of the assets concerned. That is to say, in a context of sharp falls in asset prices, the market price could not reflect the fundamental value. Returning to the previous example, the ten euro drop in the Repsol option price includes a significant loss on the earnings account (in the case of an asset bought for trading). With a short-term perspective, however, the option price looks like a good benchmark for their value. But, what happens when the asset that has been bought is not as liquid as Repsol options? The lack of liquidity becomes a major problem as the lack of selling prices from equivalent transactions means it is impossible to be sure that the price assigned by the market is the best reflection of the asset's economic value.

Let's suppose we have bought a house in a small housing estate with three terraced houses. The house cost a million euros. One of our neighbours is obliged to sell his house in under ten days for personal reasons and the only buyer he can find offers him 700,000 euros. The sale causes our neighbour a loss of net wealth, but should the third neighbour and I recognise the same loss? Would this be a fair value? Probably not, as the loss suffered by the owner of the house that has been sold may have been influenced by his pressing need for liquidity.

Aware of the importance of the accounting treatment of transactions and the importance of market value when accounting for derivatives US and international regulatory bodies (the Financial Accounting Standards Board and the International Accounting Standards Board, respectively) issued an annex to the international standards. This annex permits reassignments of financial assets between categories, so that if the bank has a portfolio of bonds backed by mortgages that are listed on a market, but it decides to hold these bonds to maturity, it can, for example, pass their value from the trading book to the credit book, thus changing the valuation system applicable from market value to historic cost (many banks did this in the third quarter of 2008, so as to minimise the value of their losses).

The consideration of fair value in accounting has been jeopardised and battered by the financial crisis. Perhaps it might have been more reasonable for these losses to have been recognised more gently applying the more traditional approach in effect prior to the International Financial Reporting Standards (the international rules have fed a vicious circle of asset sales and falling prices). But when the opposite happened, i.e. continually rising prices and profits, why did nobody criticise the accounting treatment that was yielding such fat profits for the banks?

Prevent the use of derivatives as a weapon to increase bank leverage

Imagine you are Chuck Prince, the CEO of Citigroup in late 2006. Your organisation has been enjoying unprecedented profit growth. Part of this growth has been due to the expansion of their assets through the purchase of structured products with embedded derivatives. Thus, mortgage opportunities have allowed Citigroup to accumulate subprime bond securitisations (CDOs) with the highest (AAA) credit ratings, offering very attractive returns. Being AAA products your bank can take on these assets with barely any need to increase its equity. Thus, with equity of 60 billion dollars, total assets have now reached a trillion dollars. By concentrating returns on such a small volume of equity, the return on equity (ROE), the ratio most closely followed by analysts, has risen sharply since 2002. At this point, you have to decide whether to expand the balance sheet further to take on a five billion dollar share of a fifteen billion dollar securitised issue. The assets are structured bonds backed by subprime mortgages with a maximum credit rating (AAA). You know that this uncontrolled rush of liquidity cannot end well, as just as soon as the ease of obtaining loans changes, many of these mortgages may turn sour, which could be a deadly blow to the banking system and the economy as a whole. However, analysts are watching Citigroup's earnings under your management on a daily basis. If you decide not to add these products to your balance sheet the likely outcome is that profits will stop rising in line with analysts' and investors' expectations, and the market may call for your resignation. If 2006 ends the same way as 2005 (without problems) you can expect to obtain a total income of forty million dollars. If you are sacked, your severance package guarantees you at least 125 million dollars. Bearing this in mind, will you decide to include these mortgages on your balance sheet despite the fact that you are aware of the risk?

