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TECHNOLOGY AND FINANCIAL INNOVATION

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This case study examines the global financial debacle of 2007–2008 to see the roles in which technology played in new financial schemes. It uses theory about social-technical systems and applications of technology to analyze the case. It identifies theoretical issues in which MOT can relate to classical economic theory.

Keywords: Financial innovation; corporate governance; information technology.

1. Introduction

In this paper, we begin to explore the issue of what should be the proper interactions between financial strategy and technology strategy — for long-term economic development at national and global scales. This issue is important, particularly in information technology — as historically, technological progress in the modern world has stimulated national and global economic development. One of the authors has succinctly expressed the relationship between technological innovation and wealth [Khalil (2000)]. The process of technological innovation is created by a science and technology infrastructure in a nation that we can refer to as the technology development system. This infrastructure provides new technical knowledge to the economic and financial infrastructure of the nation that we can refer to as the financial/economic system. A third important system is the trade system comprising both internal and global trade. All the three infrastructures provide the bases for national wealth creation. When technological innovation is commercialized in economic systems, they add value for markets and expand internal and export trade. Technological innovation provides a competitive for the businesses in a nation that contribute to wealth creation.

However, when this model is overly exploited for creative financial innovation and applied to the financial system of a nation or of the world, we have seen that innovation has not always created financial progress in terms of wealth creation. In the global markets of the world, there have been several examples of failed financial strategy, both dramatic and of enormous scale. The case we examine here is the global financial credit freeze of 2007–2008. First, we

reconstruct the case of financial events revealing the collapse of the world's financial system, and then we analyze the case in terms of technology and financial interactions.

It had been technological innovation in Internet and in the financial techniques which facilitated the scale of the financial fraud — so large that it brought down the banks in several nations. Without the Internet innovation of the prior decade, the financial scandals of the decade of 2000 could not have been perpetrated. Information technology was used to create a global financial derivative market (a tradable financial product whose value depends on the value of some other asset or combination of assets). Further, it was malpractice in this derivative market that brought down not only the US financial system but the world's banking systems. The scale and extent of the financial fraud would not have been possible without its use of computers and information systems and Internet communications.

But the fraud was not only in how the financial markets were enabled by Internet technology but also in the financial products and business models. What we will distinguish between is innovation in information and innovation in finance. Of course, we know that not all technological innovation has been beneficial for everyone — global warming due to the application of fuel technologies is one example and intercontinental nuclear missiles is another. So, too we see in the credit debacle that financial innovation is not necessarily beneficial — but can also be used for fraudulent business activity.

2. Case Event: Collapse of the Global Financial System in 2007–2008

We review the dramatic sequence of events in which that credit crisis unfolded.

June 2007

The New York Times reported: "The first shoe (of the global financial implosion) to drop was the collapse in June 2007 of two hedge funds, owned by Bear Stearns, that had invested heavily in the subprime market." [NY Times (2008)] Banks, such as Bear Stearns had been making up bonds to be sold as a collateralized debt object/obligation (CDO). But these CDOs contained both good, low-risk "prime" mortgages and bad, "risky" subprime mortgages. The banks had deliberately mixed prime with subprime mortgages in their bonds to increase the size and number of mortgage bonds. But, now all CDOs were contaminated with risk — as it was the greed of bankers how made them mix the risks. But, they told the people who were buying the CDOs there was no risk. They said that the mixture of primes and subprimes had "spread the mortgage risk." Yet, really this had increased the mortgage risk. To sell such a confusing product, the banks had set up hedge funds — as the example of the two hedge funds inside Bear Sterns. But this way, instead of "spreading risk," Bear Stearns had actually increased its own risk — and finally leveraged its way to bankruptcy. Stupid? Yes. Impossible? No, it happened. Not just Bear Stearns, but throughout the US banking industry.

March 2008

It then took nine months, from June 2007 to March 2008, for that hedge fund row of "financial dominoes" to begin falling as Bear Sterns kept reporting larger and larger losses on mortgage bonds. Earlier in 2007, an article had appeared reporting on Bear Sterns problem: "Bear Stern hedge funds ran into difficulties after making large bets on the troubled US subprime mortgage market [Executive Intelligent Review (2007)]." This Bear Sterns funds failure would immediately open the door to a wider credit crash. First, it occurred in Bear Sterns itself as it was then on the verge of bankruptcy, because it did not have sufficient reserve funds to satisfy Federal regulations to continue being chartered as a bank. "Then in March, the Fed staved off a Bear Stearns bankruptcy by assuming $30 billion in liabilities (of Bear Sterns) and engineering its sale to JPMorgan Chase. The price of that sale was at $10 a share, when only months earlier shares had been in the $100 range. Chase had acquired Bear Stearns for a price that was less than the worth of Bear's Manhattan skyscraper [NY Times (2008)]." This was only the first bank that would fail to meet its banking-reserve requirements and fail. Several more were to follow in New York, and around the world.

August 2008

Next the two giant semi public mortgage-bond companies in the United States, Fannie Mae and Freddie Mac, would fail. "In August, government officials began to become concerned as the stock prices of Fannie Mae and Freddie Mac, government-sponsored entities that were linchpins of the housing market, slid sharply" [NY Times (2008)].

These companies had been earlier established by the government to maintain liquidity in the US housing market. When a bank lent a mortgage, its capital in the loan would be tied up for 20–30 years, unable to use that capital to make further loans. Fannie Mae and Freddie Mac would buy these long-term mortgages from the bank. This enabled the bank to obtain back its loan capital to make another loan. Banks made money through the commissions earned on making a loan. Fannie Mae and Freddie Mac made money on the interest paid over time on their acquired mortgages. They packaged mortgages together into bonds, and sold bonds to long-term investors. Since these bonds were legally backed by the US Federal Government, they were seen as safe, low-risk investments. But, the greed of the executives of Fannie Mae and Freddie Mac to pay themselves big annual bonuses also led them to buy subprime mortgages and mix them together with prime mortgages — and sell these mixed-risk bonds as low risk.

But if Fannie Mae and Freddie Mac failed, then the whole US housing-mortgage industry would actually end. As had happened in Bear Sterns, so too executive greed for large bonuses had occurred in these two quasi-public agencies which led to their financial collapse. The government then nationalized both companies: "On Sept. 7, the Treasury Department announced it was taking over (nationalizing) Fannie Mae and Freddie Mac" [NY Times (2008)].

September 2008

Also, a second major investment bank failed: "On Sept. 12, top government and finance officials gathered for talks to fend off bankruptcy for Lehman Brothers. The talks broke down, and the government refused to step in and salvage Lehman as it had for Bear Sterns. Lehman's failure sent shock waves through the global banking system. . . ." [NY Times, Dec (2008)] Lehman Brothers could not meet bank-reserve requirements, having borrowed too much to buy mortgages, assembled into CDOs and then not sellable. Lehman's failure was the largest bankruptcy filing in the US history, as then Lehman held over $600 billion as illiquid assets.

Also in that same month of September, it was revealed that a stock brokerage firm, Merrill Lynch, had also been buying large numbers of subprime mortgages to make up mortgage bonds as CDOs. Merrill Lynch then sold itself to the Bank of America.

Who was next? "On Sept. 16, American International Group (AIG), an insurance giant on the verge of failure because it had insured the special purpose vehicles (SPVs), which had been established by banks off their balance sheets to buy their CDOs and issue sell them as derivatives. AIG issued the insurance on the CDOs as credit default swaps (CDS). Next AIG would be "bailed out by the Fed in an $85 billion deal" [NY Times (2008)].

