Inherent Fragility of Credit Risk Transfer Mechanism: Reflection on the Formation of Subprime Crisis

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Abstract: Economists have not yet reached unanimous agreement over the potential negative effects of CRT innovation. The author points out that there is conflict between risk sharing and incentive provision under information asymmetry. If innovations in risk transferring lead to excessive risk sharing, incentive structure of financial contract will be distorted, which may cause a series of negative influences on financial stability. Then the author analyses the role of CRT in subprime crisis, shows that CRT market has inherent fragility, and proposes improving directions of regulation.

Keywords: credit risk transfer; fragility; subprime crisis

1 Introduction

Since the 1980s, various new instruments for secondary risk trading have been created in the credit risk transfer (CRT) market. Their core values lie in expanding scope of risk sharing, which may not only enable financial institutions to diversify risk more efficiently, but also improve credit availability for entrepreneurs and households. Under the environment without information asymmetry and frictions, CRT innovation enhances the efficiency of risk allocation. However, in the world there exists information asymmetry, risk allocation has dual objectives in contract transaction, one is risk sharing , the other is incentive provision. Besides to share risk among contracting parties, it is necessary to provide incentive on the contract agent with opportunism propensity by proper risk allocation in order to alleviate moral hazard. If innovations in risk transfer lead to excessive risk sharing, incentive structure of contract will be distorted, which may cause a series of negative effects on financial stability and even play a key role in the formation of crisis.

The rest of this paper is organized as follows. Section 2 reviews the literature of generative effects of CRT. Section 3 summarizes hypothesis of endogenous optimizing incentive mechanism in CRT market presented by defenders. Section 4 describes the role of CRT market in formation and diffusion of subprime crisis. Section 5 analyses inherent fragility of CRT market. Section 6 discuss improving directions of regulation.

2. Debates on Negative Effects of CRT

As regards negative influences which may be brought about by credit risk transfer, there are several concerns among academic circles.

2.1 Dilution Effect on Incentive and Moral Hazard

According to financial intermediary theory, banking plays a unique role in savings-investment process. In tradition, loan is untradable contract and held by bank until maturity. That means banks are at risk during whole life of loan so that they have enough incentives to screening loan applicants and supervise borrowers. Accordingly, there is a paradox hiding in secondary trade of credit risk. Buyer of risk needs seller release information of risk, supervise borrowers and help to enforce loan contract. But bankers have no incentive to provide these services after they sell out the risk exposure. Risk transfer changes incentive structure of financial contract and has “dilution effect” on incentive of risk transferor, which makes bankers have opportunism propensity, because they are insulated from risk. Their moral hazard may express in three ways.

- **Selling Lemon Loan.** Bankers have private information of loans and may choose to sell loans with poor quality.
- **Reducing resources invested in supervision.** Once banks discharge risk burden, their incentive to supervise borrowers will be weaken.
- **Lowering screening standards for loan applicants.** Because bankers foresee risk of loan will be transferred to the third party, they won’t try to investigate creditworthiness of applicants.

At the early stage of loan sale market development, some researchers point out that risk transfer may have negative impacts on incentive. Gorton and Pennacchi (1995) think that the key reason causing loan illiquidity is preventing creditor’s moral hazard. Duffee and Zhou (2001) discuss lemon problem and moral hazard in CRT.

2.2 Encouragement of Credit Expansion and Borrowers’ Optimism

Tradability of loan risk enables banks to adjust their risk exposure flexibly and enhance banks’ risk tolerance, which increases banks’ willingness to provide financing.

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Especially, guarantee, insurance and credit default swap (CDS) have significant "leverage effect" that can make loan market rapidly grow. Increase in credit availability may encourage borrowers' unrealistic optimism and overinvestment. Santomero and Trester (1998) hold that loan sale and securitization encourage bank to increase risky asset ratio of portfolio. Instefjord (2005) suggests that use of credit derivatives will enhance bank's risk bearing propensity. Wagner (2007) believes that improvement of loan liquidity encourages bank to bear more risk, which offsets positive effects of CRT.