The banks welcomed this situation with open arms as it meant they could expand their credit portfolio easily, while reducing defaults and minimising their use of equity, thus encouraging debt, and maximising shareholder returns. The result is that whereas the financial sector accounted for barely 10% of US gross domestic product (GDP) in 1980, by 2007 it produced almost 40% of GDP, thus underpinning the US economic expansion. However, this growth also brought dangerous instability with it, with the potential to affect the global economy. As the remuneration of the vast majority of the industry's employees is linked to short-term objectives, the incentives to focus on immediate profitability and ignore medium-term risks were enormous, worsening the problem created by the excess money supply. Moreover, many banks opted to take advantage of the lucrative business of investing in AAA mortgages offering high returns by obtaining much cheaper finance from short-term financial markets (asset backed commercial paper), thereby obtaining huge profits (short-term debt was issued at a cost of close to 4% for investments in AAA subprime bonds or Alt A[7] bonds,

7 American mortgages are divided into prime, which are those which meet certain risk criteria, in particular those granted to middle class families and with the backing of the agencies Freddie Mac and Fannie Mae; subprime, which are those which

producing profits of 6%, thus leading to the illusion of its being possible to earn money for free).

To make matters worse, a number of banks opted to conduct this business off their balance sheet. This meant setting up companies known as structured investment vehicles (giving third parties access to their capital), or conduits (which only had bank capital), charged with investing in these mortgages linked to derivatives, and financing them from the money market. They were sponsored by banks such as JP Morgan, Citigroup or Goldman Sachs, which meant that the money market agreed to finance these investments as it assumed that in the event of a problem funding the assets the sponsoring banks would bail out their subsidiaries, even if they were off the balance sheet. The problem that was brewing was that if there were to be a change in the economic cycle or loss of confidence at any time, the money market could dry up, as once investors lost their confidence they would no long distinguish between the instruments sold on money markets that were backed up by good assets and those that were backed by bad ones. The result of this kind of loss of confidence is that solvent companies that use this market on a daily basis to finance critical activities, such as paying salaries, could end up being affected by the contagion and have their finance refused. This happened in the autumn of 2008, forcing top rank companies such as General Electric, which used this market to finance its working capital requirements, to issue bonds.

Part of the problem lay in the disproportionate growth in the size of many banks' balance sheets. At the start of the 20th century a commercial bank operated with leverage (i.e. the ratio of its debt, primarily deposits, to its equity) of 4 to 1. This ratio increased considerably over the course of the 1980s, and by 2007 many European banks had leverage ratios of over thirty. In the US the maximum leverage commercial banks were allowed was twenty (investment banks were exempt), this is why the crisis affected US investment banks and European commercial banks in particular so severely.

However, since the implementation of the Basel accords, the way in which the solvency of financial institutions is measured has changed, and a new concept called value at risk (VAR) has been brought into play. The capital or equity needed was calculated based on the credit, market and exchange rate risks. Each different type of banking activity has a risk associated with it, such that if the institution's asset portfolio is high quality it requires less capital (Tier 1) than if the assets are riskier. The Basel I system allowed this credit expansion, as it assigned a coefficient to each asset according to the perceived

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do not meet these criteria, in general having been granted to lower class families; jumbo mortgages, or mortgages over a million dollars, which are primarily aimed at the upper class, and Alternative A mortgages, which are mortgages given to individuals whose lack of a record makes it impossible to give them a classification. In practice, many Alt A mortgages followed the same pattern as subprime mortgages.

risk. Let's imagine that Dexia included a 100 million euro bond backed by AAA-rated subprime mortgages on its balance sheet. According to Basel, an AAA-rated asset is weighted at 25% when calculating its risk. So, only 25 million euros would be taken into account. As Basel requires 8% equity for each risk-weighted asset, it is possible to back this 100 million euro position with 2 million euros of equity. In other words, it is leveraged 50 times. If the value of this bond dropped from 100 to 80, the damage would be huge as it would not only swallow up the 2 million euros of capital set aside but also a further 18 million euros being used to back other credit risks. With its capital reserves thus depleted, Dexia was obliged to sell assets in order to meet regulatory requirements. Considered in isolation this might have been a problem for the bank concerned, but when the risk, which had been sold all around the globe, affected many large banks simultaneously, which all set about selling assets in a market in which there were no buyers, it caused huge falls in asset prices, forcing the banks to sell yet more assets. This vicious circle explains the current situation. Will capital requirements be reformulated in the light of recent experience, such that it would be possible to talk of a bank risk management policy beyond that dealt with in the Basel accords? How will structured products with embedded derivatives be treated when calculating future capital cushions? In the next few years we will probably see a thorough rethink of the way in which risks have been measured following the Basel accords.