That September, all the stock exchanges in the world imploded, with the prices of shares falling precipitously: ". . . Stocks plunged, with the Standard & Poor's 500-stock index losing nearly nine percent, its worst day since Oct. 19, 1987" [NY Times Dec (2008)].

October 2008

"The US Treasury Secretary, Henry Paulson Jr., publicly announced a three-page, $700 billion proposal that would allow the government to buy toxic assets from the nation's biggest banks, a move aimed at shoring up balance sheets and restoring confidence within the financial system. . . . Many Americans were angered by the idea of a proposal that provided billions of dollars in taxpayer money to Wall Street banks, which many believed had caused the crisis in the first place. US government intervention to save the US banking industry was underway. . . (but) it was still unclear how effective the bailout plan would be in resolving the credit crisis" [NY Times (2008)].

The banking crisis spread around the world: "Banks in England and Europe had invested heavily in mortgage-backed securities offered by Wall Street. . . . Over the weekend that followed the (US) bailout's passage, the German government moved to guarantee all private savings accounts in the country, and bailouts were arranged for a large German lender and a major European financial company" [NY Times (2008)].

But stock markets around the world continued to plunge. The central banks of many nations cut their prime interest rates to lower lending costs, and still the credit crisis hadn't ended. The government investments in their banks increased: ". . . after a week in which stocks declined almost 20 percent on Wall Street,

European and American officials announced coordinated actions that included taking equity stakes in major banks, including $250 billion in investments in the United States" [NY Times (2008)].

The impact of the credit crisis spread from banks to stock markets to exchange rates and even the price of oil: "The volatility in the stock markets was matched by upheaval in currency trading as investors sought shelter in the yen and the dollar, driving down the currencies of developing countries and even the euro and the British pound. Oil-producing countries were hit by a sudden reversal of fortune, as the record oil prices reached over the summer were cut in half by October because of the world economic outlook" [NY Times (2008)].

By then, all economists were acknowledging a global recession which the falling stock markets in the world had been anticipating: "But as the prospect of a severe global recession became more evident ... two days later, after Ben Bernanke, the Federal Reserve chairman, said there would be no quick economic turnaround even with the government's intervention. The Dow plunged 733 points" [NY Times (2008)].

November 2009

Finally, nearly a year later, in the United States, the government changed — in the November 2009 US national elections: "The credit crisis emerged as the dominant issue of the presidential campaign in the last two months before the (U.S. presidential) election. The weakening stock market and growing credit crisis appeared to benefit Mr. Obama, who tied Mr. McCain to what he called the failed economic policies of President Bush and a Republican culture of deregulation of the financial markets. Polls showed that Mr. Obama's election on Nov. 4 was partly the fruit of the economic crisis and the belief among many voters that he was more capable of handling the economy than Mr. McCain" [NY Times (2008)].

3. Case Analysis

We next analyze the key elements of this case.

Shadow-bank institutions

Commercial banks in the United States are institutions act as a financial intermediary between savers and borrowers — aggregating the savings of many depositors to make loans to borrowers. The profit margin in this kind of banking is not large — the difference between the interest rate collected from the borrowers and the interest rate paid to the savers. But, the loan procedures should be established to minimize risk — lend only to borrowers who have a good record of repayment.

To increase investment profit margins, new kinds of financial investment groups were formed, called "hedge funds" in the United States to invest principally in financial market transactions — and not in loans to businesses or individuals. Initially, these funds made investments on both sides of a financial market transaction, said to "hedge" their risk. In the 1980s and 1990s, some hedge funds made risky investments in financial markets and compiled a record of high financial returns. Then, many US institutions (such as pension-fund managers or university endowment-fund managers or managers of the investments of wealthy clients) began investing in hedge funds and their investment funds ballooned. Soon many hedge fund managers began seeking ways to invest moving from (1) hedging financial transactions to (2) buying up companies to (3) playing derivative markets.

The entry of the hedge funds into playing derivative markets increased their size to a significant portion of the banking system. In early 2007, assets in hedge funds had grown to nearly 2 trillion dollars, whereas the whole US banking system then had assets of about 10 trillion dollars — so, the hedge fund industry held 20% of US capital assets. If this 20% began to fail, the whole industry could fail. And it did. It was the failure of two hedge funds in the investment bank of Bear Sterns that triggered the financial debacle.

Deregulation of the US banking industry

The whole "shadow banking industry" of hedge funds was unregulated by the US government. Further, the emerging financial derivatives market was unregulated. In 1997, the Federal Chairman of the US Federal Reserve had argued against any regulation of the derivatives market. The US Congress and President enacted the Commodity Futures Modernization Act of 2000 — in which the derivatives market went unregulated.

In addition, a long-standing US regulatory law — the Glass-Steagall Act of 1933 to separate commercial banking from investment banking — was repealed in the Gramm–Leach–Bliley Act of 1999. In the 1930s, there had been many failures of banks in the United States, when depositors withdrew their savings, fearing the failure of a bank — called a "run-on-a-bank." To prevent this from happening again, the Glass-Steagall Act required commercial banks to be separate from investment banks. Then, the deposits in a commercial bank would be guaranteed by the federal government, so that depositors would not lose their savings, even if a commercial bank failed. But investment banks often made more profits and paid their partners more bonuses than did commercial banks. So, commercial banks lobbied the US government to repeal the legal separation — which the Congress did in 1999.

In effect, the federal government would guarantee commercial banks' deposits, even if commercial banks took "crazy risks" — which they did in the derivatives market in 2004–2007.

Bank financial leveraging and off-book accounting of liabilities

To take business risks with slender profit margins and then to make lots and lots of money from this, one financial strategy is to leverage assets. But, of course, this multiples the serious consequence of risk failure. The actions of the banking system, particularly in the United States was to allow and encourage increased risk and high leverage of assets — destabilizing the banking structure, so that financial mistakes could bring down a whole bank, and all of the banks — which did happen in 2007.

US banking regulation

The US government agency responsible for regulating the business practices of public stock companies is the Security Exchange Commission (SEC). In 2004, the SEC relaxed the net capital rule of how the ratio of liquid capital to loaned capital a bank had to maintain — lend more money on a smaller base of capital to cover bad loans. Also, to help banks increase their money leverage, accounting practices in the United States adopted a standard of allowing banks to move loans for which they were responsible "off their books" — pretending to not to account for liabilities to which they were really liable.

The result was that when large amounts of bad loans failed, the banks failed — despite their pretence of "off-book" liabilities. The hedge funds marketing the banks' derivatives of collateralized debt objects (CDO) had bought the CDOs with short-term loans, which they could not refinance. Then, the financial and commercial banks responsible for the bonds did not have sufficient liquid capital to meet even the lowered SEC standards. The banks faced losing their banking licence and thus failing. We recall this was the first forced sale of an investment bank, Bear Sterns, to another bank, Bank of America. But then, the Bank of America did not have sufficient capital to meet federal requirements, and so it had to be "bailed out" by the federal government, purchasing stock in the bank.

Banker's salaries and bonuses

In the United States, before the 1990s, most executive compensation was in the form of salaries and perks. But in the late 1980s, executive compensation moved increasingly to bonuses in the forms of cash or stock. The reason for this was that control over corporate boards passed from independent shareholders to corporate executives. They then argued to the compensation committee of the board (which the executives controlled) that they, the executives, should be paid in large bonuses for short-term performance of the firm in the stock market. In addition, they were given stock options as bonuses as an incentive to quickly drive the share price up to be able to cash in their bonuses for hundreds of millions of dollars — by any means,

sound or unsound. And so they did. But in using derivatives as a financial means, they were so unsound in practice as to finally bankrupt the financial system.