2.3 Risk Contagion among Different Financial Sections

Risk transfer between different types of financial institutions may create bidirectional risk contagion. One possibility is that two institutions exchange risk exposure so that each side bears the risk of underlying financial activities of the other side. Another possibility is that a institution as protection buyer transfers risk to protection seller, meanwhile exposing himself to counterpart's default risk. Rule (2003) investigates risk transfer between banks and insurance companies and argues that increase in their interdependence brings new challenge to regulator. Santos (2006) thinks that CRT cause change in asset portfolio of financial institutions and make risk contagion more possible.

3 Hypothesis of Endogenous Optimizing Incentive Mechanism in CRT Market: Voices from Defenders

Confronting with doubt about CRT, a few of scholars and some government officials hold optimistic attitudes towards the innovation. Greenspan believes that benefits of credit derivatives exceed their cost. The defenders of CRT deem that an efficient market has self-optimization mechanism relieving negative incentive effect incurred by CRT.

3.1 Providing Incentive by Proper Contract Design

Some researchers think that reasonable contract arrangement may relieve diluting effect of CRT on incentive. Gorton and Pennacchi (1995) suggest that bankers sell part of loan and retain the rest share to assure loan buyers to believe they will still provide credit services. DeMarzo (2005) shows that bank may transfer signal of loan quality to outsiders by holding equity tranches in loan securitization. Duffee and Zhou (2001) find that there often exist term mismatches in credit derivative contracts, whose terms are shorter than that of underlying contact. The reason for this is that banks possess more information of short-term cash flow than that of long-term cash flow of loan, so they may transfer early default risk to outsiders and retain risk of default in the later period of loan. Arping (2004) argues that short-term credit protection may help to improve supervision efficiency of bank. If bankers find borrowers shirk their responsibility and loan quality becomes poorer, they can ask the firms liquidate before due date of loan. bank's losses will be compensate d by protection seller of CDS on the loan. So the "exit option" of bank is strengthened.

3.2 Incentive Effect of Market Reputation on Risk Seller

Reputation Effect may impose implicit incentive on agents. If there exist repeated games, risk buyer will perceive the type of risk seller, and the perception will produce an effect on trade in the future. To establish their reputation, risk sellers need to consider not only current profits, but also the influences of previous contract performance on next trade. Thus they will form self-discipline mechanism to maximize their benefits in the long run. Gorton and Pennacchi (1995) believe that if loan seller break their promise, they will lose loan sale opportunity in future. Santomero and Trester (1998) think that it is difficult to sell loans at overestimated prices in repeated trades, because of reputation binding. Otherwise, loan buyers will charge "distrust premium".

3.3 Information Production and Supervision by Third Party

If buyers expect that sellers may choose to sell low-quality loans, they will cut their offer and make loans undervalued. To resolve the adverse selection problem, sellers may introduce independent third party to signal buyers. In practice, issuers of MBS can invite rating agencies to provide information of bond quality. By dynamically adjusting rates of issued bonds, supervision of rating agencies serves as supplement of that of bankers.

4 Role of CRT Market in Formation and Diffusion of Subprime Crisis

Economists argue on the advantages and disadvantages of CRT and no unanimous conclusion can be drawn. The general opinion is that even if there are some problems, they are not severe enough to cause financial turbulence, because size of CRT market is not every large relative to real economy. However, burst of subprime crisis is just like a giant iceberg suddenly floating over sea. Subprime crisis has the kernel of traditional financial crisis, but CRT market makes it take on new outer wear. In general, the role of CRT market in formation and diffusion of the crisis may be summarized in two ways.

4.1 Encouraging Subprime Mortgage Expansion and Risk Bearing

Subprime mortgages change traditional credit rationing. But evidences show that their default probability is much

higher than prime loan. Under the background of burst of I.T. bubble in U.S., subprime mortgage market shrunk between 1998 and 1999. Since 2004, subprime mortgageees dramatically grew. Development of secondary mortgage market is an important driving force. In 2003, Securitization rate of subprime mortgage reached 58.7%. With enhancement of subprime mortgage liquidity, lending institutions develop new types of subprime mortgage to explore market. In the 1990s, borrowers of subprime mortgage are mainly middle aged people, whose objective is to cash out by mortgaging house property. In resent years, lending institutions turn to youngsters or low-income individuals and engage in providing "affordability" products, such as hybrid ARM, option ARM, and interest-only mortgages. With lowering of lending threshold, riskiness in mortgage market increasingly heightens.

