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Toxic Assets: Untangling the Web

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Executive Summary

We're not moving fast enough. And we’re blowing the only chance we’ll ever have to learn from our mistakes.

While most are currently asking the question, “How much?” we think the most important question regarding the collapse of our financial market system is a very simple: “What happened?” Specifically, this is the time to build a detailed audit trail of what actually happened in the financial markets over the past five years. Some of the same technology drivers and business practice developments that enabled the system to spin so far out of control so fast are key components in building a fact base that not only describes what happened to cause the collapse, but can also provide a window into the “shadow banking system” that became a key liquidity provider throughout this period. Business practices always lag technology advances and geographic expansion, and regulatory practices have been trailing far behind due to theoretical constraints and political interference. The current focus on “valuation” is misplaced – the Credit Default Swap market does not consist of instruments that can be valued at a price of so much currency for so many shares. Instead we are talking about contingent relationships based on “expected and guaranteed views” into underlying securities – or other constructs designed to mimic underlying securities – chained across borders and types of firms in a frenzied haste with minimal, if any, supervision or forethought. We need to pick out the central threads and unravel the knot leading to who did what, when, and where the relationships lead.

The general consensus (shared by the authors) is that the collapse of the subprime mortgage market was a major cause of the current crisis. Asset-backed securities (ABS) and securitized assets created from the subprime mortgages originated in the now collapsed housing market make up the bulk of so-called
“toxic assets” now found in the portfolios of troubled banks. These subprime mortgages, and the
securitized instruments that were created from them, leave behind a money trail that can be used to
identify these assets and their owners. It’s not a simple job to follow this trail, and it will require
specialized experts to help untangle the web of relationships between those who created and sold the
securities and those who bought them (often many of the same parties were involved at multiple levels
of transactions with the same underlying securities). But through this process of discovery, we can
create a definitional set of facts that can be used to support analyses of what actually happened, rather
than continue to hypothesize and fantasize about the crisis before us. And we can start a discussion
about how to create a central repository of transactions taking place in the securities markets that will
give federal regulators a tool to help manage risk across the financial industry.

This is our opportunity to understand and learn from the collapse of the global financial system. But
every day we delay makes it more difficult.

A Starting Point

To start, here are some preliminary observations about today’s financial markets, their recent evolution
and areas of activity. Unquestionably, the increase in the number and type of tradable instruments,
especially those related to structured securities, was influenced by the following factors:

- advances in financial techniques devoted to structuring custom instruments,
- development of a legal framework to support the requisite underwriting arrangements,
- the proliferation of hedge funds, many of which were set up primarily to invest in structured
  securities proliferating from the mortgage boom, and
o the drive for market growth and extreme profit requirements coming from the very largest global banking and finance institutions, which led to the securitization transactions and explosion of relationships previously confined to a small inner circle of global banks

These factors were at the core of the business activities that generated wild volume growth in different types of securities, especially Credit Default Swaps (CDS), in the past five years. In addition to sheer volume growth, however, we also saw massive webs of relationships created across asset classes and between participants who bought and sold securities based on subprime mortgages. When the short-term commercial paper markets came to a screeching halt in September 2008, the direct cause was valuation concerns related to mortgage-based instruments.

What we find when we start looking at the intersection of advanced securitization products (Collateralized Debt Obligations (CDOs)), the simultaneous emergence of a secondary OTC (Over the Counter) Market for CDSs, and the slew of new hedge funds created to take advantage of these and other facets of market evolution, is a classic “feedback loop.” At the heart of the process, we find a relatively small number of players, a finite amount of raw material to package, and a limit to how quickly the players can package that material for distribution. The “tightly coupled” nature of relationships between market players (and the corresponding obligations – potential debts that were regarded as of negligible concern only weeks earlier), combined with problems in record keeping (no longer a task for clerks, but still treated and funded as such by the “front office” and senior management) led directly to widespread fear that the house of cards was crashing, and cascaded through from one set of securitized products (ABS CDOs) to the Asset-Backed Commercial Paper (ABCP) market in days. This crushed the real economy by freezing cash flows, since the banks at the center of everyday commerce had turned the lending business into a manufacturing and packaging game.
The products which prompted the credit freeze were the so-called toxic assets that emanated from the subprime mortgage loan market. The facts are now undisputed:

- The ABS market for subprime mortgage-backed securities grew from under 10% of all mortgages in 2000 to roughly 25% in 2007.