Also, hedge-fund managers were compensated as a percentage of asset appreciation in the funds (usually 20% of the increase). They could quickly become multimillionaires. So, why should not the presidents of America's banks also become multimillionaires every year in bonuses? The effect of this bonus compensation of executives in large corporations (banks and other firms) is to focus executive action upon rapid increase of stock price over the next couple of years and quickly cash in as multimillionaires. Then, if the firm fails in the long term (more than two years), the executives are already multimillionaires and did not need their jobs very long anyway. Only shareholders and employees (and not executives) lost their investment savings in a firm when a firm might eventually fail. For example, this is exactly what happened to Bear Sterns in February 2007. But although the Bear Sterns and Lehman top executives lost a lot of money in stock options, but they had already withdrawn hundreds millions of dollars in bonuses before the bankruptcy. In a congressional hearing after the collapse of Lehman, Henry Waxman, a Democrat, asked Richard Fuld, former head of Lehman Brothers: "Your company is now bankrupt, our economy is in crisis, but you get to keep $480 million. I have a very basic question for you, is this fair?" Short-term multimillion dollar bonuses had encouraged the executives of banks to ignore any long-term risks their employees were taking in making loans — as long as short-term loan commissions increased revenue to fuel their short-term executive bonuses. This is why banking executives in many of the major commercial and investment banks in the United States turned to the bad banking practice of "borrowing-short and lending-long" of the CDO financial activities (which we later explain).

The business point is — when your money is tied up in a long-term loan of 30 years (lending long) and you must borrow money each year (borrowing short), it is a certainty that some one year you will not be able to continue to borrow and so fail.

Sovereign oil companies

From 2006 to 2008, world oil prices quintupled from $30 a barrel to $150 a barrel. The rapid rise in prices was due to market speculation that commodity prices would increase due to the market demands of China's rapid industrialization and India's economic growth due to information technology. Yet, in terms of oil supply, governments controlled 70% of the oil in the world — Russia, Saudi Arabia, Nigeria, Kuwait, Iran, Libya, Nigeria, Venezuela, etc. Most of the oil in the world was not produced in privately owned companies but by national oil companies, "sovereign companies." In the economies of these sovereign countries, much wealth was being accumulated by individuals, which needed places for investment. "Large and growing amounts of foreign funds (capital) flowed into the USA. This created a demand for various types of financial assets. Foreign investors had these funds to lend, either because they had a very high personal savings rate or because of high oil prices. Bernanke referred to this as a saving glut. A "flood" of funds reached the USA financial markets [Bernake (2007)].

Outsourcing and the US mortgage market

Opportunities for financial investment in industrial growth in the Western economies had been limited by the extensive global corporate business practices in America ad Europe in the 1990s of "outsourcing" (1) the production of goods to China and (2) the delivery of IT services to India. Due to this outsourcing, industrial growth in goods production in America and Europe slowed in the 1990s. Some economists argued that this lack of industrial growth failed to provide opportunities for productive investment, and US financial markets turned to fabricating speculative investment.

In the United States, the financially overly enthusiastic dot-com bubble from 1995 to 2000 had next discouraged US investment in growth industries. Yet, in 2004, there was so much capital money flowing into the United States that some way had to be devised to grab it; so, instead of a productive type of investment which grow economies by financing new growth industries, the United States banks and hedge funds turned to the US mortgage market to provide an "asset basis" for speculative investment.

The reason they turned to this market was that two quasi-government agencies, Freddy Mac and Fanny Mae, had been set up in the US — to "lend long and borrow-short" — but with an explicit US government guarantee that they would never go bankrupt. The reason these government agencies were created was to fund the growth of the real estate industry, through providing loans to US veterans returning from World War II. Then, the Federal Veterans Administration set upon a loan fund to provide 30 year mortgages to veterans so they could buy homes and start families. This program was so successful in growing the domestic housing industry, that later these long-term mortgages was extended to the general population. Freddy Mac would buy residential mortgages and Fannie Mae would buy commercial mortgages from banks. These would then issue 5- and 10-year bonds paying the interest from the long-term mortgages. These bonds would be guaranteed by the US Federal government and so were deemed safe (event though Freddy Mac and Fannie Mae were "lending long and borrowing short"). Freddy Mac and Fannie Mae made a profit on the commissions of selling their bonds.

The US real estate market was operating upon government-guaranteed privately sold bonds. And as a financial process, this was working until executives at Freddy Mac and Fannie Mae decided they too wanted to get rich quick, like the hedge fund managers in the US shadow-banking business. Freddy Mac and Fannie Mae then began buying subprime mortgages and bundling them into their bonds, converting low-risk bonds into high risk bonds. The executives did this to increase revenue and pay themselves annual multimillion dollar bonuses. In 2008, with the bankruptcy of Freddy Mac and Fannie Mae looming, the federal government took over the firms and fired their CEOs. (But of course, the executives had earlier received multimillion dollar bonuses.)

Credit-default swaps — How the Ponzi scheme grew

In finance, great ideas are about how to make "more" money. Securitization was one of these great financial ideas of the 1990s (financial innovation) — how to

make more money speculatively. Capital is increased in two ways in an industrial society — through productive investments and through speculative investments. Both production and speculation are necessary investment ideas in an economy. Production investment is the use of money (capital) to build a new business or to expand an existing business. Speculative investment is the use of money (capital) to finance the flow of trade in a market.

Securitization was a financial idea to facilitate the trading of debt, based upon an underlying asset. For mortgage-asset debts, private banks purchased long-term mortgages and bundled them into CDO — just as Freddy Mac and Fannie Mae had been doing. But such bonds — made up by the private banks, such as Bear Sterns or Lehman Brothers or Bank of America, etc. — these were not guaranteed by the United States. How then could they be sold, as they were too long term for the debt market?

The second great financial idea (financial innovation) was to establish hedge-funds — to sell the interest from the mortgage-bonds as "derivatives." Then, buyers of the derivatives might not care about the duration of the bonds — if they were assured that the derivatives could be resold — a financial derivatives market.

Then, a third great financial idea was how to insure the risks of the derivatives — since they were not grounded by owned assets. How could the hedge funds create a derivative market? By attaching insurance to the derivatives, "CDS." The seller of a CDS promised to pay the full amount of a CDO if the underlying mortgage asset base failed. The US insurance company AIG happily sold a trillion dollars worth of CDS to banks such as Chase and Bank of America — which of course, AIG could not pay if the CDO's really failed.

Why was the insurance activity of CDS not regulated by the government? The AIG issued a trillion dollars of insurance which it had not the capital to pay. When the CDO market failed, AIG's CDS insurance contracts were called in, then AIG would fail. And AIG failed. Immediately, the Secretary of Treasury advocated the US government to bailout AIG (and some of the banks AIG owed insurance). The US Federal government sent a check of $85 billion dollars to AIG — which in turn immediately gave $12 billion to Goldman Sachs who had bought AIG CDS insurance (and a bank of which the then Secretary of Treasury had formally been CEO).

Risk management

Sometimes when a person has a great idea that evidently does not work, such a person can "rationalize" the idea — make up reasons why it should work. This is what happened in the reasoning of the financial community about financial derivatives. As a financial derivative obviously increased risk by removing collateral from the investment, how could a financial advisor, the hedge-fund manager sell one?

