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Securitization, Ratings, and Regulatory Practices

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Abstract

Securitization, as a structured financial instrument, can give rise to excessive risk taking by the originator. It was expected that credit rating agencies will assist the special purpose vehicles (SPVs) and investors by revealing the risk. However, given that they pursue their own objectives of increasing business volume and revenue, credit rating agencies will not concentrate on investor risks though they claim to do so. The present study defines regulatory practices against this backdrop. Two types of instruments have been considered, viz., intrusive and persistent or selective only when miscalculation is suspected. The other dichotomy is to utilize ex ante or ex post regulatory measures. It is also obvious that regulatory measures can be directed to the originator, SPV, and/or the credit rating agency. We attempt a comparative evaluation and arrive at an efficient design of regulatory mechanisms and derive the implied credit ratings.

1. The Issue

There has been a high and growing demand for finances as a result of the rapid expansion of the economy over the past few years. Conventional sources of finance, say the banking sector and the stock market, did not expand in tandem. Similarly, these instruments of finance have not been accessible for conducting some transactions. As a result, novel methods of finance, and a variety of financial instruments dealing with such transactions, emerged. Structured finance, and securitization in particular, belongs to this category[1].

Securitization has been an attractive option for two reasons. First, the receivables of a firm, originally financed by bank loans, cannot be recovered immediately. The firm's quest to increase business in a buoyant market will be set back if they have to depend on the banks. Second, the firm may find the transaction costs of recovering receivables to be too high for it to undertake the activity. Someone else, who specializes in such activities, may be in a position to handle it more efficiently.

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[1] Recall that there is a fairly comprehensive regulation of the activities of the banking sector. The non-bank financial companies (NBFCs) are subjected to much less scrutiny. However, there is a fair amount of regulatory control of their activities. Securitization, as a novel financial instrument, is designed to circumvent this regulation. The lack of a well defined institutional structure in which securitized transactions are conducted has the seeds of spreading high risk instruments.

In a typical securitized transaction a firm, designated as the originator, puts together a pool of its receivables for securitization. The firm sells them to a special purpose vehicle (SPV, usually a trust) for a consideration that is normally a fraction of the value of receivables[2]. In his turn, the SPV issues pass through certificates (PTCs) to investors[3] to recover the money paid to the originator as consideration[4]. That is, the SPV shares and/or transfers the risk to such investors.

The following aspects of such securitized transactions are by now well known. First, the originator must convince the SPV and the investors that the receivables are indeed collectible. He generally seeks a rating from agencies to achieve this. A good rating may, in fact, reduce the SPV's cost of collecting the receivables. Second, strictly speaking, the sharing of risks, implicit in securitization, should reduce the risks. However, in general, there has been an increase in the risks. For, the originator, who passes on lower quality receivables, is not really affected by the entire risk. It is also reasonable to argue that the share of the higher risks borne by the SPV and/or the PTC holders may still be within the limits of their risk bearing capacity[5].Third, when some receivables cannot be collected there is a reduction in the liquidity available in the financial markets. This aspect generally requires policy interventions. Attempts to set up standards of due diligence are in progress.

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[2] This also entails transfer of property rights of the underlying assets. That is, the transaction must be a true sale that removes the assets from the balance sheet of the originator. This alone gives the SPV the right to collect the receivables and claim the proceeds. However, these off balance sheet items of the originator have the seeds of greater risk.

[3] The reader may argue that the SPV may pay the necessary consideration to the originator, collect the receivables and derive greater profits. Issuance of PTCs then needs justification. Note that if the SPV finances the receivables on his own his costs will increase and he will not remain risk neutral. A risk averse SPV and the originator may then agree to net value maximization in choosing the consideration, the value of the pool of receivables securitized, and the number of items in the securitized pool. However, conventionally the SPV is expected to share risks by issuing PTCs. For, as an intermediary the SPV may not have adequate resources to undertake financing on its own.

[4] The small saver has many investment opportunities in a growing economy. Why would he invest in PTCs of a trust that is not well known? The basic reason will be that such trusts consolidate all similar small savings and invest more efficiently than any one small saver can. The logic is similar to channeling saving through a stock broker, mutual funds, or a holding company. Larger returns are expected only if the investor is prepared to take the increased risk.

[5] In Rao (2008) the argument was that as a result of the risk sharing the risk adjusted rate of return to the SPV and the PTC holders and/or the total net value to them may increase as a result of the risk sharing implicit in the securitization process. In general, even when any one investor loses, all of them collectively gain.

