

JOURNAL OF ECONOMIC ISSUES Vol. XLV I No. 2 June 2012 ISSN 0021–3624/2012 \$9.50 + 0.00 DOI 10.2753/JEI0021-3624460205

# Treating Uncertainty as Risk: The Credit Default Swap and the Paradox of Derivatives

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**Abstract:** The credit default swap (CDS) is implicated in the global financial crises because a vast market for securities collateralized by subprime mortgages and consumer debt could not have materialized if hedge funds and other holders of these instruments lacked a means of hedging default "risk." The argument is made that the CDS is an inherently defective concept because it is based on the assumption that future states of the economy are subject to probabilistic risk as opposed to uncertainty in the Keynes-Knight-Shackle-Davidson sense. The CDS also manifests the paradox of derivatives. By enabling individual money managers to safely increase leverage, it causes a system-wide buildup of leverage and financial fragility.

**Keywords:** collateralized debt obligations, credit default swaps, risk and uncertainty

JEL Classification Codes: G01, D81, E44

The credit default swap (CDS), a device that permits money managers to hedge default risk on collateralized debt obligations (CDOs), has proven to be an especially malign product of modern financial engineering.<sup>1</sup> Scrutiny of the CDS brings into relief a paradox that is intrinsic to derivatives. A single financial entity can safely increase its leverage by the use of portfolio insurance. However, the widespread use of portfolio insurance, to the extent that it catalyzes an overall or average increase in leverage ratios, renders the economic system more vulnerable to a painful and protracted phase of de-leveraging. Financial stability (at the level of the household, firm, government unit, or in the aggregate sense) is based on a sound relationship between income streams and debt service. A widening disparity between the growth

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rates of private debt outstanding and income is a salient statistical feature of the era of "financialization" (see Figure 1).<sup>2</sup> Derivatives count as "financial weapons of mass destruction" (Buffett 2002) largely because they act to loosen the constraint imposed by current income flows on the growth of debt. Or, to put it in Minskyan terms, derivatives incentivize money managers to shift from hedge or speculative positions to Ponzi finance (see Minsky 1986).

The purpose here is to examine CDS-related questions through the post-Keynesian lens. First, can the frequency of "credit events" such as delinquency, default, debt rescheduling, or ratings downgrade be predicted by the application of actuarial science? That is, are credit events subject to probabilistic risk or are they characterized by non-probabilistic uncertainty? We argue the answer matters because, if it is the latter, the CDS is an irremediably defective financial product.

Another question pertains to the role played by the CDS in the unprecedented household debt surge of 1995–2007. We argue that the CDS was a crucial innovation



Figure 1. Private Debt as a Percent of GDP, United States

Source: Federal Reserve of St. Louis. Available at research.stlouisfed/fred2.

in terms of creating a market for securities collateralized by home equity, auto and credit card receivables, and student loans. Finally, we examine the importance of the CDS in incentivizing systematically important financial institutions to pursue highleverage strategies.

## Mispricing of "Risk"

Regulatory treatment of the CDS (especially within the United States) highlights the importance of abstract economic theory as a normative policy guide. Shyamala Gopinth, Deputy Director of the Reserve Bank of India, commented that "[t]he pursuit of complete markets, before the crisis, was axiomatically believed to be an unalloyed virtue and the policy and regulatory frameworks were expected to have this as an explicit policy objective. It had become the holy grail of market regulation and everything else followed from this fundamental truth" (Gopinth 2010, 1-2). The existence of a complete set of markets for future and contingent claims is a requirement for Pareto-efficiency in Arrow-Debreu economies (see, Debreu 1954 and Duffie and Huang 1985). Viewed in this context, financial engineers were seen as doing the important work of completing markets, or of creating financial instruments that permit gambles on all possible future states of the world. Thus, the proliferation of derivatives served the desideratum of pushing real life to closer approximation of the Arrow-Debreu economy, conceived of as a kind of Platonic form.