But if a derivative does not have collateral, then insurance on the debt is essential. But how can one judge the proper insurance on a CDO if it is composed of mortgages of different risk? Obviously, one cannot except by adding in a weighted manner, the risk on each mortgage. But, this is too much trouble for one wanting to make money fast. So, they made up a "risk-management model" — a mathematical theory to estimate risk. This was then called "risk management" by the

hedge-fund sellers of derivatives. But who would buy a mathematical model based upon rationalization and not empiricism? Bond rating firms did, since hedge fund managers paid them to rate their CDOs on the basis of their mathematical models. George Soros commented: "The super-boom got out of hand when the new products (derivatives) became so complicated that authorities (bond ratters) could no longer calculate the risks and started relying on the risk management methods of the banks themselves. Similarly, the rating firms relied on the information provided by the originators of synthetic product. It was a shocking abdication of responsibility" [Soros (2008)].

Government bail out of banks

A final action occurred, in the historical event of the global financial debacle, when national governments rescued many private banks in their countries. The previous failure of proper regulation of banking systems by the respective governments finally cost those governments large sums of tax payers money to prevent collapse of national financial systems.

4. Theory: IT and Financial Technology

Innovations in IT made the whole global derivatives market scheme technically possible; and innovations in financial technology (securitization and hedge funds) made the Ponzi scheme of the whole mortgage-asset based derivatives possible. But, why did not the banks then use IT to unwind the market — revalue the derivatives? Instead, the US Secretary of Treasury obscured the market issue — calling all the mortgage securitization of CDOs "toxic." He asked the US Federal government to allocate $700 billion to make AIG and the US banks solvent. The political argument for the bailout whole was that big banks were too big to allow them to fail — even if they had been financially irresponsible. Interesting! Upon what economic theory was this argument positioned? No economic theory was argued — just that the banks were too "big" to fail. But if so, what government regulation would be necessary so that banks did not get too big to imperil a whole financial system?

The technology in the socio-technical system of asset securitization enabled the large profits in the commission structure due to the huge volume of the commission-based transactions — made possible in scale by IT. But using technology for volume while not performing ethical financial transactions, the banks involved in the CDO market from 2004 to 2007, were institutions operating unethically. Unethical business practices are not likely to be economically sound in the long term. Individuals in the banking group had the idea of creating mortgage-asset-based derivatives (CDOs) as a way of selling long-term mortgage loans — by stripping the interest payments from the mortgage bonds into the financial derivative contracts (CDOs). Their ideology for these contracts (CDOs) was that the derivatives were sellable in a derivative market, whereas the long-term bonds were not sellable. They added to their ideology the argument that the derivatives were low risk because the risk of subprime mortgages were spread over the derivatives — a fallacious ideology since the subprimes did not spread risk but extended and increased risk — as subsequently empirically proved when the derivative market collapsed. Consequently, the

financial strategy for the CDOs was a lend-long-borrow-short strategy, which was incompetent in the long run (three years from 2004 to 2007).

This was the financial issue. Why were CDOs based upon bonds into which subprime mortgages were included been rated as low risk? The ratings were fraudulent — bought from unscrupulous ratings businesses who sold their rating without proper scrutiny.

There was evidence published in the *New York Times* from Bear Stern records that all the mortgage bonds were recorded in computerized records (Fig. 1). Therefore, technically, they all could have been resorted and revalued — individually — by the banks and by government regulatory oversight. Computers can easily and quickly do such information resorting. But they were not revalued — instead $85 billion was given "carte blanch" to AIG to be regiven to US banks — without ever reevaluating the "toxic assets."

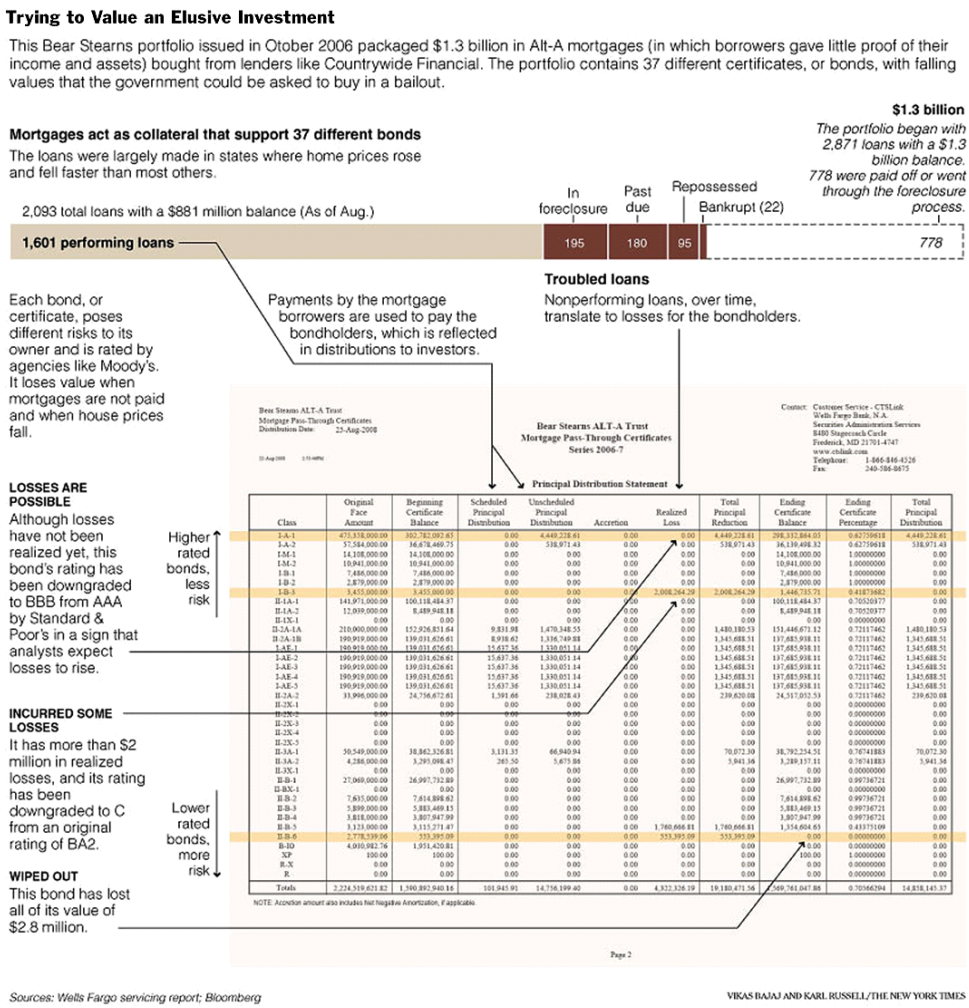

Fig. 1. Trying to value an elusive investment.

Source: New York Times, December 2008.

The point of this image is that actual bank records existed with the details of the bonds and CDOs. All records of the mortgage bonds and CDOs based on them were computerized and so could have been easily and quickly resorted as to the value of each individual mortgage contained in them — each and every one. The IT was not used — which could have made accessible the important and critical financial information about the derivatives accessible.

Financial information remained hidden and obscured all during the political processes of saving the banks from their "toxic asset" businesses — and by all the governments so involved in saving their banks which were "too big to fail."

Since IT made possible the compilation of thousands of mortgages into thousands of bonds and CDOs, and it would have been possible to back track on the information and measure just how many subprime mortgages (high risk) were in them. The question is: why was this reevaluation not done? Instead, in the United States then Secretary of Treasury called the CDOs all "toxic assets" and urged the federal government to buy them up. The US Congress passed a Toxic Asset Relief Program (TARP), which was used to lend bail-out capital to the large US banks. Why call everything "toxic" when the subprimes were less than 20% of the total and only 25% of these defaulted? One can conjecture two motivations:

(1) The US government officials were technically illiterate and did not know that computerized records could be backtracked and sorted out by a computer.
(2) The US government officials were reluctant to create public records of the CDOs, which could be used in courts as evidence of fraud on the part of banking personnel.