- For a variety of reasons, there was a significant drop in the quality of subprime mortgages beginning in late 2005. (Everyone who could reasonably afford a mortgage had one at that point, so in order to maintain growth, mortgage brokers began selling mortgages to people who could barely afford them). The subprime mortgages written in 2006-07 are significantly more likely to default than earlier vintages of loans.

- The realization that significant numbers of new mortgages, and the securitized assets built on them, would not perform nearly as well as the models used to structure and value them predicted, caused a collective panic to build in the trading and banking community.

- The continual refinement of increasingly specialized asset classes from prior larger groupings, done in order to create specialized products, combined with a limited numbers of players in each sub-sector, led to a cascading seizure that started in long-term debt markets and moved rapidly into short term money markets, crippling the economy.

Simply put, the relationships among market participants trading CDS and other products based on subprime securities served as the transmission mechanism to spread toxins throughout the system.

Adding to the above factors, the prevailing naked emperor’s view that market participants would moderate their own behavior in order to protect their individual corporate viability meant that no one had the information to put together the big picture – and that those who did raise doubts (or facts) would
be ignored. This was further complicated by increasing globalization of the Financial Services industry, accompanying decreases in transparency, and the corresponding tendency of firms to engage in regulatory arbitrage.

**The Supply Chain – Or, Follow the Money**

With a foundational understanding of the factors leading to the current crisis, we begin our untangling with a specific target set of Collateralized Debt Obligations (CDOs) – those securities built from subprime ABS with underlying vintages of 2005, 2006, and 2007. Following the supply chain, in both directions (from origination on one end to purchase on the other), will provide key insights into who was doing what.

After identifying these structures and their distribution (a relatively simple task, compared to tracking the downstream counterparty relationships), we will identify the genesis of related CDS transactions. As will be shown below, these may originate as a part of CDO structures, or as bets about the resulting CDO securities. At that point, we will be able to unwind enough of the puzzle to understand exactly who has what – and where those assets and obligations are tied out to other parts of the markets.

Looking down from 50,000 feet, we can say that a modern market economy is organized around (at least for our purposes) moving money – either in the present (making payments, borrowing money for a very short period of time) or into the future (borrowing money for longer periods, or investing in some form of asset that either should, or we hope will, appreciate in value over a given time period). Those firms devoted to maintaining these mechanisms are categorized as belonging to Financial Services, while everything else is lumped under the title “Real Economy.”
The payment mechanisms and short-term lending functions are plumbing that is essential to the operations of all members of the larger economy, and here are referred to simply as Banking. The Investments and Insurance sub-sectors of the Financial Services industry are more complex and differentiated. Here we’ll focus primarily on that sub-sector of the Investments group that engages in Capital Markets activities – the creation and trading of securities. All gateways to the Investments group go through some type of Banking layer – in the US, this is a path that is made up of a finite number of firms, and, for our purposes, is a very simple group to identify. As we will see, many participants play multiple roles – the same firm can wear many hats. And that’s only the start.

The Processes and Players

The overall process of creating and selling new financial instruments consists of the two following reasonably discrete steps:

- **Loan Origination and Underwriting** – Specific mechanisms vary across asset classes and by original source of funds. As an example, creating corporate bonds is a different process than that for creating municipal bonds, though the general forms are similar. In the specific case of subprime mortgages, the original securities were not designed to be traded in the Secondary Markets, and required further modification, into structured ABS pools (and the CDOs, built on top of these) to make them tradable assets.

- **Structuring and Packaging** – Structuring refers to the legal, financial, and operational business processes required to acquire and create pooled securities. Packaging refers to the marketing, sales, distribution, and lifecycle management pieces required to solicit buyers for the new securities.
Once the securities have been sold to the initial investors, they then become available in the Secondary Markets, where ownership of the actual securities themselves can change, and where other market participants, not necessarily owners of the new securities themselves, can use derivative instruments to place trades that reflect their view of the value of the securities underlying the new instruments.