There are many considerations in structuring these policy interventions. One of these dimensions deals with the role of the credit rating agencies. For, this is an important constraint on the originator if he is not motivated to exercise the necessary caution in selecting quality tranches of receivables for securitization. More specifically, an ideal (efficient) credit rating system must keep the following factors in perspective[6]:
(a) degree of intrinsic risk of recovery of receivables being securitized
(b) extent of risk aversion of the investor in the PTCs of the SPV
(c) costs of setting up efficient rating given the risks of recovery associated with the receivables
(d) the possibility that exogenous factors, like a recession, may severely restrict the SPV from collecting the receivables

There is no denying the fact that credit rating agencies do take these factors into account while announcing a rating. For, after all, their long term reputation and business will be at stake if they misrepresent facts. However, their actions are constrained by two factors. First, credit rating agencies cannot anticipate the unexpected external exigencies that bring down the value of securitized assets. They can act on information only as and when it becomes available. Generally, this takes the form of downgrades if they discover unfavorable conditions belatedly. See, for example, Hull et al (2004).However, since the securitization is already put in place, the damages to the investors cannot be recouped. Second, they are unlikely to compromise on their business objective of generating greater revenue for themselves and the originators who are their clients. There is a pervasive feeling that credit ratings per se have been inadequate to protect the interests of the investors who bear the brunt of the risk in securitization transactions. It has, therefore, been suggested that regulating credit rating agencies is necessary.

Regulatory policy has to go beyond restrictions on the credit rating agencies. Landau (2007) noted that regulatory practices should keep three dimensions in perspective. First, in general, the SPVs do not have the financial structure or stability to absorb risks. Second, securitization is a complex, individual centered, instrument. As such no single measure of risk may be adequate from a regulatory perspective. Third, we do not as yet have a credible framework of the desirable characteristics of a robust securitization process. In particular, it would be necessary to reevaluate the role of the originator in the collection of receivables. For, otherwise, the adverse selection problems of the SPVs may be severe[7]. In general, dimensions, other than the risk characteristics of the receivables need attention.

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[6] For a detailed presentation see Adelson (2007), and Ashcraft and Schvermann (2008).

[7] Two dimensions of this problem should be emphasized. First, in the recent past, financial institutions offered loans to borrowers who did not have an adequate collateral backing. Perhaps they did so because they know that they will pass on the risks through securitization. However, this resulted in the defaults that the SPVs experienced. Regulatory policy must address this adverse selection problem. Second, as Mendoza (2008) observed, the ecuritization process resulted in credit granting practices exceeding the collateral constraint. When the collateral constraint binds there will be an endogenous financing premium that affects one period debt, working capital loans, and the return on

The design of regulatory mechanisms must keep the following aspects in perspective. First, regulation may be ex ante or ex post. To the extent possible ex ante measures should be specified in such a way that high risk securitization, and the associated loss for the investors, is kept under control. Ex post action is warranted if failure occurs despite the diligence exercised. Second, two types of regulatory action have been suggested, viz., intrusive and persistent action or selective action only when miscalculation is suspected. The latter has been the recommendation of IIF (2008) and the World Bank studies typified by Caprio et al (2008). Third, it is obvious that regulatory measures can be directed to the originator, SPV, and/or the credit rating agency. We attempt a comparative evaluation and arrive at efficient design of regulatory mechanisms.

These micro level precautions are a necessary condition to reduce potential liquidity crisis[8]. Suppose there is a problem even after all this diligence exercised by the rating system, the originator, and the investor. For example, it may so happen that a sudden change in macroeconomic conditions may reduce income of home owners and their ability to pay mortgages. This will also eventually reduce the demand for and valuations of housing. In such a case the banking system must step in and create liquidity to preserve the integrity of the financial system in the short run[9].

The present study is set against this backdrop. It offers a detailed micro level perspective on the role of ratings and the ability of securitization to spread risks. The primary aim is

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equity because there will be an increase in the effective cost of borrowing. Further, when the collateral constraint binds, agents need to liquidate capital in order to meet margin calls. The sale of assets reduces capital and tightens the constraint further. This results in spiraling effects in financial markets. Regulatory practices in general, and with respect to securitization in particular, must find ways of containing the system within the collateral constraint by overcoming the adverse selection problem.

[8] MOF (2006) and IIF (2008) contain a detailed discussion of the precautions that need to be exercised by originators, SPVs, investors, rating agencies, and the regulators. For the originators the emphasis is on risk management, stress analysis that takes into consideration the risk in its other assets, and valuation of assets. For the rating agencies they emphasize greater transparency, specification of the risk factors that go into their rating methodology and so on. To the extent I am aware of it none of the existing studies really capture the different dimensions considered in this study let alone examine the efficient combination that should guide the rating process. Needless to say, an improvement in the rating system decreases the potential effects of adverse selection and decreases the need for regulatory intervention. Li and Earnst (2006) and Financial Stability Forum (2008) also contain useful analysis of these regulatory aspects.

