

Credit Default Swaps: The Key to Financial Reform

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“Sir, George Soros (“The false belief at the heart of the financial turmoil”, April 3) suggests establishing a credit default swaps clearing house or exchange as an institutional mechanism for reducing counterparty risk in this \$45,000 bn (notional) market. We have been here before also.

Walter Bagehot’s Lombard Street explains how a bank’s acceptance of a bill of exchange (in effect a CDS) turned an illiquid asset into a liquid one. The key to the system, as Bagehot made clear, was the central discount facility at the Bank of England. In Bagehot’s time, the CDS was bundled with the bill, and the entire bundle was eligible for discount. In our time, the two instruments trade separately, and the CDS part has no access to the lender of last resort.”

Perry Mehrling, Financial Times, April 7, 2008

Commentary about the credit crisis has identified a wide range of culprits: faulty risk models (both at banks and at rating agencies) that relied on historical frequencies during a time of changing practice; faulty underwriting driven by the skewed incentives of the new originate-to-distribute model; faulty regulatory oversight based on imagined effectiveness of private counterparty risk policing; faulty monetary policy that kept interest rates too low for too long, so sparking an asset bubble which interest rate policy did nothing to avert, and then a credit contraction which interest rate policy has been unable substantially to affect.

All of this commentary is well-taken, but for my taste little of it goes to the heart of the matter. In my view, the current crisis is better seen in broad terms as a test of the brave new world that we’ve been building in the image of the theory of modern finance. Here is one early and remarkably prescient characterization of the world that could be:

“Thus a long term corporate bond could actually be sold to three separate persons. One would supply the money for the bond; one would bear the interest rate risk; and one would bear the risk of default. The last two would not have to put up any capital for the bonds, although they might have to post some sort of collateral.”

This is Fischer Black writing in 1970, and the world he is imagining is very much the world that has come to be, some forty years later. The instruments he is suggesting are what we know today as interest rate derivatives and credit derivatives, and more specifically interest rate swaps and credit default swaps.

In its efforts to put a floor under the spiraling crisis, the Federal Reserve soon found that standard interest rate policy did little, not even when augmented with a new Term

Auction Facility. It was only when the Fed announced its readiness to swap bona fide Treasury securities for private name mortgage backed securities that markets stabilized,¹ and much the same policy has been introduced by the Bank of England as well.

I would argue that the Fed has muddled its way into a kind of discount facility for credit default swaps, without perhaps even realizing that it has done so. What is needed now is recognition of why this has proven necessary and, building on that analysis, a less haphazard system of determining which credit default swaps the Fed will discount, and which it will not, in order to create appropriate tiering in the market.

Brave New World

Suppose that some person buys a corporate bond and then engages in the following balance sheet entries. Bracketed items are “mirror” bonds that offer the same cash flow as some other bond, but with a different counterparty.

Person 1		Person 2		Person 3	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Corp. Bond					
[Treas. Bond]	Corp. Bond]	[Corp. Bond	Treas. Bond]		
[Treas. Bill]	Treas. Bond]			[Treas. Bond	Treas. Bill]

The second line represents a kind of credit default swap, in which Person 1 commits to make all the payments that the corporation makes on its bond, while Person 2 commits to make all the payments that the U.S. Treasury makes on a bond of the same maturity. Thus, after the swap of IOUs Person 2 is now bearing the risk of default on the corporate bond.²

The third line represents an interest rate swap, in which Person 1 commits to make all the payments that the U.S. Treasury makes on a long term bond, while Person 3 commits to make all the payments that the U.S. Treasury makes on a short term bill (rolled over at maturity until the maturity of the long term bond). Thus Person 3 is now bearing the interest rate risk on the corporate bond.

Although Person 1 still holds title to the corporate bond, in effect he has swapped the cash flows on that bond for the cash flows on a sequence of Treasury bills. He is the one funding the corporate borrowing, but Person 2 and Person 3 bear the credit risk and interest rate risk respectively, just as Fischer Black imagined. If the bond defaults, then

¹ Significantly, this innovation was introduced on the heels of the Bear Stearns failure in which the Fed was forced by the prospect of cascading default to take \$30 billion of Bear Stearns' least attractive assets onto its own balance sheet.

² It will be recognized that the Fed, by swapping Treasuries for mortgage-backed securities, has in effect been behaving like Person 2. We will return to this point below.

Person 2 is on the hook for the loss. If short term interest rates rise above the fixed long term rate, then Person 3 is on the hook for the loss.