**Special Purpose Vehicles**

Special Purpose Vehicles (SPVs) are the means by which the subprime asset-backed securities in their new securitized form were sold into the market. The SPV has specific legal, accounting, governance and operational processes, and there are several different versions of these structures, due mainly to different rules for manufacturers depending

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**Diagram 1**

*Source: CGFS (2005).*

**Structured finance: key market participants**

Stylised overview of the "players" involved in (funded) structured finance transactions and of their roles

- **Rating agencies**: evaluate credit risk/deal structure, assess third parties, interact with investors, and issue ratings
- **Asset manager**: trades assets
- **Financial guarantor**: insures particular tranches
- **SPV**: funds
- **Senior**: tranches
- **Mezzanine**: tranches
- **Junior**: tranches
- **Investors**: funds
- **Servicer**: collects and makes payments
- **Trustee**: monitors compliance
- **Originator**: funds
- **Arranger**: funds
on their position in the supply chain and relationship to the core underlying instruments. Here we’ll use
the term SPV generically to include all these variations.

SPVs are a core piece of the ecosystem of structured finance, and the specific parties to a given SPV are
important links in the chain to “Follow the Money.” (See diagram 1 for a generic view of relationships
and players involved in a typical deal.)

We begin to follow the money trail with the originators of the loans used to create asset-backed
securities. For subprime mortgages, the loans were originated by independent loan brokers, who sold
the mortgage at time of closing to a mortgage loan company, like Countrywide, or another non-bank
lender. Countrywide (or a similar loan company) would then sell the loan to a bank or an investment
bank or brokerage firm, like Citigroup or Merrill Lynch. (By 2006, nearly every major investment
bank and bank had purchased a non-bank specializing in subprime mortgage loans and set up a
“warehouse” program to accumulate loans for repackaging, making their ties to the industry even closer.
And, of course, increasing the demand for new loans.) The investment bank would then package pools
of these loans (typically with common characteristics, e.g. interest rate or maturity) into an asset-backed
security, which they would then in turn sell to institutional investors, including, hedge funds, insurance
companies, pension funds, mutual funds or institutional asset managers.

Each pool of asset-backed securities was required to be registered with the Securities and Exchange
Commission (SEC), which typically meant that the investment bank or bank used their own in-house
counsel or hired outside attorneys to prepare and file the paperwork with the SEC, and hired
independent accountants to review their books in accordance with SEC requirements. It appears,
however, that there are significant holes in the records – especially since certain filings are elective.
Actual completeness and accuracy of filings related to securitized structures appears to vary widely. A
systemic assessment of these is essential to unraveling the knots – and providing a specific, definable viewpoint into the constellation of players.

The Products

Derivative Securities – Structured products (CDOs) and pure derivatives (CDSs)

There are two major categories of derivatives: structured instruments that represent pieces of underlying assets, and the classical “pure derivatives,” including Options, Forwards/Futures, and Swaps. Options allow you to pay for the ability, but not the requirement, to buy or sell something in the future at a price determined today. Forwards allow you to lock in a future price without having to pay for the privilege, but you are committed to the deal – there is no option not to transact at the given date. A future is a form of standardized forward that trades on an exchange. A swap is exactly what it sounds like – “I’ll swap you this for that.” The evolution of the markets for structured debt products led to the emergence of a market for pure derivatives based on the credit risk that one party in a deal may default on their payment terms, hence the name “Credit Default” market, often referred to as the “Credit Risk” market also. We’ll exam Credit Default Swaps in more detail below.