Whatever the reason, it is factually notable that (1) IT was used to enable a global financial scam through scale and nontransparency and (2) next, it was not used to rationally sort it out, continuing to obfuscate details.

How technology is applied provides the ethical underpinning of a technology; and also how technology is not properly applied impacts ethics.

5. Case Event: The Scheme

The operational details of the "mortgage-asset-securitized-derivatives" financial scheme were difficult to find in the published news at the time. Emphasis by government and banking officials was on the "toxicity" of assets and not on how the assets were operated. Yet, the operational question is how did the banks and their hedge funds make only millions of dollars off their mortgage-bond scheme (CDO) and then lost billions of dollars? Many mortgages of the value of hundreds of thousands of dollars were escalated into trillions of dollars of economic losses. How was this done?

As best one can reconstruct from the published information at the time, it was all self-organized into a huge, gigantic inverted-pyramid financial scheme. This had three parts: (1) in the scale of bonds constructed (thousands of mortgages), (2) the leveraging of the cost by loans (banks loaned money to each other), and (3) fraud in calling the bonds a financial "low risk" (banks simply good bought ratings

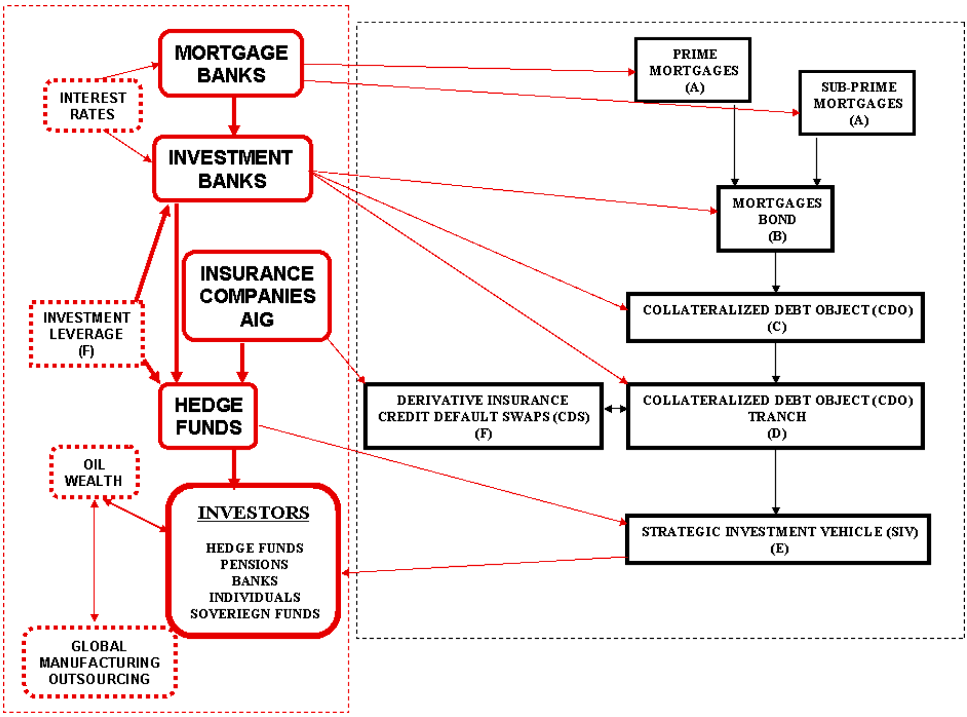

Fig. 2.

from bond-rating companies) To understand how the scheme worked, we show an example, as described by Fig. 2.

(1) US commercial banks lent money to people to purchase property in the United States as mortgage loans of 30-years duration.
(2) The commercial banks had made the mortgages but the investment banks bought the mortgages to construct mortgage bonds containing a large number of mortgages.
(3) Next, the investment banks stripped the interest payments to the mortgage bonds and sold off these interest payments as derivatives in a financial contract that they called a CDO.
(4) Next, these CDOs were sliced into groups of interest payments (which they called a CDO "tranched" in order to manipulate difference rates of interest paid to a different CDO tranch. This slicing began the pyramiding of investments of many slices of a single derivative based upon a single bond. CDO high risk tranches with high interest rates could be sold to investors who want high returns with high risk and low-risk tranches with lower interest rates could be sold to conservative investors.
(5) Hedge funds (within investment banks or outside investment banks) formulated investment partnerships, called "SIVs" to purchase and sell CDO tranches to investors — individuals, pension funds, other banks. The investors in a CDO tranch did not have to worry about the long-term nature of the mortgages,

which were obscured first into a bond and then into a derivative and then into a derivative slice (tranch) — as the hedge fund assured investors that there would always be a derivative market in which to sell a derivative. This assurance was backed by insurance, a CDS. (Yet, in reality, the derivative market collapsed in 2007, and then a CDS was not worth the paper it written upon — unless governments came in and bailed out the banks underwriting all this. And the governments did.)

(6) The collapse occurred because hedge funds had not fully paid for their CDOs. Instead, they borrowed money from the investment banks formulating the CDOs. This borrowing provided a higher return to hedge funds than that of the interest directly from a CDO. And this was called "leveraging." If I pay for only a part of the price of a purchase and borrow the rest (and never have to pay back the loan), then I have "leveraged" the partial payment to the full price of the purchase. Hedge funds never intended to pay off the loans, but to continually reborrow the money until the bond underlying the CDO was paid off — lend long and borrow short and borrow short and borrow short — and so on. This is why this is a bad practice for a the survival of a banking practice.

In Fig. 3, we illustrate how this monetarily worked by looking at the flow of cash in the scheme — using as an example, a mortgage (Z) obtained by a home owner (Y) from a lending bank (X).

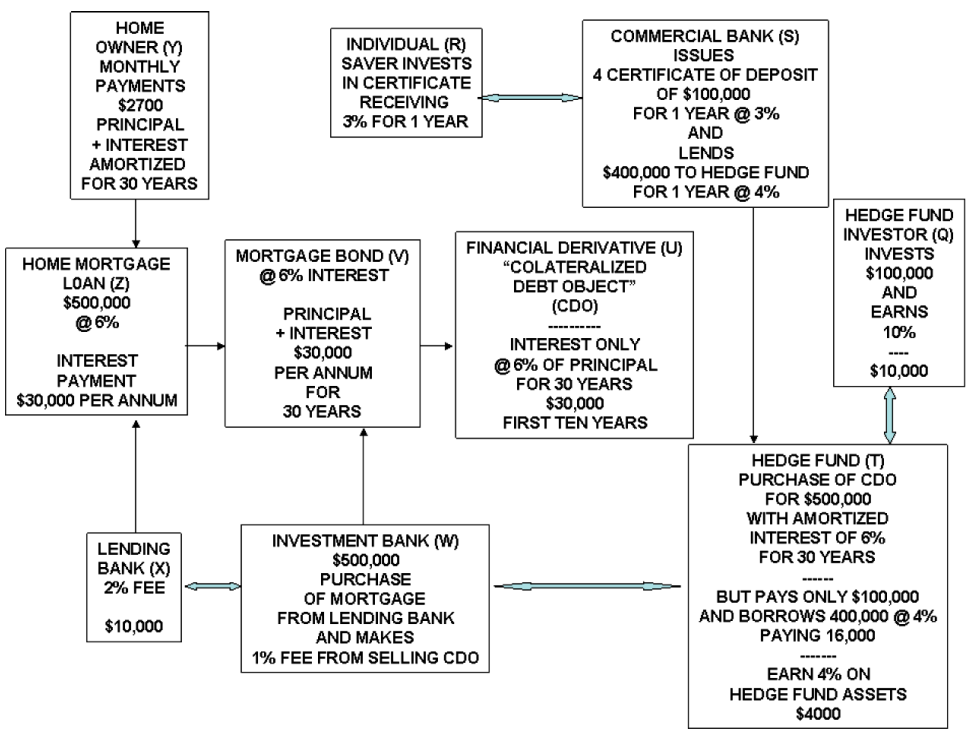

Fig. 3.