Now actual credit default swaps and interest rate swaps operate just like this swap of IOUs, except that the bilateral payments are netted. Market convention treats Person 1 as the “buyer” of a credit default swap, and the “buyer” of an interest rate swap, so we treat these long swap positions as assets and rewrite our balance sheet relationships as follows:

Person 1		Person 2		Person 3	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Corp. Bond			CD swap		
CD Swap					IR swap
IR Swap					

(This market convention can be a bit confusing since being long a swap means being short the associated risk exposure. Think of the long swap as an insurance policy.) For Person 1, short positions in credit risk and interest rate risk exactly hedge the long exposures embedded in the bond, so the net exposure to both risks is zero. By means of the swaps, credit risk has been transferred to Person 2 and interest rate risk to Person 3. They are short their respective swaps, but long the underlying risk.

It is straightforward to extend this analysis to other kinds of fixed income claims, such as mortgages. In this case the interest rate exposure is a bit more complicated because of the right of the mortgage borrower to prepay—the system of tranches was originally developed to handle this problem, and the higher rated tranches got paid off first. Also the credit risk exposure is a bit more complicated because individual mortgages are so heterogeneous and small—the system of pooling, and writing credit default swaps on indexes was developed to handle this problem. (In practice, these two adaptations got a bit muddled, as the tranche system got used for default risk as well as interest rate risk. Clarification of this muddle is likely to be one consequence of the crisis.³)

The devil is in the details in these matters, and we can expect that many details will be revised as a consequence of the current crisis. For our purposes the important point to hold on to is that all this apparatus exists essentially to carve off the interest rate risk and credit risk and sell them separately. This is the brave new world of modern finance, and I take it as a maintained hypothesis that this world is here to stay, modulo a certain amount of tinkering.

Counterparty Risk

This system of risk distribution depends crucially on each of the counterparties fulfilling their commitments. Person 1, for example, has promised to make payments that match the payments on the underlying corporate bond. So long as Person 1 actually holds the

³ Paul Davies, “BIS report heralds demise of key security behind subprime crisis,” *Financial Times* (April 2, 2008).

bond, this commitment could be iron-clad, since it involves nothing more than transferring a payment received. But if Person 1 sells the bond, or even has the right to do so, then there will be counterparty risk, even if the bond is replaced with a similar bond.

Person 1 has also promised to make payments that match the payments on a Treasury bond. Here again, Person 1 is in line to receive exactly the same payments (as one leg of the credit default swap), but in this case the payor is Person 2 not the Treasury, so we can hardly say that Person 1's commitment is iron-clad since Person 2 may fail to pay. And there is the further problem that Person 1 might sell the credit default swap, so there is counterparty risk in this transaction as well.

In both cases, appropriate margin requirements might mitigate counterparty risk.⁴ This is the "collateral" that Fischer Black imagined might be necessary in order to ensure performance. The role of such requirements comes clearer when we consider the position of Person 2 and Person 3, and think now about the swap contract rather than the swap of IOUs.

By writing a credit default swap, Person 2 has a (notional) long position in the corporate bond and a (notional) short position in the Treasury Bond, although he cannot close one leg without simultaneously closing the other. At inception, we may suppose that the value of these two positions exactly balance so that the initial value of the swap is zero. The main purpose of margin is to ensure performance, so we focus on what exactly performance would entail. Until the corporate bond defaults, Person 1 pays the difference between the corporate coupon and the Treasury coupon, and his margin should presumably be tailored to ensure such performance. Upon default, Person 2 pays the face value of the bond, and his margin should presumably be tailored to ensure that performance. Person 1 is on the hook for a series of small payments, while Person 2 is on the hook for a possible single large payment.

Similarly, by writing an interest rate swap, Person 3 has a (notional) long position in the Treasury bond and a (notional) short position in the Treasury bill, although he too cannot close one leg without closing the other. Again, suppose that the initial value of the net position is zero, and think about margin as a matter of ensuring performance. Person 1 pays the difference between the contracted fixed rate of interest and the current short term rate when that difference is positive, while Person 2 pays the difference between the current short term rate and the contracted fixed rate when that difference is positive. Because short rates tend to be lower than long rates, in general we might expect Person 1 to be paying Person 2, and that might affect margin.

⁴ In practice, explicit margin requirements were rarely imposed, so my analysis probably understates the extent of the problem. In practice, counterparties simply kept track of their exposure to one another, and limited the size of exposure. We can think of such a system as an implicit margin system, where counterparties are treated as having a fixed margin account that limits the maximal size of their bilateral position.

An additional element involved in ensuring performance is the ability to hold the swap position to maturity, and this might depend on valuation. Although swaps start life with zero value, that value can fluctuate quite a bit during the life of the swap. If default probabilities rise, for example, the value of a long position in the default swap will rise to reflect the increased probability that Person 2 will have to make a large payment (in other words, credit insurance is worth more). The value of the short position will correspondingly fall, and if Person 2 marks his position to market, that fall will be absorbed by whatever capital cushion Person 2 has on the rest of his balance sheet, perhaps so much as to affect his ability to maintain margin.