Structured products were generally developed with one of two goals in mind – either to raise capital (especially for corporations) or to free up room on the balance sheets of lending firms. As they proliferated (over the past 20 years, with rapid acceleration in the past 10, and explosive acceleration in the past 5), the layers of relationships and corresponding obligations (debts or potential debts) became a house of cards tied together with an increasingly complex series of links between both instruments and participants. This was compounded by past industry sins, specifically a chronic lack of investment in the Back Office, where the physical processing of transactions takes place, primarily due to incentive structures and historical attitudes that “Traders and deals make money, everyone else is just a parasite.”
Companies made plenty of short-sighted investments in outsourcing of staff and production mechanisms that put no value on experience in a market growing new weeds out of the old ground. In other words, as the products and markets became more complex and specialized, the cost measurements regarding productive assets, that is, the people and machinery required to manage and complete transaction life cycles, focused only on a small subset of actual value: “If we don’t know how to measure it, or we haven’t taken it into account in the past, then it doesn’t exist.” Indeed, in the case of CDS, one of the authors is currently working with an industry group to define a standard view of their “lifecycle” – the products are too new for this to have been done yet. The costs and risks of maintaining a portfolio of CDSs are being discovered as we go along – but that hasn’t slowed down trading desks in the least.

In terms of figuring out who owns what, however, it is necessary to understand some specific deal structures and the assumptions behind them. What follows next is a brief overview of the products involved in those deals.

**Collateralized Debt Obligations (CDOs)**

CDOs are essentially bond funds, where the bonds are artificially created from the pooled cash flows of underlying bonds or credit instruments. The “standard” structure utilized in CDOs where the underlying assets consist of investment grade bonds (agency and prime) is referred to as the “Six Pack.” This refers to six logical tranches grouped into three classes: Senior, Mezzanine, and Subordinate.

In the case of the set of CDOs that utilize subprime ABS as underlying collateral, the structure used is generally referred to as XS/OC (eXcess Spread/Over Capitalization), referring to the methods used to extract the premium associated with higher risk.
The following is simplified for this discussion. CDOs can be categorized in a variety of ways, but for purposes of following the money there are three important areas to focus on:

- Is the CDO “funded” or “unfunded?” The distinction here is a combination of how the deal is constructed and whether or not the creator of the SPV actually has to issue securities or invest cash to launch the deal.

- Is the CDO a “Synthetic” or “Hybrid” structure? A “standard” CDO is one where the tranches represent actual underlying ABS instruments. A Synthetic CDO is one where some or all of the tranches consist of packages of CDS that are designed to emulate the cash flows that would result from the selected underlying instruments – in other words, instead of acquiring the ABS instruments, the Issuer can write CDS deals to generate similar cash flows. (This usually creates what is known as basis risk).

- Is the CDO actively or passively managed? If the fund manager has the ability to trade other products to maintain the asset base of the CDO, then there may be several areas where hard to measure (or detect, it would seem) risks are introduced.
“MAGIC HAPPENS HERE” or How to Make Something Toxic Smell Clean

When US housing price appreciation slowed starting in 2007, pulling the rug out from under newer “affordable” mortgage products that assumed steadily increasing prices and continual re-financing based on that accumulated equity, CDOs based on subprime ABS went from reasonably risky but high yielding instruments (that one in theory could pass off to other investors) to “toxic assets” almost overnight. This was significantly due to a combination of poor modeling assumptions (“house prices never go down”) and related inflated credit ratings applied to structured ABS tranches when they were wrapped inside the CDO envelope and augmented with various forms of credit enhancement. The term “Mezzanine CDO” refers to CDOs built from low-rated tranches of subprime ABS. In a process that now looks to be a combination of magic and wishful thinking, some of these tranches somehow ended up with AAA investment ratings and were marketed as high quality investments, dramatically broadening the base of potential investors to include pension funds and asset managers. (See Diagram 2.)
Credit Default Swaps (CDS)

CDS are bi-lateral contracts entered into between parties. Originally created as a method for banks to mitigate their risks on loans and bonds, they have evolved into the primary instrument used in the Credit Risk Markets. Other products in these markets include Total Return Swaps and Asset Swaps, but CDS comprise roughly 95% (British Banking Authority, 2006) of the currently estimated transactions, and have served, in specific combinations with certain types of Structured Instruments, as the primary disease vector to spread interlocking risks globally across balance sheets.