4.2 Providing Channels for Secondary Trade and Spread of Mortgage Risk

In CRT market, product design based on subprime mortgage risk may be classified to three levels.

- **Primary Securitization.** Most of subprime mortgages are sold to SPV as collateral for MBS. Issuers need to relax those conservative investors' worry about risk of subprime mortgage. The aim of pooling and tranching of subprime mortgages is to create highly-rated senior bonds, which are supported by subordinate bonds. MBS backed by subprime mortgages have high weighted average coupon (WAC). The difference between WAC of subprime mortgages pool and market **interest** rate of prime loans is referred to off-market spread (OMS). Higher OMS means higher expected cash flow from subprime mortgages pool, meanwhile indicating larger loss.
- **Resecuritization.** MBS backed by subprime mortgage may be resecuritized. Commonly, mezzanine tranches of MBS is repacked into CDO. Senior tranches of CDO can get AAA rating, which have higher yield than corporate bonds, to attract conservative investors, such as pension funds. For the mezzanine tranches of CDO, financial engineers try to mine their value by pooling mezzanine tranches of different CDOs and tranching them again to create "CDO-squared", "CDO-cubed", even" CDO^n". The object is to strip off highly rated bonds and issue them to institutional investors.
- **Grafting credit derivatives on securitized products.** Structuring technology may be combined with credit derivatives to construct synthesized CDO. Credit default swap is created on risk exposure of MBS, and then multiple tranhces securities underlain by CDS are issued to investors. Credit default swap may also be constructed on CDO to create "CDO CDS", of which the reference debt is tranches of CDO.

By risk decomposing, repacking and implanting, a series of structured products are derived from Subprime mortgages. As the scope of investors increasingly widens, default risk of low-quality borrowers is passed to every part of financial system. Once real estate prices in U.S. supporting the expected value of subprime mortgage drop from the peak and rising interest rate prevents borrowers from refinancing to renew their debts, Domino effect must occur

5 Inherent Fragility of Credit Risk Transfer Mechanism

5.1 Limitation of Contract Design and Reputation Effect

Contract design to relieve dilution effect of risk transfer on incentive may be summarized as follows: First, risk exposure is tranched into multiple levels. Risk seller retains the first loss of equity tranches and buyer hold senior tranches. Second, risk exposure is decomposed into different periods. Banks transfer risk of early stage and retain risk of late stage. And third, payment of credit derivative links to default or bankruptcy index, which can not be manipulated by both sides of trade. Although these arrangement may reduce moral hazard to some extent, but their application is limited in practice, or incentive provided by them is insufficient.

Risk tranching is widely applied in loan securitization. Nevertheless, even transferring part of loan risk still weakens incentive on risk seller. If a bank doesn't provide full guarantee for loan repayment, his effort devoted into screening and supervising borrowers will be lower than the first best level. Term mismatch is limited by bank's hedging demand and capital restriction. Those banks with insufficient capital need insurance for long-term default risk of borrowers and require credit protection covering the whole life of loans. Indexing credit derivatives are typical parametric contracts, whose payment to hedgers isn't based on their real losses. That means there is" quality basis risk".

5.1.2 Limitation of Reputation Effect

Reputation effect may reduce information asymmetry problem but cannot eliminate it. Although market players may consider loan default as signal of bank shirking, it contains noise. Uncertainty of exogenous nature states is also the likely cause of loan default. That means loan default cannot serve as a fully representative signal of bank supervision level, thereby reputation effect is incomplete. If quality of borrower is very low, the signal passed by loan default is too noisy, and it is hard for bank to reduce the default probability substantially, or a banker places great value on short-term profit, it is likely that reputation equilibrium will not be reached.