Its putative utility to the representative, optimizing agent notwithstanding, the CDS as presenting configured is a financial technology that overrides important and long established principles of insurance, law, and commerce. For example, the principle that insured parties must have an insurable interest has been established in common law since the seventeenth century. But the preponderance of CDS payouts are received by "naked" counterparties (like John Paulson's hedge fund), meaning those with no assets at risk.<sup>3</sup> The evolved legal solution to the problem of hidden leverage is to punish secret lien holders by subordinating their claims to those of other creditors in bankruptcy proceedings.<sup>4</sup> The U.S. Uniform Commercial Code at present does not require the reporting of liabilities created by the sale of credit default protection, which makes the buyers of such protection secret lien holders. But the time-tested institutional remedy is inapplicable in this case, as CDS counterparties receive preferential treatment in bankruptcy.<sup>5</sup>

The takeaway from the financial crisis, as codified in the Dodd-Frank financial reform legislation (and specifically Title VII of the Act, "Wall Street Transparency and Accountability") appears to be that CDSs are not inherently bad products. Rather, the legal and regulatory environment presented opportunities to derive huge profits by establishing rates on credit default insurance that bore virtually no relation to the likelihood of credit events affecting reference assets. The mispricing of risk is widely identified as a primary, perhaps *the* primary, cause of the financial crisis.

Insurance rates established by sound actuarial methods should provide an accurate measure of the risk of events like fire, flood, or disease. It is clear now that CDS spreads leading up to the crisis lacked any basis in sober risk assessment. There

was price-setting behavior by a handful of CDS sellers (such as AIG, Lehman Brothers and Bear Stearns) that dominated the over-the-counter market, and, taking into account the lack of capital requirements as well as the design of compensation systems within these units, it is likely the CDS spreads were set to maximize sellers' revenues. The CDS market also featured a strange circuit of mutual reinforcement between CDS spreads and CDO ratings issued by Moody's and Standard and Poor's. The investment grade carried by many CDO tranches gave dealers a running defense against charges that CDS spreads were dangerously low. Models used by the rating agencies generated "market implied" CDO ratings on the "implicit assumption that financial markets, and CDS markets in particular, can price default risk correctly" (Salmon 2009, 16).

CDOs present seemingly intractable problems for risk analysts because, unlike conventional bonds, income streams originate from many debtors as opposed to a single (issuing) debtor. Presuming a risk analyst possesses good information on the quality of individual loans underlying CDOs, the real difficulty lies in estimating joint default probabilities (or risk correlation).<sup>6</sup> For conventional insurance, risk correlation between entities included in a given risk pool can be accounted for by estimating a large number of conditional probabilities with the use of historical data. But historical data that would allow for the measurement of default risk correlation between student loans, credit card receivables, or mortgages, is not available. The solution to the problem came in the form of David Li's (2000) now infamous copula, which became standard paraphernalia for Wall Street quants and prompted derivatives expert Janet Tavakoli to comment that "[c]orrelation trading has spread through the psyche of finance like a highly contagious thought virus" (Tavakoli 2006).

Li's copula is a complex formula that applies the "broken heart" syndrome (used by actuaries to chart life expectancy after the death of a spouse) to produce a single measure of correlation risk known in the industry as "gamma." It also uses current market information – CDS spreads – as opposed to (nonexistent) time series data as informational input. Thus Li's copula presupposed an "efficient" swaps market, meaning CDS spreads could be trusted to provide accurate information about the likelihood of CDO – linked credit event – an assumption that, taking into account the structure and opaqueness of the CDS market, should have been dismissed out of hand. That Li's copula made such an impact was largely a function of convenience and opportunism, but it also testifies to the dangers inherent in the practical application of the efficient market hypothesis.

### Credit Events are Subject to Uncertainty, Not Risk

The post-crisis furor over Li's copula has passed over the bigger question, which is: Are CDO-related credit events subject to probabilistic risk or are they subject to uncertainty in the Knight-Keynes-Shackle-Davidson sense? The very existence of credit default insurance presumes that: (1) credit events are subject to risk – meaning they are embedded in ergodic, or time-independent, probability distributions; and (2) such probability distributions are discoverable from time series realizations. An argument might be made that, given the newness of synthetic CDOs, insufficient time has elapsed to allow for (objective) probability distributions to be realized in the time series record. Credit default would therefore be subject to *ambiguity* or "uncertainty about probability created by missing information that is relevant and could be known" (Camerer and Weber 1992, 330) – but not true or "unmeasurable uncertainty" (Knight 1921, 233). The distinction is important as it suggests that the CDS is capable of evolving to a non-toxic form with the accumulation of denser data sets.