A home owner (Y) receives $500,000 (Z) to purchase a house and repays the loan in monthly payments of about $2,700 (principal and interest) — totalling $30,000 for interest and $2,400 on principal per year. In a 30-year amortized mortgage, payments for the first 10 years are nearly only interest; and in the next 20 years, the principal is paid off, as interest on a declining principal balance becomes less and less from years 10 to 30. The lending bank (X) received about a 2% fee for making the loan, earning $10,000 from the two months it took to process the loan. But, the lending bank (X) does not want to hold the loan to a 30-year maturity and so gets its $500,000 back by selling the loan to an investment bank (W).

The investment bank (W) packages the mortgage into a mortgage bond (V); with actually perhaps a 1,000 purchased mortgages packaged into $50,000,000 bond (1,000 mortgages times $500,000 each mortgage). But, let us assume a bond (V) holding this single mortgage for $500,000 to follow its cash flow — providing $30,000 cash the first year from its interest payments. Now again, no one wants to hold a 30-year bond — too long in this uncertain financial world of possible inflation.

In fact, in the last 30 years in the US home price market, inflation did run at about 100% over 30-years. And the principal of $500,000 of a 30-year mortgage (loaned in 1975) and held over the 30 years (to 2005) had then only the purchasing power of $5,000. This is why 30 years is a very, very long time to the world of financial systems.

These mortgage bonds (which the banks bundled and sold their interest off as CDOs) were then worthless — even to the bank which held them. That bond produced no interest over its term — since the bank had sold off all interest payments as a financial derivative (CDO). This is what was "toxic" about the mortgage bonds — no interest over its life. That bond could not be resold, except at a very steep discount (such as 10 cents to the dollar) — toxic.

So, next to make the interest payments marketable, the investment bank (V) writes an investment contract of a "derivative" (U) on the mortgage bond which it called a "CDO." This CDO is a promise to pay the interest collected by the mortgage bond to a purchaser of the CDO for the next 30 years. For the first 10 years of a CDO, the interest paid to the CDO holder would be nearly $30,000 per year. But over the next 20 years, the interest paid to a CDO holder would decline to zero. Why would anyone hold a CDO for 30 years?

This was the financial trick. No one was expected to hold it over its lifetime. Instead, the bright financial idea was that there would be a market for financial derivatives, and they could be traded, at least for the first 10 years. Then what happened after that first 10 years, no financial seller of a CDO cared! They assumed they would be traded at current value — whatever be that then. The financial principle here was: let the buyer beware!

We continue to follow the cash flow. To make a CDO sellable, the investment bank (W) then created a hedge fund (T). For example the investment bank, Bear Sterns (W) created Bear Sterns hedge funds (T). (It was the collapse of two Bear Sterns hedge funds in June 2007, which started the chain reaction of bank failure around the world. After its' hedge funds failed, Bear Stearns Investment Bank itself collapsed in March 2008 — as the first of many banks to fail.)

A hedge fund (T) could not sell the CDO with amortized 6% interest and so paid only 20% of the CDO ($100,000) from its funds and borrowed $400,000 from a commercial bank (S) at 4%. The $100,000 in the hedge fund came from an investor (Q) to which the hedge fund had promised a 10% return on the investor's money. But, 6% interest payment from a mortgage bond was less than the promised return of 10%. And to make up the difference, the hedge fund (T) leveraged the investment. By "leverage" it meant to borrow the rest of the investment. But, this was the problem! The hedge fund (T) could only borrow $400,000 only in a short-term loan of one year. The reason for this was that one kind of bank, the investment bank (W), was borrowing money from another kind of bank, the commercial bank (S). The commercial bank (S) was receiving deposited money from a savings depositor (R) and paying this depositor (R) an interest rate then of 3% (with the investor's deposit guaranteed by the US governments' Federal Deposit Insurance Corporation). The hedge fund could borrow at 4% (with the commercial bank making (4%–3%) and then make 1% on the deposited money. One percent does not sound like much, but "leveraged" with hundreds of millions of borrowed dollars, it adds up to big profits for hedge funds — for a while — until the bubble burst. This was a very short-term financial strategy — requiring a very long-term and recurrent refinancing.

The hedge fund (T) would have to continue to reborrow that $400,000 amount each year for the next 30 years.

In financial parlance, this is called "lending long and borrowing short." It is a classic rule for eventual financial disaster. If you can't get back the money you lent for a long time and must continually borrow in the short term to cover the loan, eventually something will go wrong in the short term and you lose the money you invested for the long term. Why would investment banks set up hedge funds to lend long and borrow short? Perhaps, the CEOs paid little attention to what their employees did, just as long as they produced lots of income. Or perhaps, CEOs and their employees did not think about it at all. Or perhaps, those who might have thought about it were certain that tomorrow would never come.

Or perhaps it did, but they need not personally care. In the mean time, they could all make millions. And it was a fact that in their short term from 2004 to 2007, those investment bankers did take home millions and millions of dollars in their annual bonuses — earned by the enormous cash flows from the CDO derivatives sold in markets around the world. This desire for commissions as a instant revenue to boost annual bonuses for executives drove the whole scheme and brought down large financial institutions: Bear Stearns, Lehman Brothers, Merrill Lynch, and Washington Mutual in the United States and many other banks around the world.

In reality, that whole CDO — mortgage-asset-based, derivatives market — financial scheme was just a lend-long-and-borrow-short scam — workable only in the short term.

And the short term was from 2004 to 2007, when it all imploded.

In the short term, the cash flow worked like this. From the first year $30,000 interest payment from the bond (V) to the CDO (U) provided the hedge fund manager (T) with $16,000 (4% of 400,000) to pay on interest on the short term from the commercial bank (S). This left the hedge fund with $10,000 to pay an

investor (Q) on its $100,000 investment for a return of 10%. And the hedge fund had $4,000 left over from the $30,000 to pay its managers a 4% investment fund fee. So, for the first year of the CDO, every one won! The investment bank (W) hedge fund (T) made $4,000 from each mortgage (and in a 1,000 mortgages bond, this would pay the hedge fund (T) $4,000,000 — plenty for banker's bonuses). The hedge fund investor (Q) made 10% return. The commercial bank (S) made 1% on its issued certificate of deposits. The savings depositor (R) made 3%. And the home owner had a 6% and 30-year home mortgage. What could go wrong?

What went wrong was that in 2006–2007, about half the mortgages then being issued by home mortgage lending banks (Z) were "subprime." Subprime mortgage is a financial euphemism for a loan to a borrower who probably cannot pay off the mortgage and default. But, the mortgage bonds (V) which the investment banks (W) assembled included unspecified amounts of subprime mortgages. Yet, the investment banks (W) continued to call these bonds as safe (AAA-rated bonds). This was a major misrepresentation of the financial value of the bonds (V) and the CDOs (U) based on them. This misrepresentation was to bring the whole financial house of cards (the lend-long-and-borrow-short scam) down. And down! And finally everything DOWN!!

First, commercial banks (S) stopped lending to investment banks W) — not knowing whether the CDOs could be sold. The hedge funds (T) leveraging CDOs could not refinance their leveraged loans. Investors (Q) lost their investments in hedge funds (e.g. Harvard University endowment funds lost 25% of their value in 2008).

When banks stopped lending to banks — the global credit market seized up and credit stopped!