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5.2 Information Attenuation in Risk Transfer and Systematic Incentive Distortion

Dazzling innovations in CRT market magnify the principle-agent problem to extremes. The derivative chain of mortgage risk increasingly elongated. That leads to the distance between final risk bearers and borrowers is continually increased. Along the path of primary securitization-resecuritization- synthesized securitization, information flow of underlying assets attenuates and degree of information asymmetry rises by steps. Moral hazard exists in every link related to risk transfer.

5.2.1 Slackness of Lender's Screening and Supervision

Risk transfer induces lender to shrink and choose low-quality loan to sell out. Key et al.（2008）find that securitization has negative influence on lending institutions' incentive to screen loan applicants. Their prediction is that those loans of borrowers with FICO scores above 620 are easier to be securitized, so lenders are expected to slack the screening standards for such borrowers. Meanwhile, for those with FICO scores below 620, lenders will screen them more carefully, because their loans are hard to sell. Empirical result shows that securitization ratio of loans with score slightly higher than 620 is significantly greater than that of loans with scores somewhat lower than the threshold, however default ratio of former is higher than latter. The performance of this group of loans is instead poorer, because lenders won't put more effort to collect soft information of applicants. Downing（2009）finds that quality of loans sold to SPV is lower than that of loans which are not securitized. That means MBS market is a lemon market.

5.2.2 Collusion between Security Issuer and Rating Agency

Complication of CRT raises investors' dependence on rating agency. The assumptions of PD and LGD of underlying asset portfolio set by rating agency are key determinants of asset-backed security rating. Before burst of subprime crisis, rating agencies held highly optimistic assumption of subprime mortgage products, despite that speedy expansion of this market was abnormal. Until middle of 2007, when severity of problem became obvious, they didn't modify the assumption in time. In 2004, Moody assumed that expected LGD of subprime mortgage portfolio was 4.5%. According to Moody's report in 2007, this ratio was raised to 5.5% - 6%. However, the real losses are higher than Moody's estimation. Rating agencies' unrealistic assumption is not a pure technology problem. In fact, rating agencies seemed to be aware of the problem revealed in loan performance. In 2006, Fitch made rather negative prediction of perspective of subprime mortgage market. This report forecasted delinquency rate would rise by 50%. Even so, rating of subprime mortgage products was insensitive to quality of borrowers and change in housing market condition.

Underlying cause of ratings inflation of subprime mortgage products is benefit drives. Conservative institutions are main buyers in security market. But their investment is restricted by regulator. To open their door, securities must get high rating. So rating shopping emerges. Issuer invites several rating agencies to make preliminary rating of their bonds, namely shadow rating. Then issuers choose to corporate with the rating agency who assigns the most favorable rating to the bonds. However, it is worthwhile to note that so serious misrating was uncommon before subprime crisis. An important reason is the complexity of CRT instruments further fosters rating shopping. When security structure is very complicated, rating results may have marked difference. Issuer will intend to shop rating by introducing competition mechanism among rating agencies.

5.3 Moral Hazard of Investing Institution Manager

Why does real information of risk not be conveyed to final investors? It is not simply the problem of rating agencies. Actually, rating inflation is not purely the result of collusion between securities suppliers and rating agencies. It is also droved by "demand". Moral hazard also exists in investing institutions.

Experienced managers of investment funds seem unaware of that rating agencies put a varnish on risk profile of securities. A potential cause is the interest conflict between fund manager and investors. When much capital flow into investment funds, good projects are not enough to meet the demand for profit. If fund managers inform clients of the fact, they will require redeeming their shares. But management compensation mainly depends on the scale of funds. For their private benefits, fund managers invest a lot of capital in risky subprime mortgage products. Operating such complex assets makes high management fee rather reasonable. If assets suffer loss, manager may attribute it to breakdown of real estate market. With the plausible deniability, they actively pursue risk, instead of rationally evading risk.