As a result of what has happened it will be necessary to place limits on leverage such that bank's solvency is not placed in jeopardy. As we have seen in the previous paragraph, in recent years the percentage of debt on banks' assets has been excessive. The regulatory capital requirements have proven to be inadequate, as many structured products which employed derivatives were much riskier than thought. The downturn in the markets and consequent loss of value of banks' assets has led to a shrinking of their capital to the extent that they no longer have the level of solvency required by regulators. One practical solution would be to go back to leverage ratios, so that banks will not be allowed to take assets above a certain multiple of its book value (let us say, 20 times). This ratio will not be broken irrespective of the risk of the asset or the derivative structure. This simple rule should prevent bank managers and proprietary desks from expanding balance sheets in the future through aggressive use of derivatives, hence limiting systemic risk.

A stable macroeconomic environment: tackling risk measurement

Let's highlight the impact of the property market on the crisis and its consequences in various economies. The property bubble, facilitated by the use of derivatives, that got underway in the United States in 2005, combined with the stable macroeconomic environment and very low interest rates, led to financial institutions relaxing their risk management policies, and this was especially worrisome when dealing with derivative products. Imagine you work in the risk management department of a financial institution. A colleague in the trading department asks for your authorisation for a derivative transaction which promises a high yield, but has a significant risk associated with it. Turning down the transaction leads to a confrontation between departments,

as given the stability and continuous increase in prices of the underwritten assets, it seems impossible not to recover the assets at risk. Finally, the risk department caves in to the pressure from the operations division and allows the deal to go ahead.

In January 2007 the world seemed to be risk free. In a context of stability (four consecutive years of low interest rates and falling credit spreads, i.e. the differences in risk between economic actors were not reflected in the interest rates) it is not easy to determine the potential risk of insolvency. Risk managers are responsible for approving transactions sent by the people in the front office. At the time, the possibility that there could be a lack of liquidity in markets was unrealistic. There was no shortage of institutional investors such as hedge funds, insurance companies and venture capitalists. All these players wanted to invest, and this excess liquidity meant firms, whether good or bad, had no problem obtaining finance. Thus, there were few bankruptcies, and the world as a whole reduced its estimates of future bankruptcies (which translated into minimal credit spreads).

Banks' proprietary trading departments, through derivatives, took positions in mortgage-backed bonds on the basis that as these assets were entered on the accounts at market value, the profit or loss would show up immediately on the books, and if difficulties emerged, these positions would be easy to liquidate, particularly in the case of AAA and AA tranches. Mortgage-backed assets required very little capital, making them very profitable.

As these assets were held on trading books they were subject to less exhaustive credit risk detection processes than assets held on traditional banking books. In a trader's eyes, the risk manager did not generate business for the bank, but was considered almost an obstacle to income generation. Complaints to the risk department were frequent. Even so, the risk department based its analysis of complex products on the ratings given by rating agencies, making for an explosive mixture. The boom years had marginalised the role of risk departments in banking institutions. Giving them back their role is a key part of the proper functioning of the system.

On occasions, if a bank had lent too much money to a company, the regulator or risk department opposed fresh loans being given to the same borrower. To get around this obstacle, the bank would buy 'insurance' so that if the company to which the loan had been given were to go bankrupt, the bank would obtain compensation. This insurance took the form of credit default swaps (CDSs). The bank paid a premium for this protection, and the insurance was sold either by insurance multinationals such as AIG or by investment banks. Banks lent and lent and lent, and when they could not lend any more, they bought CDSs and carried on lending. The system works if the insurance pays compensation when there is a problem with the company the bank is lending to. However, if there are a lot of problems with companies not paying at the same time, there is a risk that the insurance companies that have sold so much cover will not be able to meet their commitments either, thus leading to a systemic crisis. Given the huge number of CDS positions AIG had sold, its losses in the downturn

were enormous. However, so many banks were relying on AIG honouring its positions that the US government could not allow it to go bankrupt. It therefore nationalised it in September 2008.