[9] Utilizing an altogether different analytical framework Rao (2009) examined the short term remedies for the liquidity crisis and the associated solvency crisis. That approach also brought into the foreground other dimensions of regulation necessary to ensure that the possibility of financial crisis is reduced in the long run. Clearly, such an inclusive analysis acknowledges that securitization is only one of the many reasons for the emergence of the type of financial crisis that we witnessed in recent years.

to define efficient ratings based on the four factors alluded to earlier. The models are set in a modified principal agent framework. For, this is the most suitable approach to defining efficient risk sharing among the parties involved in securitization.

The rest of the study is organized as follows. Section 2 sets out the basic model. The primary purpose is to show that there are several economic forces that tend to generate greater risks once it is clear that they can be passed on to other agents. Section 3 examines the efficient rating choices as the agency perceives them. We also contrast this with the possibility that the SPV exercises due diligence in collecting receivables. Section 4 then evaluates the efficiency of less intrusive control of the originator, SPV, and the credit rating agency. We have not been able to show that this would efficiently reduce investor risks. In section 5 we therefore investigate the possibility of the regulator making the originator more accountable. In particular, he may be expected to hold a reserve, based on the volume of receivables securitized and their intrinsic risk, with the regulator or an agency that they designate[10]. The idea is that these reserves can be used to rescue the investor if the SPV is unable to collect the receivables in practice. With this mechanism in place it will be shown that the actions of the credit rating agency will also be efficient. A broad summary will be provided in section 6.

2. Basic Model

Assume that an originator (typically a firm or a financial institution) is securitizing a pool of receivables. Let r be the value of receivables. He sells them to a SPV for a consideration pr where p is a fraction of the value of the receivables. The originator seeks a rating of his assets from an independent credit rating agency to convince the SPV, and the eventual investors, that the receivables are of high quality. The cost of doing the rating increases more than proportionately with the volume of receivables since the agency must develop more information. It can be surmised that the agency charges cr^2 to provide the rating[11]. The gain to the originator is therefore

$v_0 = pr - cr^2$

This is entirely deterministic. Note, next, that the originator must incur the costs of obtaining the rating before he can conclude the sale to the SPV. As a result he would be concerned about the volume of receivables that he can securitize profitably. Such a choice will be

$r = p/2c$

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[10] Conceptually this may also be in the form of financial instruments that can be liquidated at short notice. In general, it should be possible to rescue the SPVs and the investors from unexpected losses since they did not generate them in the first place and they do not have the wealth position to cushion their losses. In the absence of such a precaution the financial system may lapse into a far reaching collapse.

[11] It is of course true that the degree of difficulty in rating also increases with the risk involved in the recovery of receivables. The agency may then charge more on this basis. However, from a practical viewpoint it would be difficult for the agency to have any information about this apriori.

for the value of p that the SPV will choose eventually[12].

The SPV, in his turn, issues PTCs to collect pr. It is expected that the investor will provide this money through the purchase of PTCs. The SPV will eventually collect the receivables and repays the investors. Note that one basic feature of such pools of receivables is that the amount that can be recovered will not be the same for every transaction in the pool[13]. The total recovery will be random[14]. For analytical purposes it will be represented by (r+u) where u is a random variable with expected value $E(u) = 0$[15] and its variance $V(u) = \sigma^2$. Hence, the SPV will eventually collect (r+u) and pays a fraction q(r+u) to the investors[16].

Consequently, the gain to the investors is
$g_i = q(r+u) – pr$
The investors are generally risk averse. Risk aversion of the investor implies that the value of g_i to them will be
$v_i = (q-p)r – \lambda q^2\sigma^2$
where λ is the degree of risk aversion. The investors are not sure about the return they can expect and/or repayment of investment. They can be expected to choose a q so that their returns are satisfactory. This choice results in
$q = r/2\lambda\sigma^2$

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[12] A true sale may not be sufficient to make securitization successful. For example, Fitch India reported the following. Citi Bank securitized three tranches of mortgage loans. Royal trust was the SPV. They needed the help of Citi Bank to recover the receivables due to some legal issues of ownership transfer. These costs may be included in cr^2 if and when they arise. In general, ratings will account for such contingencies as well.

[13] The SPV can take possession of the asset if the original buyer defaults. Hence, it may be argued that the randomness is not with respect to whether or not receivables can be collected. Instead, the difficulty will be reflected in the costs of recovering the original loan amount. The treatment of this alternative will be symmetric.