If, on the other hand, CDO credit events are uncertain, there is no statistical/ actuarial technique available that could be trusted to equate the credit default insurance premiums with the expected value of payouts. That the structure of the economy is *transmutable* – meaning it undergoes incessant change as the consequence of human agency - is a fundamental tenet of post-Keynesian thought. Davidson writes that "Kevnes' uncertain future involves a *creative* economic reality in the sense that the future can be permanently changed in nature and substance by the actions of individuals, groups (e.g., unions, cartels), and/or governments, often in ways not foreseeable by the creators of change" (1996, 482, emphasis added). The introduction of new tool-combinations, the construction of new production capacity, or the issue of debts - these are examples of structure-altering behaviors or what Shackle called "crucial" decisions - meaning that "the person cannot exclude from his mind the possibility that the very act of performing the experiment may destroy forever the circumstances in which" action was taken (Shackle 1955, 6). Nonergodicity implies that variables such as the price of cotton, employment in the healthcare industry, or the co-movement of mortgage default rates, cannot be reliably forecasted from existing information because the scheme of cause and effect that will define their future values is yet to be created.

Extrapolation on the basis of statistical relationships estimated from currently available data is effective so long as forecasts are projected across a fixed "state of the world." Natural scientists have a big advantage in prediction because they deal with phenomena belonging to an undeviating (ergodic) "state of the world" characterized by structural (or parametric) constancy as the time axis shifts forward. Economic structure is in a perpetual state of emergence under the influence of innovation and institutional change. The hyperlink, the multimodal freight container, or the ban on resale price maintenance – these are examples of things with the power to recast the nexus of interdependency among many economic quantities. Attempts to price CDO "risk" by use of actuarial science are (implicitly) grounded in the view that "people's acts cannot create 'new states of the world'" (Dequech 2000, 49). Holton (2004, 22) notes that the Knight-Keynes distinction between risk and uncertainty "has played essentially no role" in modern financial theory, something that would be of little import if financial theory were not so thoroughly implicated in the socially destructive practices of systematically important financial institutions (SIFIs).

## The CDS, Leverage and Financial Fragility

The sufficiency of cash flows in relation to debt service is a crucial test of balance sheet quality, both at micro and macroeconomic levels. Leading up to the financial crisis, a vast number of U.S. households used borrowing as an expedient to convert an increase in the market value of their assets (mostly home equity and tax-deferred pension accounts) to liquid spending power. While this practice gave a powerful stimulus to aggregate consumption, it could not be sustained as a proportion of current income claimed by debt service passed beyond tolerable levels. Judged by the extent of household debt exposure entering it, the recession of 2007–2009 was historically unique. A strong recovery has not materialized partly for the reason that a significant slice of household income continues to be absorbed by debt retirement (manifested statistically by an increase in the saving rate).

The astounding growth of profits and compensation in the financial sector are the direct result of the emergence of the "originate and distribute model" of banking and more specifically of the exponential growth in the volume of securitizations collateralized by mortgages, credit card and auto receivables, home equity and student loans. The evidence shows that the securitization of household debt also had the effect of expanding credit availability for consumers at all levels of income and creditworthiness. The average quality of household debt necessarily diminishes as the ratio of debt liabilities to household income rises. This principle would not apply if new debts were distributed fully to the balance sheets of high income households. However, a sharp rise in average debt to income ratios of middle and lower income households is a salient aspect of the securitization era. The credit flowed because underwriters were able to find markets for securities backed by consumer debt. The CDS figures importantly here, as it would have been impossible to place such massive quantities of CDOs if buyers were not able to hedge on advantageous terms. It is safe to say that originate and distribute as a model for consumer and mortgage finance is, at least on its present scale, made viable by cheap credit default insurance. This fact is well understood by financial industry leaders, who are presently mounting an aggressive lobbying effort to head off any regulatory changes that might cause a permanent increase in CDS spreads.