Similarly, if interest rates rise, the value of a long position in the interest rate swap will rise to reflect the increased payments from Person 3 to Person 1. The value of the short position will correspondingly fall, and if Person 3 marks to market, that fall will eat into the capital cushion of Person 3.

Either way, as capital cushions erode, leverage increases, and the only way to restore a given margin of safety is to reduce one's position, either by paying someone else to take over some existing positions, or by entering the market on the other side as a buyer. (This latter depends on an institutional mechanism for netting offsetting exposures. Such a mechanism exists for interest rate swaps, but not for credit default swaps.⁵) Thus does an accounting loss become an actual loss.

Meanwhile, any uncertainty about whether one person will be able to perform tends to undermine the value of all of his commitments, and so threaten the balance sheet of any and all of his counterparties. One way to hedge such counterparty risk would be to buy credit default swaps on all of one's counterparties. This observation makes clear the central role of credit default swaps in the modern system, especially in times of trouble. People like Person 1, who thought they had eliminated the credit risk involved in their portfolio by buying insurance from people like Person 2, find themselves exposed to a different kind of credit risk, and scramble to find a way to hedge that new exposure.

Either way, whether the scramble comes from issuers of credit insurance trying to pare back their exposure or from buyers of credit insurance looking to hedge against falling creditworthiness of their counterparties, the predictable consequence is upward pressure on the price of insurance. In a mark to market accounting system, that consequence has a way of becoming self-fulfilling.⁶ Doubts about the credit worthiness of a counterparty lead individuals to buy insurance, which drives up the price and so undermines the market value of that counterparty's commitments. Note that this channel of contagion depends not at all on irrational waves of panic, but only on the interlinked character of balance sheets.⁷

⁵ Soros (2008, Ch. 8).

⁶ Think Ambac, MBIA, AIG.

⁷ One way to avoid this self-fulfilling death spiral is to avoid marking to market, but one man's "fair value" accounting is another man's "number juggling." Just so, observes Charles Morris (2008, p. 132): "Midquality subprime CDO tranches are carried at 90 at the Swiss bank UBS and 63 at Merrill, while the ABX, a widely used index of such CDOs, trades at 40. Similar indexes on CMBS, leveraged loans, and credit default swaps all suggest that internal marks should be much higher."

The point to hold on to is that, as in any scramble, liquidity can be a problem, and prices can be pushed rather far from underlying values. I take it that one of the central reasons for lender-of-last-resort intervention is to take such gross liquidity distortions off the table. The classic Bagehot Principle recommends lending freely at a penalty rate against collateral that would be good in normal times. The central problem facing us today is how to extend this principle to the instruments at the core of modern financial markets. The classic Bagehot Principle was concerned with the liquidity problems of Person 1, the funder, not the liquidity problems of Person 2 or Person 3.

Regulation

Basel I (and II as well) required banks to maintain capital reserves against their risky asset portfolio, in proportion to the riskiness of the assets. Critics always emphasized the pro-cyclical character of this regulatory framework. In good times, bank capital increases and so also the ability to expand balance sheets, both by making more loans and by making more risky loans. In bad times, the same effect works in reverse. What the critics feared would happen is what in fact did happen.

Indeed, if anything, the critics underestimated the procyclical character of the regulatory framework, because of the way that the capital adequacy regulations created incentives for off-balance sheet expansion. The consequence of these incentives was that effective capital cushions actually fell during the boom (leverage increased), as credit expanded on balance sheets that the Basel regulations did not reach. One possible direction for reform is to extend the Basel framework to include these new balance sheets, so it is important to understand why that extension has not been done previously.⁸

One way to avoid the tax is to do your lending off balance sheet, by establishing a Special Purpose Entity to hold the loans, which vehicle issues its own debt and equity to fund the holdings.⁹ SPEs are not banks and so not subject to the Basel regulations. This loophole was intended, one supposes, to provide a way for new capital to flow to finance banking activity without diluting existing ownership. It was imagined that the buyers of the debt and equity would be long term investors such as pension funds.

Regulatory Arbitrage

	Assets	Liabilities
Capital Account	Mortgages	Deposits Equity capital
Special Purpose Entity	RMBS	AAA CDO tranche AA CDO tranche

⁸ This is the general direction being pushed by the Financial Stability Forum.

⁹ Another way to avoid the implicit tax involved in capital adequacy regulations is to do your lending on your trading account, where assets attract much lower capital requirements. The analysis of this section applies directly to that case as well, and so is omitted.