[14] Clearly, the problem is particularly acute if the external conditions reduce the value of the asset acquired by the original buyer. For, though the SPV has the legal right to sell it to recover the receivables, he will not be in a position to do so in a declining market. Thus, Danis and Cross (2007), and Doms et al (2007) argued that the degree of risk implicit in the pool itself is not the major cause.

[15] Note that the maximum amount that the SPV can collect is r unless the valuation of the receivables changes drastically post securitization. This may, for instance, be the case with variable interest mortgage loans.

[16] Normally, the PTCs or bonds will have a fixed interest obligation. However, depending on the quality of receivables the SPV may default on interest payments and/or the principal amount. Hence, q(r+u) is an appropriate specification. Credit ratings may decrease σ^2 but cannot eliminate it altogether.

The SPV receives an amount (1-q)(r+u). However, he must spend some money to collect the receivables[17]. This can be denoted by $r^2/2\delta$ where δ is the rating on the securitized pool of receivables. His gain will therefore be

$g_s = (1-q)(r+u) - r^2/2\delta$

Note that the SPVs tend to be more willing to accept the risk because they are better organized in collecting such receivables[18]. Further, they can cushion risks in one transaction against another because they will be dealing with many similar securitized pools. In addition to the advantages of diversification it may be claimed that the SPV is not taking any risk with respect to the payment pr to the originator. For, he makes the investor pay for it[19]. In either case, the SPV can be expected to be risk neutral. The value of g_s to the SPV may then be written as

$v_s = (1-q)r - r^2/2\delta$

For all practical purposes the SPV and the investors in PTCs are sharing the risk of collecting the receivables.

The SPV must bear the entire risk if he pays pr to the originator from his own sources. Hence, v_i is, for all practical purposes, the opportunity value to the SPV of involving the investors. Consequently, he can be expected to maximize

$N = v_i + v_s$

$= (1-p)r - r^2/2\delta - \lambda q^2\sigma^2$

In general, the SPV is handling many such pools of receivables and much larger quantities of r as a result. He will not consider r as his primary choice. Instead, he would be more concerned about the consideration that he must pay to the originator. Consequently, he will choose p taking the participatory constraints of the other two parties into account. The efficient choice of p is therefore

$p = 4\delta c\lambda\sigma^2 / [\delta + 2\lambda\sigma^2(1+4c\delta)]$

Observe that p increases with δ and $\lambda\sigma^2$ for all values of δ and $\lambda\sigma^2$. The originator is more prone to securitize risky assets.

Somewhat more specifically, note that the resulting r is also an increasing function of δ and $\lambda\sigma^2$. It is therefore obvious that both the originator and the credit rating agency stand to improve their returns by securitizing more risky assets and/or announcing higher credit ratings even for highly risky transactions. That is, the seeds of risk augmentation and spreading tend to be initiated by the originator and supported by the credit rating agency.

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[17] There is a general consensus that insisting on obtaining ratings from at least one credit rating agency is an efficient regulatory policy. However, this conclusion is not accepted unconditionally. For some useful analysis refer to Mukhopadhyay (1999).

[18] Higher credit ratings may simultaneously reduce the degree of risk aversion of the investors or the perception of risk represented by σ^2. It can be verified that the qualitative nature of the results developed in this study will not be affected.

[19] Equivalently, the claim is that the originator, by claiming a fixed consideration, does not share the risk.

It is not surprising that concerns of moral hazard on the part of the credit rating agency have been voiced in the literature[20].

It can also be verified that v_0, v_i, v_s, and cr^2 will increase with δ for all values of $\lambda\sigma^2$ so long as v_i remains positive. That is, all the participants in the securitization process favor larger ratings. They tend to create and spread more risks[21].

3. Choice of Ratings

Let us now consider the choice of δ by the credit rating agency[22]. It can be expected that, in its desire to maximize returns, it maximizes r. Note that

$r = p/2c$

$= 2\delta\lambda\sigma^2/[\delta + 2\lambda\sigma^2(1+4c\delta)]$

Consequently, $dr/d\delta > 0$. Clearly, the credit rating agency would choose the largest possible value of δ. However, the agency is choosing a δ in response to an anticipated $\lambda\sigma^2$. Hence, it maximizes r keeping in perspective its choice of δ depending on $\lambda\sigma^2$. It can be verified that this implies

$d\delta/d\lambda\sigma^2 = - \delta^2/2\lambda^2\sigma^4$

This would indicate a choice

$\delta = 2\lambda\sigma^2/ (2C\lambda\sigma^2 – 1)$

where C is a constant.