In effect, investment banks had pyramided (multiplied) investments by: (1) spinning off interest from the bonds to CDOs (derivatives), (2) slicing the CDOs into many parts (tranches), and (3) loaning money to hedge funds to buy the CDOs in SIVs. And this scheme provided the investment banks with millions of dollars in commissions — but left the investment banks with billions of dollars in liabilities. So, when that derivative market (CDOs) collapsed — no one could buy another CDO — the banks were left with billions of dollars in liabilities — far beyond their regulatory requirements to hold capital. The banks were technically bankrupt! This is why the collapse of the whole asset-based derivative scheme (CDOs) resulted in the wholesale collapse of banks around the world — they were all holding billions of dollars in suddenly worthless financial instruments.

This whole financial scheme — from mortgages to bonds to CDOs to SIVs to investors — was sold as low-risk investments. But, the financial scheme turned out, instead, to be terribly high risk — in fact, a financial catastrophe! It brought down the whole global credit system! The reason the scheme went from mortgages to bonds to CDOs to tranches to SIVs was simply to create a pyramiding financial scheme. That pyramiding financial scheme expanded millions of dollars of mortgage loans up to trillions of dollars of derivative investments.

This complex and obscure information scheme was devised by a set of financial institutions practicing a rapacious business of only short-term commissions. Those

firms were mortgage banks, investment banks, hedge funds, and insurance companies. Their financial interest was wholly in short-term commissions — made at each stage of a financial transaction — and not in the long-term productive value of the whole scheme to society. This was a case of a short-term self-organizing by financial institutions, unregulated for the long-term good of society. It was not a case of a failure of a market mechanism in economics; but a failure of proper government regulation to make the new technology and market mechanisms of an economy work effectively.

6. Theory: Self-Organizing Socio-Technical Systems

What we see in this example is that the self-organizing financial system did not ensure honesty and financial integrity. Some overall system control was necessary for the honest operation of the financial system — and this should have been appropriate government regulation control. The asset-based financial derivatives can be seen as an example as a self-organizing socio-technical system. The idea of self-organizing within a system is a principle of order in which subunits within a system create a local order by relation to each other — which ends in providing a whole order for the system. At each point of the system, order in the system begins to appear in each neighborhood of every point. The term was first used by Ross Ashby in 1947, and then used in the new area called cybernetics. For example, in 1961, Norbert Wiener used the term in the second edition of his book [Wiener (1961)].

Accordingly in economic systems, there should be a balance between a free market (self-organizing) and proper government regulation of the free market, to ensure for the good of the whole society in which the market exists. This raises an opportunity for research in technology management to help improve government regulatory systems — for effective system regulation of self-organizing financial system that they operate honestly.

7. Case Event: Ethical Judgments about the Collapse

That credit debacle was such a dramatic world event that immediately afterward, many normative judgments appeared in the public literature, soon after the events unfolded. These judgments concluded that the mortgage-based CDO derivatives was a bad scheme, which was enabled under special economic conditions in the world in the decade of 2,000. Then, a combination of unusually low interest rates, rapidly increasing oil wealth, huge leveraged investments, global manufacturing outsourcing, and no proper government regulation of banking practices facilitated the bad banking practices. These special conditions were exploited in a large scale and in financially irresponsible manner, because the instruments could be globally sold due to the new Internet connections.

In retrospect, the repeal of the Glass-Steagall act in the 1999 in the United States allowed investment banks to speculate with depositors' savings in commercial banks (insured by the federal government). It is a human condition to expect that when someone gambles with other people's money, that gamble may be expected to take large risks.

The new derivative financial market grew in five years from millions of dollars of contracts to trillions of dollars. This was an enormous financial leveraging upon a relatively small asset base of a US mortgage market — attracting billions and billions of capital from around the world. Even one of the richest oil sheiks lost at least a quarter of his wealth in the debacle; and the Arab world noted at least $2.4 trillion was lost. And if all appeared complex and difficult to understand, it was meant to be. In any confidence scheme in which a trickster takes money from a fool, that fool, the "mark," is meant to be wholly confused during the play. A new financial device (asset derivatives) — made possible by IT applied in financial markets — was applied in a fraudulent manner. In historical perspective, some have used the term "fraud."

An example of an economic commentator who used the term fraudulent in making normative judgments on the episode was the Nobel Prize economist, Paul Krugman. As he summarized the scheme: "America emerged from the Great Depression (1930s) with a tightly regulated banking system, which made finance a staid, even boring business. Banks attracted depositors... used the money thus attracted to make loans, and that was that.... After 1980 a very different financial system emerged. In the deregulation-minded... era, old fashioned banking was increasingly replaced by wheeling and dealing on a grand scale.... And finance became anything but boring. It attracted many of our sharpest minds and made a select few immensely rich. Underlying the glamorous new world of finance was the process of securitization. Loans no longer stayed with the lender. Instead, they were sold on to others, who sliced... individual debts to synthesize new assets. Subprime mortgages, credit card debts, car loans — all went into the financial system's juicer. Out the other end, supposedly, came sweet-tasting AAA investments. And financial wizards were lavishly rewarded for overseeing the process. But the wizards were frauds... and their magic turned out to be no more than a collection of cheap stage tricks. Above all, the key promise of securitization — that it would make the financial system more robust by spreading risk more widely — turned out to be a lie. Banks used securitization to increase their risk, not reduce it, and in the process they made the economy more, not less, vulnerable to financial disruption. Sooner or later, things were bound to go wrong, and eventually they did. Bear Stearns failed; Lehman failed; but most of all, securitization failed" [Krugman (2009)].

The investment banks had gone to bond-rating agencies (such as Moody) and paid for the highest bond ratings — triple A — meaning such bonds were practically risk free. And such high ratings were given to mortgage bonds, even through the investment banks deliberately included high risk subprime mortgages in the bonds! And the rating agencies complied, giving high ratings — since their fees depended upon satisfying their bank customers.

Later in September 2009, the head of Goldman Sachs (a lead banker in the scheme) also admitted poor normative judgment (without going so far as "fraudulent"): "Lloyd Blankfein, chief executive of Goldman Sachs... admitted that banks lost control of the exotic products they sold in the run-up to the financial crisis, and said that some of the instruments lacked social or economic value... Mr. Blankfein said: 'The industry let the growth and complexity in new instruments

outstrip their economic and social utility as well as the operational capacity to manage them.' ... The Goldman boss, who himself received total compensation of more than $70 million in 2007, said multi-year bonuses should be outlawed and senior staff should receive large proportions of pay in stock, rather than cash" [Jenkins (2009)].

Soon after the financial debacle, a universal consensus emerged that it all was a completely bad performance — "lacking social or economic value" or "cheap stage tricks." But then, no banking executive went to jail in any country.

Further, what about the US government's performance when they bailed out many of the big banks, saving them from the economic consequences of their bad performance? Even this had ethical problems. For example, Morgenstern wrote about the initial payments with the United States Treasury made to AIG: "Every day, insurance companies sell policies to homeowners to cover the cost of damage in the case of fire. Why would those companies agree to pay out in full to a policyholder even if a fire had not occurred? That is the type of question being asked about the federal government's bailout of American International Group in which the insurance company funnelled $49.5 billion in taxpayer funds to financial institutions, including Deutsche Bank, Goldman Sachs and Merrill Lynch. The payments, which amount to almost 30 percent of the $170 billion in taxpayer commitments provided to A.I.G. since its near collapse last September, were disclosed by the company on Sunday. The company had resisted identifying the recipients of the taxpayers' money for months, citing confidentiality agreements. But instead of quieting the controversy, the disclosure of the amounts paid to A.I.G.'s customers has created still more questions and unease over the insurer's rescue, arranged by the Federal Reserve Bank of New York and the United States Treasury.... The criticism surrounds the action taken by the government on credit insurance that A.I.G. had written and sold to large and sophisticated investors, mostly financial institutions. The banks that did business with A.I.G. bought credit insurance to protect against possible defaults on debt securities they held or had underwritten.... The top three recipients of money from the government related to the credit insurance A.I.G. had written are Société Générale, a French bank, at $11 billion; Goldman Sachs, at $8.1 billion; and Deustche Bank, at $5.4 billion" [Morgenson (2009)].