		Equity tranche
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The balance sheet makes clear how this method of financing mortgage loans evades the capital adequacy restrictions of Basel. When people speak of the “shadow banking system”, they are usually emphasizing that capital adequacy regulations are no obstacle to expansion of mortgage (and other) lending.¹⁰

From a macroeconomic perspective, we are interested also in the liability side, which is to say how the new assets are ultimately funded. Some were in fact held by pension funds, but as these pockets got filled, new sources of funding were found in the money market. For example, the paper issued by the SPE might be purchased by a Structured Investment Vehicle and used as collateral for so-called Asset Backed Commercial Paper, which paper might be held ultimately by a monetary market mutual fund, as follows:

SPE		SIV		Investor	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
RMBS	AA tranche	AA tranche	ABCP	ABCP	MMMF shares

The balance sheets make clear that (on the margin) the ultimate funding for the assets comes from an expansion of money, or money substitutes.¹¹ Even though the credit expansion was not on the balance sheet of entities we know as banks, nevertheless it was financed by an expansion of money. Not only do capital regulations prove no constraint to credit expansion, but also neither do portfolio preferences.

This involvement of the money market is key to understanding why the crisis took the form it did, as a liquidity crisis. When doubts arose about the value of the assets backing the commercial paper, it became impossible to roll the paper at maturity, and the SIVs had to seek alternative sources of financing or liquidate. In practice many of the assets have apparently found their way back on to the balance sheet of the various entities that created the SIVs in the first place, so off-balance sheet lending turned out in practice to be on-balance sheet. But that has only moved the problem, not solved it, since these assets still have to be financed or liquidated. Regulatory capital requirements only make matters worse since they require that some of the financing has to be equity.

In practice, we got a little bit of everything. Some assets were liquidated, which drove down the price of those assets. Some were financed, which drove up the price of financing (LIBOR and its kin). And some equity was raised, although not enough. In an effort to stretch equity farther, some assets were hedged in order to qualify for lower capital charges, with the effect of driving up the price of hedges. All this price movement naturally had the effect of destabilizing other financing structures, as ripples spread throughout the market.

¹⁰ This is the origin of proposals by FASB/IASB to require stricter accounting for off-balance sheet exposures.

¹¹ Funding of trading account assets with repo has a similar effect.

CDS and system liquidity

We do not know what was in the \$30 billion portfolio that the Fed took onto its own balance sheet as part of the deal for JP Morgan to take over the rest of Bear Stearns. Certainly it was illiquid and hard to value assets. My guess would be equity tranches of CDO structures and, most importantly, credit default swap contracts on which Bear would otherwise have defaulted. In effect, the Fed issued credit insurance, substituting its own ample capital cushion for that of Bear Stearns. But that is just a guess.

What we do know is that subsequently the Fed announced its willingness to swap up to \$400 billion of its own Treasury securities for illiquid mortgage backed securities of various kinds. These swaps of assets are in effect credit default swaps, and the Fed's offer amounts to a floor below which the price of credit insurance cannot fall. As such, the Fed is in effect providing lender-of-last-resort support to balance sheets like that of Person 2. Bear Stearns was such a person, and so is Lehman Brothers, but so also are many hedge funds, and here we come to the crux of the matter.

The Bernanke CDS put is both too broad and too narrow, both too temporary and too permanent. The underlying problem is that the Fed is operating on the securities themselves, rather than on the swap. No doubt one reason is a fear of supporting swaps that do not arise from any real funding operation—this is the modern equivalent of the ancient banker's idea that confining discount to "real bills", and avoiding "finance" bills, was the way to ensure safety. What is needed is a recognition that swaps are here to stay, and need their own discount facility.

Why a discount facility for credit default swaps but not interest rate swaps? Because the latter already exists implicitly. Every day the Fed swaps Treasury bonds for short term money in its repo auction, and it does the same periodically in its Term Auction facility. In effect, the Fed is already providing lender-of-last support to balance sheets like that of Person 3. These are not explicit interest rate swaps, but arbitrage in the organized interest rate forward and futures market ensures that the operations have that effect. Such institutional arrangements show the road forward for credit default swaps as well.

In Bagehot's day, the bill of exchange was the significant instrument for short term borrowing, and acceptance of the bill by a bank or bill broker provided a kind of credit insurance that made it possible to discount the bill for current cash. In Bagehot's day, the credit default swap traveled with the bill, and the entire package was the asset acceptable for lender-of-last-resort discount at the Bank of England. Since Bagehot's day, we have learned the value of extending discount eligibility to long term bonds—no one today argues "bills only". But long practice of confining central bank activity to government liabilities has gotten us out of the habit of thinking about credit risk as appropriate for discount. We have gotten over "bills only" but not "Treasuries only".

Current intervention has been aimed at temporary crisis support of particular categories of financial institution. The Bear Stearns failure extended support from banks to broker-

dealers. Permanent measures should shift attention toward defining the class of assets that are eligible for discount.

References

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