Three observations are in order. First, irrespective of the costs involved, the credit rating agency, in the interest of long run credibility, prefers to reduce δ as $\lambda\sigma^2$ increases. For, it may consider the losses, in terms of its credibility, of wrong credit ratings to be important. C is, for all practical purposes, an expression of these responses. Second, it should also be acknowledged that the credit rating agency incurs some costs in fixing δ while making adjustments to $\lambda\sigma^2$. This was not explicitly incorporated in the model. One

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[20] It may be argued that the costs of collection to the SPV will increase with r the same way costs to the originator increase with r in the process of getting credit ratings. The SPV may then be inclined to restrict r analogous to the originator. The choice of p will be then with the originator. It can be readily verified that the risk spreading feature alluded to here remains in tact.

[21] One approach to minimizing the overall risk of securitization is placing a limit on the fraction of the total receivables that may be securitized. Suppose L is the total receivables and r = fL. It can be readily verified that the efficient choice of f is

$f = 1/(2c\lambda\sigma^2 – F)$

where

$F = (\delta+2\lambda\sigma^2+4c\delta\lambda\sigma^2)/ (\delta+2\lambda\sigma^2+2c\delta\lambda\sigma^2)$

Of course, the limits on this f should be

$1/(1-p+2cL) < f < 1/(1-p)$

for the efficient p defined above. This is one solution for designing efficient regulatory policy.

[22] Jullien et al (1999) considered this possibility. However, they feel that the costs involved may outweigh the benefits.

possible expectation is that an increase in such costs inhibits the credit rating agency from doing a thorough investigation. The δ announced will then vary inversely with such costs. The choice of C may also reflect this effect. Third, the payments to the credit rating agency have been postulated as cr^2. This is an increasing function of c. Consequently, the credit rating agency need not make any adjustments in δ based on c.

It can be readily verified that the credit rating will decrease with an increase in the risk. Further, observe that the optimal choice of p then reduces to

$p = 2c/(C+4c)$

which is independent of δ and $\lambda\sigma^2$. This corresponds to the general observation that p is usually the present discounted value[23] independent of δ and $\lambda\sigma^2$.

The originators would be willing to accept this approach to rating because their net return

$v_0 = pr - cr^2$

$= cr^2$

is an increasing function of r.

Clearly, both the originators and the credit rating agency tend to gain by underestimating the losses due to reputation, impute a small value for C, and announce high credit ratings. This, for all practical purposes, is one major source of problems while using securitization as a financial instrument[24].

One finer point of analysis may now be noted. The costs, to the SPV, may depend on his efficiency in collecting receivables as much as it depends on a favorable credit rating. Consequently, the δ in the above formulation can be interpreted as the efficiency of the SPV. Suppose, now, that the SPV exercises due diligence in the choice of his δ given the exogenously determined $\lambda\sigma^2$. If he makes an efficient adjustment the intrinsic uncertainty of receivables will be only due to their nature as created by the originator. In such a situation the SPV is not bearing any of the residual risk. Hence, the investor can claim the

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[23] This may be a disadvantage from a practical standpoint. For, the SPV cannot offer a lower consideration even if the securitized pool is deemed to be more risky.

[24] Caprio et al (2008,p.16) considered the possibility of drastically over rating and offering over sized tranches of structured financial instruments. They argued that part "of the argument lies in the incentive conflict managers and line employees of such firms faced between preserving the long run value of the firm's reputation and choosing bonuses and raises that short term revenue expansion can generate. Errors in classification are slow to reveal themselves. They can only be established after a long and variable lag. This lag means that, to keep a firm's reputation strong over the long run, compensation structures must include features that promise to reward employees for taking long view and penalizing them for succumbing to short-termism. Given the high proportion of revenues earned in recent years at the top three rating firms (Moody's, Standard & Poors, and Fitch) from rating securitization, individual managers and analysts must have been sorely tempted to risk the firm's reputation to secure or retain the repeat business of the biggest issuers and it is doubtful that salary structures fully neutralized this temptation."

maximum share of the receivables that the SPV collects[25]. Maximizing q with respect to $\lambda\sigma^2$, while assuming that the SPV is diligent in his choice of δ, results in

$d\delta/d\lambda\sigma^2 = \delta(1+4c\delta) /\lambda\sigma^2$

Solving for δ we have

$\delta = C\lambda\sigma^2/ (1-4Cc\lambda\sigma^2)$

where C is a representation of the cost of the effort of the SPV in the process of exhibiting due diligence. It would be generally expected that large values of $\lambda\sigma^2$ create more cost. However, the SPV then tends to be more cautious in his choice of receivables being securitized. Note that, as expected, δ increases with C as well as $\lambda\sigma^2$. Similarly, observe that a ceteris paribus increase in the cost of obtaining credit ratings makes both the originator and the SPV exercise more caution in choosing tranches that they seek to securitize. The resulting efficient choice of q is therefore