In a generic CDS arrangement, it is entirely optional for either party to have an ownership interest in the underlying reference entity. (See Diagram 3 for a view of the relationships in a CDS.) This is a critical factor in the growth of the market and in some of the more negative aspects of CDS combined with other instruments, especially CDOs. In Options markets, writing (selling) a Put Option on a security you don’t own is called a “Naked Put.” A firm selling a CDS who does not own the reference obligation is essentially writing a Naked Put. Note also that the Reference Entity has no voice in the transaction – neither the buyer or the seller is obligated to report to anyone else that they have entered into the swap agreement. A useful analogy is in relation to auto insurance – not only can I buy insurance for my car,
but so can you and hundreds of others. The insurance company will collect a lot of money in premiums – but if I drink too much and drive my car into a ditch, they also have to pay out to everyone who has purchased insurance on my car.¹

For the Buyer, CDS function as a form of insurance against a default event on the part of the reference entity, similar to a Call Option. The Buyer pays a premium (typically computed on an annual basis, paid in quarterly installments) to the Seller. If the Reference Obligation experiences a Credit Default Event, then premium payments halt, and the Seller pays the Buyer with either securities or cash (physical or cash settlement), the amount determined by the original contractual terms. The risks assumed by the parties are asymmetrical – the Buyer is short the Reference Entity’s credit risk, reducing his exposure to default but giving up the profit opportunity from that exposure, and picks up Counterparty Risk from either the Seller or both the Seller and Reference Entity (called “double default” counterparty risk). To the extent that the Reference Entity risk doesn’t precisely track with the CDS’s risk (for example, a bond maturing in 4 years vs. a CDS with a 5 year term), the Buyer may also assume basis risk. The Seller, on the other hand, is long with regard to the credit risk of the Reference Entity, and also takes on Counterparty Risk with regard to the Buyer. A variation on this set of interlocking risks is a Credit Linked Note (CLN), also called a Funded CDS. Here the Seller will lend the notional amount of the CDS to the Buyer in order to remove his (the Buyer’s) counterparty risk. In order to further mitigate the Seller’s risks, the parties may set up a bankruptcy-remote SPV that sits between the two and is independent of Buyer default risk.

Reference Entities and Obligations are typically Sovereign or Corporate Debt, or, starting in roughly 2002, tranches of Structured Securities - ABS, MBS, or CDOs in our nomenclature. The definitions and

¹ Special thanks to Jim Northey of FIX/LaSalle Technology Group for this analogy.
associated consequences of Credit Events relative to Entities have evolved with the market. While the 2003 International Swaps and Derivatives Association (ISDA) templates are generally regarded as definitional for these transactions, it should be emphasized that each deal is subject to customization by the parties. Default events are either “hard” or “soft,” depending on whether or not the terms of the deal allow, for example, a missed payment to be made up in future installments. The ISDA documentation covers six types of Default Events, see www.isda.org/ for specifics. These “soft defaults” and the customization with which they were created are a significant factor in the recordkeeping nightmare that CDS transactions have evolved into.

A key attribute of CDS is the difficulty in getting out of one – there is no standard way to “tear up” a contract. This led many players to simply write another CDS with a third party that would offset the risk of the original contract, but adding one more instance of counterparty risk. Additionally, the process of “Novation,” or a somewhat controlled re-assignment of deals, created a significant mess in the record keeping and lifecycle management processes related to CDS deals.
Subprime Synthetic/Hybrid CDOs – The Toxic Disease Vector

Synthetic and Hybrid CDOs created using CDS to emulate subprime ABS tranches created multiple layers of relationships based on what turned out to be wildly incorrect valuations. Since many players in the CDS market have offsetting positions (entered through specific new CDS), the chain of relationships is very tightly coupled, and cascaded out to other parts of the market faster than the participants could track or measure. Returning again to our generic SPV diagram, we’ve highlighted some the possible sources of CDS creation or usage in a synthetic CDO. (See Diagram 4.)
The Toxic Assets Web

As we unwind the threads from subprime mortgages to asset-backed securities containing these mortgages, the packaging of CDOs from the same underlying subprime assets, and CDS transactions based on the subprime securities (but not requiring the underlying asset), we find essentially the same players creating, selling and buying securities. (See Diagram 5.) The creation of a CDO required the bundling of existing ABS and other assets into a single securitized loan with differing tranches. Bankers and lawyers created the security, the traders and sales people in the investment bank sold pieces of the
loan, and the same parties who had purchased the original ABS were often the same hedge funds, insurance companies, and pension funds purchasing these derivative securities. In the same way, CDS sales and trading was typically done among the same cast of characters, with the traders once again making money for their investment bank, hedge fund, or bank with each trade. The investment banks made money with every trade, from the bottom of the structure to the top.