The CDS is also a key factor in explaining dangerously high leverage ratios in the shadow banking system. In contrast to corporate bonds or equities, CDOs offer sophisticated financial entities virtually nothing in the way of capital gains income. A deep and continuous secondary market for these derivatives never developed. It requires no great skill to produce above-average returns for investors using high leverage. The problem with leverage is that a relatively small (percentage) loss can cause catastrophic failure as capital reserves are quickly depleted and margin calls flood in. Hedge fund strategies entailed using extremely high debt to capital ratios (leverage) to turn big profits on the (narrow) spread between the yields of CDOs and interest paid on borrowed funds. The exposure of SIFIs to hedge funds is well known, as the latter offered a convenient way for regulated banks to evade capital requirements by moving liabilities off-balance sheet. Such high leverage was evidently deemed safe because positions were insured by CDSs (hedge funds are among the largest users of credit default insurance – see Table 1). But, as we noted at the outset, the CDS subsumes a paradox or fallacy of composition. Cheap portfolio insurance makes its safe and profitable for interconnected investment funds to leverage up, while simultaneously rendering the financial system more fragile.

Unless CDS dealers are forced to set aside very substantial reserves against potential losses, the credit default insurance system will never be able to handle anything more than a localized, quarantined credit event. This much should be obvious from the allocation of \$182 billion in Troubled Asset Relief Program (TARP) funds to AIG to pay off its CDS obligations.

### **Concluding Remarks**

The position that credit default insurance should be regulated but not banned is defensible only if it can be shown to have a socially-redeeming value. Mathematical proofs of the benefits of market completeness should not suffice. The main practical

| Market Participants       | Notional amount<br>outstanding <sup>a</sup> |         | Gross market<br>value <sup>b</sup> |         | Net market<br>value <sup>c</sup> |         |
|---------------------------|---|---------|------------------------------------|---------|----------------------------------|---------|
|                           | Amount                                      | Percent | Amount                             | Percent | Amount                           | Percent |
| Reporting Dealers         | \$17,348                                    | 53.53%  | \$804                              | 59.73%  | \$178                            | 47.59%  |
| Central Parties           | 5,543                                       | 17.10%  | 93                                 | 6.91%   | 18                               | 4.81%   |
| Banks and Security Firms  | 6,108                                       | 18.85%  | 223                                | 16.57%  | 50                               | 13.37%  |
| Insurance Firms           | 358   | 1.10%   | 36                                 | 2.67%   | 20                               | 5.35%   |
| SPVS, SPCs and SPEs       | 528   | 1.63%   | 66                                 | 4.90%   | 39                               | 10.43%  |
| Hedge Funds               | 963   | 2.97%   | 47                                 | 3.49%   | 20                               | 5.35%   |
| Other Financial Customers | 1,323                                       | 4.08%   | 61                                 | 4.53%   | 36                               | 9.63%   |
| Non-financial Customers   | 238   | 0.73%   | 16                                 | 1.19%   | 13                               | 3.48%   |
| Total                     | \$32,409                                    | 100.00% | \$1,346                            | 100.00% | \$374                            | 100.00% |

### Table 1. Credit Default Swaps Market Structure at the End of June 2011

*Notes:* <sup>a</sup>Gross nominal or notional value of all deals concluded and not yet settled on the reporting date. Transactions between reporting dealers are counted only once, others are not netted. <sup>b</sup> Sums together the absolute values of all open contracts with either positive or negative replacement values evaluated at market prices prevailing on the reporting date. Contracts with positive and negative replacement values with the same counterparty are not netted.

<sup>c</sup>Market values after netting positive and negative replacement values with the same counterparty.

*Source:* Bank for International Settlements, June 2011. Available at www.bis.og/statistics/derstats.htm. Accessed December 8, 2011.