$q = C/(C+2)$

This choice does not depend on any aspect of credit ratings as such. However, q is an increasing function of C. A higher value of $\lambda\sigma^2$ results in a higher C and a correspondingly higher q. This increases the volatility of the returns to the investor. It should also be noted that the total volatility of the securitized transaction is

$V = [q^2 + (1-q)^2] \sigma^2$

which is minimized only if C = 2. This may happen only as a coincidence. Consequently, there is every likelihood that the volatility increases.

4. Efficient Regulation

Two approaches to regulation have been generally conceptualized. First, a detailed quantitative specification of guidelines that the originators and SPVs must follow. It was pointed out that adherence to such prudential norms does not guarantee that the degree of uncertainty in the collection of receivables will necessarily go down. An extreme example is the prudential norms specification under Basel II agreement. A bank may hold the required reserves with the central bank while the quality of its loans is deteriorating. Second, the creation of a regulatory agency to whom all originators will be expected to provide the requisite data. The agency undertakes an evaluation of the quality of receivables and credit ratings on its own. There will be no immediate and direct interference with the activities of the originator. If, however, the agency finds any irregularity it would have the right to interfere and seek correction. The functioning of such an agency entices the originators to behave honorably. In essence, they will be forced to accurately reveal the risks involved in the specific securitized transactions on hand. Unlike the quantitative controls mentioned earlier this provides a more credible approach to risk management.

For purposes of analysis the existence of such an agency imposes some additional cost on the originator. For, now, he has to reveal information about the pool and face penalties if the ratings are incorrect. Let us denote this by εr^2 since an efficient agency implies more caution and costs for the originator. Similarly, more diligence and transparency will be

[25] The return to the investor and its variance vary directly with q. As such it is not really possible to minimize the volatility while maximizing returns.

necessitated when the volume r, and $\lambda\sigma^2$ along with it, increases. For all practical purposes, the agency may choose ε depending on $\lambda\sigma^2$. The basic difference, compared to the analysis of the previous section, is in the choice of r. For, it now becomes
$r = p/2(c+\varepsilon)$
The other quantities q and p can also be defined in an analogous fashion.

Consider the efficient choice of ε by the regulator. The primary concern of regulation is to minimize the volatility of investor earnings. For, as noted in the previous section, the originators and credit rating agencies tend to accept more risky pools for securitization. The variance of investor earnings is
$V(g_i) = q^2\sigma^2$
The choice of ε, as $\lambda\sigma^2$ varies, which minimizes q is given by
$(c+\varepsilon)\ \lambda\sigma^2 = A$
where A is a constant. For all practical purposes A is a representation of the degree of difficulty that the regulating agency experiences in spotting and defining corrective action.

Note that the efficient choice of ε varies inversely with $\lambda\sigma^2$. This may be rationalized in the following manner. It was noted earlier that efficient ratings of an agency vary inversely with $\lambda\sigma^2$. Hence, if $\lambda\sigma^2$ is high the credit rating will reflect this and more extensive regulatory action will not be warranted. Greater regulatory vigilance becomes important only when $\lambda\sigma^2$ is low. For, the propensity to offer a more than justified credit rating must be curbed. In a sense, the regulatory agency should be more suspicious of declaration of lower volatility of the pools being securitized.

The efficient choice of q is therefore
$q = \delta/(a\delta+2\lambda\sigma^2)$
where $a = 1+4A$

Reconsider the decision of the credit rating agency. It will be maintained that they would still choose to maximize the resulting r. The corresponding choice of δ can be shown to be
$\delta = 2\lambda\sigma^2/a(2C\lambda\sigma^2-1)$
Consequently, the optimal choice of p becomes
$p = 2(c+\varepsilon)/[aC+4(c+\varepsilon)]$
Clearly, p is a decreasing function of $\lambda\sigma^2$. This is an advantage from the viewpoint of the SPV because he can now guess the risk class based on the p claimed. Alternatively, he can offer a lower consideration if he suspects that $\lambda\sigma^2$ is high. The regulator can therefore induce the credit rating agency to offer more useful information to the SPV and the investors[26].