**Unraveling the Documentation**

Regular reporting of distributions from structured investment vehicles can be found in documents filed with the SEC. What is difficult to find is the internal company documentation of settled transactions in CDS. Trades in CDS were done by teams on the CDS desks of the investment banks, but the telephone calls or text messages that resulted in trades were rarely cleared and settled in a timely fashion by the back office operations of these banks. In 2005, there was a three-month delay uncovered by the Federal Reserve, with over 70% of the CDS transactions still unsettled after 90 days. A lack of investment in back office technology, and probably a lack of communication with the front office, hindered efficient operations with regard to these securities. As a result, this world was completely opaque to federal regulators.

In the chaotic ABS/CDO/CDS market of the 2005-2007 time period, it is apparent now that there was little effort made to evaluate carefully the risk of the investments being made by those both buying and selling these products, all which contributed in a myriad of ways to the meltdown of the credit markets. But another key finding in our analysis, and one which will affect the unraveling process, is the extent to which there was a lack of timely documentation and recordkeeping in this unregulated market, especially with respect to CDS. Trading new, evolving, and highly complex instruments that have undocumented (or unknown) lifecycle requirements, coupled with a chronic lack of investment in
operations, is hardly a novel recipe for trouble. But the historical tendency of the “front office” and senior management to regard operations as a “necessary evil” to be funded at minimal levels does not, by itself, explain what happened. The question raised from a regulatory and senior management perspective is the extent to which corporate governance issues may emanate from this lack of supervision.

**Conclusion**

Creating a conceptual audit trail of the toxic assets born of the subprime mortgage market, by identifying the inputs and their corresponding instruments, is a universe of work with data and documentation. It is work that can be done. The core arena for the market meltdown is the intersection of the markets for CDOs and related CDS. Fewer than 50 firms, globally, are at the nexus where SPVs where spun out of banks and used to create subprime ABS CDOs. Starting with known loans with poor vintages (post-June 2005) and working out the (at times theoretical) money and contract flows structurally through the securities markets is a daunting task – but the data is out there. Every day delayed leads to further obfuscation, but that’s the nature of the business practices we’ve developed – time passed leads to distinct signal loss. Given the current stage of technical tool evolution, however, the bare minimum required to poorly manage huge global data flows now leaves enough of a trail that we have a new resource available to us – if we take advantage of it.

Once the data are collected from the various parties, there is a policy question as to whether or not to continue the data collection in these products. Our government’s policy with respect to providing transparency in our financial markets would make such a data warehouse for financial instruments and market participants a critical piece in rebuilding our financial infrastructure. While the costs of this
effort are not trivial, we’ve already thrown many times the amount of money required for this task at the market participants responsible for creating much of it, with little discernible result.

Former Federal Reserve Bank Chairman Alan Greenspan testified before the Committee of Government Oversight and Reform on October 23, 2008. During his testimony, Greenspan acknowledged under questioning that he had made a “mistake” in believing that banks, operating in their own self-interest, would do what was necessary to protect their shareholders and institutions. Greenspan called that “a flaw in the model ... that defines how the world works.” Greenspan’s testimony that there was a “flaw” in his world view was a poignant moment in many ways. But if we do not learn from what has happened in the world’s market systems, it won’t be the last such statement from a bewildered regulator or central banker. Unlike past systemic market breakdowns, however, we have the ability to figure out precisely what happened. In the process, we can gain the knowledge we need to craft future regulatory and governance approaches that take into account the collective set of facts that led to the Credit Crisis. While we’ve skimmed over a myriad of details at each level of analysis here, there is a transaction trail that has not yet grown cold. Time is of the essence, however; each day new transactions further obscure the record from which we can learn.

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