Were there possible conflicts of interest in the governance of the fund? Reporters from the news agency, Reuters, also raised troubling ethical issues about the governance of the US Treasury's bank bail-out fund: "American International Group (AIG.N) funnelled over $90 billion of taxpayer bailout funds to various US and European banks, but the biggest beneficiary was politically connected Goldman Sachs Group Inc (GS.N). Suspicions of potential conflicts of interest and favouritism have been fuelled by $12.9 billion AIG paid to Goldman Sachs — where then Treasury Secretary Henry Paulson had previously worked as chief executive — in the months after the insurer was rescued by the government last September. Goldman, for its part, has insisted it did not need the bailout money because it was "always fully collateralized and hedged." [Reuters (2009). "Goldman's share of AIG bailout money drwas fire", March 17, 2009 New york].

Reuters also commented: "In an editorial on Tuesday, *the Wall Street Journal* pointed to Goldman's claim that 'all of its AIG bets were adequately hedged and that it needed no 'bailout. Why take $13 billion then? This needless cover-up is one reason Americans are getting angrier as they wonder if Washington is lying to them about these bailouts,' the journal said. 'The bailout has stirred resentment not just in the US Congress, but on Wall Street, where investors have speculated that Goldman and its connections helped it get a better deal.' In recent years, many former Goldman executives have moved into government. Paulson left Goldman in 2006 as chief executive. The chairman of the New York Federal Reserve is former Goldman Chairman Steve Friedman. "The person that should be subpoenaed is Hank Paulson. How do you go from running Goldman Sachs in '05 and '06 and making all of these bets with AIG's financial products unit and then end up in the government guaranteeing those bets and not have a conflict of interest? Stansberry asked" [Reuters (2009)].

This is how the US government administered the bail-out fund. But need it have been so run? One practising economist, George Soros, wrote about a possible and different normative approach, which he thought have accomplished better societal results: "Now that Hank Paulson (Secretary of Treasury) has recognised that the troubled asset relief programme is best used to recapitalise the banking system, it is important to spell out exactly how it should be done. Since it was not part of the Treasury secretary's original approach, there is a real danger that the scheme will not be properly structured and will not achieve its objective. With financial markets on the brink of meltdown, it is vital to make the prospects of a successful recapitalisation clearly visible. This is how (I think) Tarp ought to work. The Treasury secretary should begin by asking the banking supervisors to produce an estimate for each bank, how much additional capital they would need to meet the statutory requirement of 8 percent. The supervisors are familiar with the banks and are aggressively examining and gathering information. They would be able to come up with an estimate in short order provided they are given clear instructions on what assumptions to use.... Managements of solvent banks would then have the option of raising additional capital themselves or turning to Tarp, which would state the terms on which it is willing to underwrite a new issue of convertible preferred shares.... The new issues would dilute existing shareholders but they would be given preferential rights to subscribe on the same terms as Tarp and if they were willing and able to put up additional capital they would not be diluted.... Using this approach, $700 bn should be more than sufficient to recapitalise the entire banking system and funds would be available to buy and hold to maturity mortgage related securities" [Soros (2008a)].

Arguments later occurred in the US Financial community about the need for increased government banking regulation, the issue divided elder banking statesmen from current banking chiefs. "Paul A Volcker has the support of many former Wall Street leaders for a new rule prohibiting banks from trading securities for their own gain.... Ask the elder statesmen of banking — giants like George Soros, Nicholas F. Brady, John S. Reed, William H. Donaldson and John C. Bogle — where they stand on regulation.... (and) parting company with the current (banking) chieftains, they want more rules. While the younger generation, very visibly led by Lloyd C.

Blankfein, chief executive of Goldman Sacks, lobbies Congress against. . . regulation, their spiritual elders support reform. . . . Mr. Reed, a former Citigroup co-chairman. thinks about resurrecting the Glass-Steagall Act of 1933, which prevented banks from engaging in any sort of trading activity involving stocks and bonds. It was revoked in 1999, partly at the behest of Citigroup, then run by Sanford I. Weil" [Uchitelle (2010)].

Normative (ethical) judgements made by observers at the time, emphasized the prevalence of bad banking practices, unethical business practices, and failures of government regulation.

8. Theory: Technology, Governance, and Regulation

Three issues stand out in this case, the connections (1) between technology and financial instruments, and (2) between corporate governance and information, and (3) governmental regulation and information.

Technology and financial instruments

Information technology enabled (1) the composition and recording of mortgage bonds from hundreds and thousands of mortgages, (2) the recording of financial derivatives from these bonds, and (3) sale of these derivatives globally through Internet communications. Financial instruments used IT to construct derivative financial contracts (CDOs), credit swaps, and risk models. But the financial technology did not use the IT to improve the transparency and fiscal due-diligence of the CDOs and credit swaps. Instead, the financial technology (CDOs, credit swaps, risk models) were deliberately constructed for obfuscation and false credit ratings.

Corporate governance and information technology

Corporate governance encouraged top-level executives to earn annual bonuses upon business models, which were certain to bankrupt the banks, sooner or later. Large debts were generated in banks by buying subprime mortgages but hiding them off-book. Corporate governance used IT to obscure and hid business practices rather then make them transparent and fiscally responsible. This effectively violated existing bank regulations, since banks had not sufficient capital to remain licensed. Moreover, corporate boards permitted and rewarded bank executives for operating a business model of "lending long and borrowing short" — which was certain to be unsustainable over any long term. CEOs were motivated and rewarded for driving large banks toward bankruptcy with deliberately bad loan practices.

Government regulation and information technology

Responding to bank lobby efforts in the 1990s, the US Congress and President repealed the Glass-Steagall Act — which had earlier separated investment banking from consumer-deposit banking. This allowed investment banks to take federally-guaranteed deposits and use that money to speculate in the derivative markets — rewarding the banking executives with large bonuses when their speculation with

depositors' moneys worked — and necessitating governments to bail out these dishonestly speculating banks. Also, the hedge funds, financial derivative markets, and credit-swaps were not regulated to ensure transparency and fiscal responsibility in a financial system which grew in size to enable the failure of the world's financial system.

Moreover, government regulatory agencies had not made serious and extensive use of IT to improve government regulation responsibilities. When new technology (information and financial) is implemented within a socio-technical system creating new markets, then government regulation needs to ensure the honest and effective operation of the new market.

9. Summary

What this case of the global debacle of world finance and the Internet shows is that macro economic theory alone is insufficient to provide theory for proper operation and regulation of world finances. There are many issues to which management of technology theory can add to economic theory:

(1) How do real markets technically work — as opposed to how they are supposed to work as "perfect markets" — as now IT is central to the performance of real markets (perfect or imperfect).
(2) How does new technology facilitate self-organized economic efforts in socio-technical systems?
(3) How can regulatory systems use IT to monitor proper operations of self-organizing financial markets and to identify fraudulent business practices?
(4) Wealth that is based solely upon a socio-technical financial transaction (speculative capital) and not also upon productive activity (production capital) cannot sustain economic development over the long term.

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Biography

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