[26] Even with this additional advantage the credit rating agencies can only provide the information about known risks. Hull, Predescu, and White (2004) suggested that credit rating agencies cannot anticipate unexpected external exigencies that lower the value of securitized assets. They can only react to it by downgrading when the information is available. There is an intrinsic possibility of moral hazard in the functioning of credit

The analysis so far postulated that the originator is the major source of risk. Consequently, the regulator was expected to monitor his transactions. However, two aspects of securitization must be acknowledged. First, the originator and the credit rating agency originally work together to define feasible tranches that can be securitized. However, they can succeed in shifting the risk only if the SPV concurs. For, post securitization he has to either bear the risk or pass it on to the holders of PTCs. Further, the true sale conceptualization removes the originator from legal obligations and places the burden squarely on the SPV. In his turn, however, the SPV will try to shift the risk to the investor. Hence, it may be more appropriate for the regulatory agency to concentrate on the functioning of the SPV. Second, observe that the efficient choices
$(c+\varepsilon)\lambda\sigma^2 = A$, and
$\delta = 2\lambda\sigma^2/ a(2C\lambda\sigma^2-1)$
imply that the choice of q becomes
$q = \delta/(a\delta+2\lambda\sigma^2)$
$= 1/2aC\lambda\sigma^2$
This is still a function of $\lambda\sigma^2$. The SPV may under represent the risk involved, offer a high q, and generate a high risk to the investors. Hence, even this argument indicates that regulating the SPV may be far more important.

Postulate that the regulatory cost to the SPV will be εq^2. We will assume, for analytical simplicity, that the originator is not regulated any longer. The following efficient choices will then materialize.
$r = p/2c$,
$q = r/2\lambda\sigma^2$, and
$p = 4c\delta\lambda^2\sigma^4/[2\lambda\sigma^2+ \delta(\varepsilon+\lambda\sigma^2+8c\lambda^2\sigma^4)]$
As in the earlier analysis the choice of ε that minimizes q is given by
$\varepsilon+\lambda\sigma^2+8c\lambda^2\sigma^4 = A$ (constant)
Such a choice of ε decreases with $\lambda\sigma^2$. That is, reported low values of $\lambda\sigma^2$ are more suspicious and should therefore attract more stringent regulation. Corresponding to this choice of A the value of r will be
$r = \delta/2(2\lambda\sigma^2+A\delta)$

Let the credit rating agency choose δ to maximize the benefits to the originator and itself. Maximizing r results in the choice
$\delta=C\lambda\sigma^2$
and the corresponding
$r = C/2(2+AC)$

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rating agencies. For, even with efficient regulation the resulting value of r is $r = 1/aC$ which is independent of $\lambda\sigma^2$. Ideally, a lower revelation of $\lambda\sigma^2$ should result in a reduction in r. In practice, the credit rating agencies may be practicing this in a limited way. For, they do advise the originator about defining the tranches that can be given a desired rating. However, this has been unreliable. The regulatory approach described here cannot circumvent this moral hazard problem efficiently.

Observe that this is not a function of $\lambda\sigma^2$. Hence, moral hazard may persist even under this regulatory regime.

These two results seem to reinforce the following observation of IIF (2008). "Resolution of liquidity issues of the current market stress will depend on sound internal risk management decisions by firms; principles based regulation following on outcomes rather than quantitative requirements."

5. Practical Way Out[27]

Note that the analysis of the previous section suggested that a regulator expecting the originator to provide him all the information pertaining to the securitized transaction may be efficient. However, the costs to the regulator may be too high. The regulator would also be burdened with voluminous work and specialized skills to do the ratings or evaluation.

An alternative approach to the choice of the structure of securitized transactions may be the requirement that the originator keep αr as a deposit with the regulator or an institution designated by him. This places some accountability on the originator in case the SPV is unable to collect the receivables because they are of low quality[28].

Consider the return to the originator under this dispensation. It is given by
$v_0 = (p-\alpha)r - cr^2$
The optimal choice of r from this perspective will be
$r = (p-\alpha)/2c$
The value to the investor will now be
$v_i = [q(1-\alpha) - p]r - \lambda\sigma^2 q^2$
Hence, the efficient choice of q is
$q = (1-\alpha)(p-\alpha)/4c\lambda\sigma^2$
Similarly, the value to the SPV is
$v_s = (1-q)(1-\alpha)r - r^2/2\delta$
The choice of p that maximizes the net value is given by
$(p-\alpha) = 4c\delta\lambda\sigma^2(1-2\alpha)/ [\delta(1-\alpha)^2+2\lambda\sigma^2(1+4c\delta)]$
$= E_2/E_1$ (say)
The efficient choice of α that minimizes q is given by
$E_2 = AE_1$

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[27] Fan et al (2003) argued that the information set can be improved if the shareholders retain a residual claim on the securitized asset. This section attempts to offer a specific form that the claims should take.