As we have seen, to avoid future problems the need to create institutions that settle crossed positions in CDS contracts is being considered, as happens in the case of the stock market, so that fulfilment of the contract is guaranteed by this central organisation, which will require guarantees from each of its members. This would reduce systemic risk and add transparency to this market, which is of such crucial importance to finance in the 21st century. On the other hand derivatives risk should be treated as a core operation of any financial institution. This implies that a clear understanding on the risk embedded in the different derivatives being part of a structured product is key to assess and monitor the risk of the holder of such structure.

Section 4 – Main Conclusions

> Now, my dear, I must say that lately I have been having a great deal of luck in finances. Sir Harry McGowan asked me, before I left, that if the opportunity arose, whether he could buy shares on my behalf without asking me first. I told him that I could always obtain two or three thousand pounds sterling. I mentioned it as a limit on the investment, that is to say, the maximum outright purchase of shares. He clearly understood the figure as the limit I would be willing to go up to in the case of a credit purchase on margin. He therefore multiplied my usual scale tenfold [...] and in just a few weeks we have earned a small fortune[8].

The letter this quote is taken from was written by Winston Churchill to his wife one month before the 1929 stock-market crash. In it, the British politician was referring to how easy it was to make money on the stock market by means of "leveraged" purchases where the investor (Churchill) put up some money of his own (two or three thousand pounds) and the bank multiplied this bet with a loan. Thus, if the sum invested, say 200,000 or 300,000 pounds, yielded a return of 20% on the stock market, the profits would be between 40,000 and 60,000 pounds. A small share of this would have to be repaid to the bank as interest, but the rest would be profit for the investor: "a small fortune." Obviously, this kind of leveraged strategy worked well during a period of strong economic growth and rising markets. However, in a downturn, the risk for both the investor and the bank was huge. In the event of a fall in the stock market they would both lose their money, resulting in panic; which is precisely what happened in October 1929. What followed was known as the Great Depression, and the world described here unfortunately sounds very similar to that experienced between 2003 and 2007.

8 Quoted by P. JOHNSON, *Modern Times* (Translated back into English from the text quoted from the Spanish translation, *Tiempos Modernos,* p. 286).

In this paper we have exposed how derivatives contributed to the emergence of systemic risk during the 2001-2007 period, without generating any pre-emptive policy reaction to tackle this extremely dangerous systemic risk. Unfortunately, the relationship between derivatives and liquidity proved mortal, as we saw in the 1930s. We have exposed how systemic risk was built in the major classes of derivative contracts, with a special emphasis on credit default swaps. We finally have exposed some ideas on how policy makers should write new rules to prevent derivatives from becoming new weapons of mass destruction.

If applied, we will probably move towards the old times, when derivatives were use to hedge risk, not to enhance risk. Yet, this road will face many difficulties. Banks will oppose them, as the real secret behind banks profitability lies in generating obscure and complex structures which can attain a high margin. On the other hand, many members of financial institutions boards have proved too ignorant and incompetent to serve as directors, as they were unable to understand leverage or the implicit risks behind derivatives. A well known Swiss bank which faced very serious difficulties which prompted the Government's aid had only one member of the board with experience in derivatives, and the Lehman Brothers board included the head of US Red Cross and a well known Broadway play writer… experience in derivatives and risk was sacrificed at the expense of diversity. This tendency will probably change, and in the future knowledge of derivatives and risk management will be a key ingredient when selecting members of banks boards.

This road to create a framework where derivatives could be used to limit risks and not to expand risks will be tough and long. Yet, if attained, the future will be a much more stable but much more boring world.

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