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argument in favor of the CDS is that its proliferation corresponded to a general improvement in credit availability, a claim that, for the reasons outlined above, is probably true. It is also likely that an outright prohibition, or the adoption of rules that make portfolio insurance more expensive, would, by reducing the demand for CDOs, make credit more difficult to obtain for many individuals. But is this necessarily a bad thing? An important lesson of recent economic history is that reliance on debt to sustain consumption causes the deterioration of household financial conditions, driving the system inexorably toward a Minsky moment.

In the end, the CDS is a piece of financial engineering that serves a narrow, albeit politically powerful, interest. Students of banking history know that a high degree of financial sector concentration in combination with high leverage among financial institutions is a formula for economic disaster. There is no evidence to support the belief that financial engineering enables economic systems to safely operate at permanently higher leverage or debt to GDP ratios.

#### Notes

- 1. A credit default swap is a bilateral contract where a counterparty buys default protection with respect to a referenced entity (such as a CDO tranche). The contract has a given maturity, but will terminate early if the credit event occurs. The protection seller receives a premium (expressed in basis points per annum on the notional amount) from the protection buyer, who will receive a payment upon the occurrence of the credit event (default, bankruptcy, debt rescheduling, or rating agency downgrade) linked to the reference entity. Normally, the default payment is given by the notional amount minus the recovery amount (net loss). According to the condition of settlement, CDSs are divided into physical settlement and cash settlement CDS. The latter are also called naked CDSs, since the buyer need not deliver any insured or protected interest to the seller.
- 2. Wray (2011, 60) writes: "Financialization is marked by increased leverage, with debt piled on top of debt, and more and more complex linkages between financial institutions essentially, an explosion of financial layering in which financial institutions borrow from one another to lend. These linkages create the conditions under which the failure of an institution like Bear Stearns or Lehman Brothers can result in the sort of toppling of dominoes that occurred in the financial sector."
- 3. Speculative use of CDSs dwarfs their use as portfolio insurance. For example, the notional value of CDS contracts outstanding in November 2007 was \$60 trillion while the insured value of CDO reference assets was \$5 trillion. Wray (2009, 822) writes: "Given the size of the CDS universe . . . a default on \$1 billion of bonds can cause CDS sellers to default on many billions of dollars in insurance. In this way, leverage works against the bailout government has to spend many more times on defaults in mortgages to cover losses on bonds, and still more to cover CDS losses." The European Parliament banned naked CDS use effective in December 2011.
- 4. A secret lien is an undisclosed security interest. Simkovic (2009) explains that the "doctrine of secret liens" is expressed most clearly in Clow v. Woods (1819), a case where the Pennsylvania Supreme Court ruled that undisclosed security interests constitute "fraud per se." He notes that "by overriding privately negotiated payment priorities, the doctrine of secret liens creates incentives for transparency" (Simkovic 2009, 256).
- Simkovic (2009, 272) writes that "credit default swaps, like other OTC (over-the-counter), are an ideal vehicle for secret liens because of their inherent complexity, limited disclosure, and superior treatment in bankruptcy."
- 6. Let *p*(X) be the probability of fire at building X and Y is the event of fire at building Y. X is correlated with Y if the conditional probability of X given Y is not equal to the probability of X that is *p*(X|Y) ≠ *p*(X). In reality, the rating agencies did *not* have good information on the quality of loans collateralizing derivative securities, as became clear in a 2008 hearing before the House Committee on Oversight and Government Reform, 110th Congress (statement of Henry Waxman available at

http://oversight.house.gov/story.asp?ID=2255): "In 2001, [S&P analyst Frank] was asked to rate an early CDO called 'Pinstripe.' He asked for 'collateral tapes' so that he could assess the creditworthiness of the home loans backing the CDO. This is the response he got from Richard Gugliada, the managing director: 'Any request for loan level tapes is TOTALLY UNREASONABLE!!!! Most investors don't have it and can't provide it. Nevertheless we MUST produce a credit estimate. . . . It is your responsibility to provide those credit estimates and your responsibility to devise some method for doing so.' [Mr Raitner] emailed back: 'This is the most amazing memo I have ever received in my business career.''

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