[28] It is possible to argue that the originator cannot be held responsible for the receivables once they are moved out of his balance sheet. That is, he will not compensate the SPV ex post even if he cannot collect the receivables. The mechanism suggested here operates ex ante and does not prevent us from treating the receivables as off balance sheet items so far as the originator is concerned. The role of the regulator is also one of a trustee in this framework.

where A is a constant. Clearly, the choice of α is not independent of $\lambda\sigma^2$. In particular, it can be verified that

$d\alpha/d\lambda\sigma^2 = 2A(1+4c\delta)/[(4\alpha - 3)+2A\delta(1-\alpha)]$

Hence, α increases with $\lambda\sigma^2$ whenever $A\delta > 2$. Higher credit ratings attract larger deposits with the regulating agency.

Assume that the credit rating agency chooses δ. Such a δ satisfies the equation

$2C\delta\lambda\sigma^2 = \delta(1-\alpha)^2 + 2\lambda\sigma^2$

The corresponding efficient choice of r can be shown to be

$r = (1-2\alpha)/[C(1-2\alpha)+4c]$

Note that r now decreases with an increase in α.

It can be concluded that assigning responsibility to the originator, in the form of making a deposit to be used in case of SPV not being able to collect the receivables is a good idea. Note also that this makes the credit rating agency more responsive. For,

$\delta = 2\lambda\sigma^2/ [2C\delta\lambda\sigma^2 - (1-\alpha)^2]$

decrease with an increase in α. For all practical purposes a regulation of this nature, making the originator responsible, makes securitization a more efficient and less risky financial instrument[29].

6. Conclusion

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[29] Filson and Morales (2005) utilized a somewhat different argument, in a very different context, to arrive at a similar conclusion. Suppose the originator is expected to make a deposit D prior to securitization. The SPV can use this signal to estimate the probability θ with which he would be able to collect the receivables. The SPV then agrees to pay a consideration pr to the originator with a probability θ and zero otherwise (that is, he will not accept securitization of the proposed ttranch of receivables). The expected net benefit to the originator is

$N = pr\theta - D$

It may now be surmised that the originator would be willing to make a larger epost the larger the value of θ. Let us denote this by

$D = d\theta^2$

It can be expected that the originator would maximize N. The corresponding

$\theta = pr/2d$, and

$D = p^2r^2/4d$

Hence, if the originator agrees to make a deposit D the corresponding value of θ can be estimated. Note that the originator will not accept this value of D if the value of θ is lower. That is, by choosing a suitable value of D securitization can be limited to desired levels of probability of default. It is therefore possible to limit the problem of adverse selection through this mechanism. Notice that a similar result holds even if the originator chooses θ and r simultaneously to maximize v_0. In fact, the maximization of v_0 with respect to r and θ yields

$d\theta^2 = cr^2$

Hence, it may be claimed that this mechanism can effectively replace the credit rating agency.

The volatility problems associated with securitization have been traced to the originator, the SPV, and the credit rating agency. It is evident from the above analysis that the volatility of securitized transactions increases if these institutions operate in tandem and pursue gains to themselves. The initial expectation that credit rating agencies will curb the risk enhancing behavior of the originator does not generally materialize. For all practical purposes, there is no effective mechanism to shield the investor from high risks. This problem indicates the necessity of a regulating agency.

The regulatory agency may try to control the activities of the originator, SPV, and/or the credit rating agency. Further, the controls may be of two types. First, specific and intrusive action can be conceptualized. The only ex ante control specification that can effectively reduce investor risk appears to be a deposit with the regulator, or an agency designated by the regulator, commensurate with the volume of receivables being securitized and their intrinsic risk. An efficient choice can minimize investor risk while preserving maximization of returns to the originator and the credit rating agency. The result holds on an expected value basis. However, in a high risk regime, unexpected events may still have devastating effects on the actual functioning of these structured instruments. Second, these agencies may be required to provide relevant data to the regulator so that they may perform independent investigations and initiate corrective action only if some inadequacies are discovered. This may be too expensive, unreliable in itself because the regulator will be excessively burdened, and the remedy may come too late (somewhat similar to the downgrades by credit rating agencies).

On the whole, the present study suggests that regulation, directed to the originator revealing risks truthfully and providing an adequate cover ex ante to cushion SPV's inability to bear the risk if he cannot collect receivables as anticipated, is the most desirable choice. More detailed and intrusive regulatory measures will be difficult to design and even more cumbersome to implement. Similarly, precautionary regulation is superior to ex post regulatory action after the securitization transaction is put in place.

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