5.4 Group Panic and Chain Reaction under Shock

Intricate risk flows in CRT market makes every player stay at a corner of an infinite maze. It is difficult for them to grasp direction of risk flow and get a full view of risk distribution. As real estate prices continually rise, market participants are infected by group euphoria. Once house prices drop rapidly and mortgage default rate trends upwards, the situation is entirely opposite. Agent problem in risk transfer adds fuel to the fire, as well as leads to over-reaction to unfavorable shock. Because it is hard to estimate the scale and distribution of final losses, market

participants are thrown into a state of anxiety. As the overall situation worsens, their risk perception gets more pessimistic. Partial crisis in CRT market leads to a crisis of confidence in the whole market system, which urges funds fly to harbor. People sell risky assets and buy safe assets. Prices of asset-backed securities sharply fall off and CRT market breaks down. At the same time, money market also freezes up. Those financial institutions holding subprime mortgage products suffer heavy losses and have to seek for financing in markets. However, other institutions are reluctant to provide loans to them because information asymmetry leads to distrust. The financial institutions in urgent need of capital cannot get liquidity in interbank market and face bankruptcy.

6 Improving Direction of CRT Market Regulation

6.1 Improvement of Information Environment in CRT Market

6.1.1 Establishment of Central Clearing Institution

OTC transaction is one of features in credit derivatives trading. Lack of transparence may lead to lemon market and make credit derivatives illiquid. It is hard for regulator to supervise the risk concentration. To resolve the problem of opaque market and high counterparty risk, many economists propose to establish Central Counterparty Clearing Institutions (CCPCs) for credit derivatives, which may serve as common counterparty of buyers and sellers and collect trading information for regulation. American Intercontinental Exchange begun to provide clearing for CDS in March, 2009. And the European Union also plans to set up clearing house for CDS. But regulator shouldn't compel all CDS trading to enter it. According to experiences of interest rate and stock index derivatives development, only when standard products are designed, trading based on CCPC will boom. In addition, it is inappropriate to impose restriction of "only hedging" on CDS. In reality, buyers and sellers of protection have little possibility to perfectly match.

6.1.2 Choice of Information Disclosure Standards

The key of improving information transmission is to understand what the most important information is. Information for estimating PD and LGD is necessary. However, risk appraisal of structured products is something different from that of ordinary loans and bonds. According to the lesson drawn from subprime crisis, information of default correlation is of paramount importance. However, estimation of this parameter is a weak link in CRT market. Banks, rating agencies and regulators need to make joint efforts to collect relevant data. And regulator shall lay down rigid rules. Without data of joint changing of the quality of underlying asset portfolio, structured products cannot get public rating and be issued to average investors.

6.2 Adjustment of Market Participants' Incentive Structure

6.2.1 Improvement of Traditional Banking Regulation

For the purpose of capital arbitrage, banks transfer assets to off-balance institutions, such as conduits. Meanwhile, banks provide guarantee to them, which make part of risk implicitly flowing back to banks. But regulators don't pay sufficient attention to such risk circuit. The key to avoid regulation failure is to eliminate banks' incentive of capital arbitrage. One measure that can be the selection is to set the minimum requirement of the amount of subordinate bonds held by bank as risk seller so that they are urged to fulfill screening and supervision function.

6.2.2 Reduction of Excessive Dependence on Rating Agency

Rating agencies determine whether a bond is safe and financial institutions may hold it. Regulators assign great discretion to rating agencies, ignoring they are benefit-related units. Rating agencies are semi-regulators, but not simply opinion providers. However, their privileges reduce the key value of rating. Under pressure of competition and temptation of money, even Moody and Standard & Poor's abandon professional morality. The key of regulation reformation is to remove excessive power of rating agencies and strengthen market discipline. Regulators may publish testing results of rating accuracy and punish the rating agency whose misrating rate is too high, or ask them to pay a portion of rating fee as collateral.

6.2.3 Reformation of Investment Institution Management Compensation

Regulator specifies mutual fund managers must symmetrically share profit and loss of investment. If they hold 20% of profit, they need to absorb 20% of loss. Managers commonly choose to charge management fee at a certain percentage of assets under management, which encourages them to maximize assets scale, but not assets value. Reformation of management compensation needs to trade off incentive on managers and their risk aversion. On one hand, managers shall be encouraged to participate in long-term profit sharing, on the other hand, the downside risk borne by them needs to be properly limited. Fund manager will be rewarded for performance and reasonably share risk with their clients.

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