The Effect of Credit Risk Transfer on Financial Stability

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2005
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January 2005

Abstract

This paper shows under which conditions debt securitization of banks can increase the systemic risks in the banking sector. We use a simple model to show how securitization can reduce the individual banks’ economic capital requirements by transferring risks to other market participants. This can increase systemic risks and impact financial stability in two ways. First, if the risks are transferred to unregulated market participants there is less capital in the economy to cover these risks. And second, if banks invest in asset-backed securities, the transferred risk causes interbank linkages to grow. This results in an increasing systemic risk for which the economic capital put aside is insufficient. We develop a modified version of the infectious defaults model of Davis and Lo (2001) and use this model to quantify the augmented systemic risk of increased bank linkages in the banking sector.

JEL Classification: G21, G28
Keywords: Systemic risk, financial stability, debt securitization, economic capital, expected loss, infectious defaults model

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1 Introduction

Asset-Backed Securities (ABS) issuance, especially Collateral Debt Obligations (CDO) and Collateral Loan Obligations (CLO), shows a remarkable growth during recent years and can be expected to continue over the next years.

What makes these ABS bonds so attractive for banks? Several factors play a role. First, there is an economic risk transfer, that is, banks can transfer part of their risks to the market by selling fractions of their debt. Secondly, funding a loan can become significantly cheaper since the expected loss and economic capital are reduced. Third, securitization offers arbitrage spread opportunities and finally, banks can obtain regulatory capital relief. Using the 8%-rule this can easily be shown (e.g. see Bluhm et al. (2003), and Basel Committee on Banking Supervision (2003)). In addition, banks increasingly invest in ABS bonds since this can offer new investment opportunities.

This paper focuses on the economic risk transfer and shows under which conditions this risk transfer of an individual bank can increase the systemic risks of the whole banking sector.

This paper also attempts to present a systemic risk model called for by Goodhart (2004) who states that “...we need to construct models of systemic stability, not just of individual bank probability of default [...].” (page 3)

We propose an extended version of the "infectious default" model of Davis and Lo (2001) to build a model of the banking system that explicitly includes interbank linkages through securitization while also modelling potential contagious effects (e.g. see Giesecke and Weber, 2004).

The paper is structured as follows. First, we present a simple model to demonstrate the economic risk transfer through securitization. In the next section a model of the banking
A system including contagious effects is proposed. Third, we present simulation results for different structures of interbank linkages caused by an increased securitization of banks and show under which conditions the amount of capital in the banking system is insufficient given the linkages between banks. Finally, we summarize our findings and conclude.

## 2 Risk transfer through securitization

Banks engage in the securitization business due to different reasons. The most important ones are economic risk transfer, different funding, spread arbitrage opportunities and regulatory capital relief. In this section we focus on economic risk transfer and use a simple model to quantify the amount of risk which is transferred from a bank to the market.

Assume we have an index set, $I = \{1, \ldots, m\}$, referring to loans of a portfolio. The easiest case possible is to assume that the complete portfolio is selected for securitization through a CLO. Based on this collateral portfolio, an equity piece and one or more mezzanine and senior pieces are sold to different investors. The equity piece, often called the first loss piece (FLP), receives interest and principal payments only if all other investors received their promised payments.

In the literature different ways to model the cash flows are proposed. The most common ones are the simple BET (e.g. Moody’s Investors Service (1996)), double BET (e.g. Moody’s Investors Service (1998)), the lognormal model (e.g. Moody’s Investors Service (2000)) and methods using Monte Carlo simulations or fourier transforms (e.g. Moody’s Investors Service (2003)). In the BET and double BET we construct a new portfolio of loans that are all equal and independent from each other and mimic the original portfolio. The number of defaults is modelled by use of the binomial distribution. The lognormal method uses a lognormal distribution for the cumulative number of default instead of the binomial distribution. In this way we do not need to assume that all the loans are equal and independent.
In the Monte Carlo method and fourier transform method we use the information of all the loans in the portfolio directly and keep in mind that there is a certain correlation between the loans to find the cumulative probability of default. A drawback of this last two methods is that they are rather time consuming.

Applying one of the methods above we can model the cash flows in case of securitization given a value for the first loss piece. For simplicity the loss given default (LGD) is taken equal to 100%. The loss statistic for the portfolio \( I \) is given by \((L_1, \ldots, L_m)\). Hence the total loss in case there is no securitization is equal to

\[
L = \sum_{i=1}^{m} L_i.
\]

For the securitization we assume that no Interest Coverage tests (IC) or Overcollateralization tests (OC) are used and also no cash reserve account is available. We also suppose that the bank manages to sell all the senior tranches and keeps the equity piece itself. The securitized portfolio is hence protected against losses exceeding the first loss piece. The loss of the securitized portfolio is equal to the loss of the equity piece and will be denoted with \( L_{sec} \). Since the equity piece absorbs all the losses up to a certain level FLP its loss is given by

\[
L_{sec} = \min(\sum_{i=1}^{m} L_i, FLP).
\]

The change (denoted by \( \Delta \)) in expected loss \( E(L) \) from the bank that securitizes its debt is given by

\[
\Delta EL = E(L) - E(L_{sec}).
\]

The required economic capital (denoted with \( EC_\alpha \)) is defined as the difference of the \( \alpha \% \)-quantile \( (q_\alpha) \) and the expected loss. Hence the difference in economic capital due to the
Securitization is

\[
\Delta EC_\alpha = EC_\alpha(L) - EC_\alpha(L_{sec})
\]

\[
= q_\alpha(L) - E(L) - (q_\alpha(L_{sec}) - E(L_{sec}))
\]

\[
= \Delta q_\alpha - \Delta EL
\]

(1)

with \(\Delta q_\alpha = q_\alpha(L) - q_\alpha(L_{sec})\), the change of the \(\alpha\%\)-quantile. In this case without tests and without a cash reserve account the losses of the portfolio with and without securitization will be increasing functions of percentages of defaults in the portfolio. The mezzanine and senior pieces that are sold to the market have a total loss which is denoted with \(L_{sp}\). Since no extra money is transferred the sum of the loss of the equity piece \(L_{sec}\) and the loss of the senior pieces \(L_{sp}\) will always be equal to the loss in case there is no securitization \(L\).

This leads to

\[
E(L) = E(L_{sec}) + E(L_{sp}).
\]

(2)

The three losses are all nondecreasing functions of the percentages of default which implies that the correlation between the loss of the senior piece and equity piece is equal to one. Using this dependence and the fact that the sum of those two is equal to the loss without securitization, we get the following equation for the quantile functions

\[
q_\alpha(L) = q_\alpha(L_{sec}) + q_\alpha(L_{sp}).
\]

(3)

With the results of equations (2) and (3) we can rewrite equation (1) as

\[
\Delta EC_\alpha = q_\alpha(L_{sp}) - E(L_{sp}).
\]

(4)

Hence, \(\Delta EC_\alpha\) denotes the reduction of economic capital that the bank has to put aside. In other words, it is the regulatory capital relief obtained by securitization. Since the capital relief of the originator is due to the credit risk transfer to the market, the market now bears the risks that was previously borne by the bank. This transfer of risks can
be classified as follows: first, the debt is sold to a certain number of unregulated market participants that are not obliged to and hence are likely not to put sufficient capital aside. And second, the debt is sold (i.e. transferred) to regulated market participants, e.g. banks.

In the first case the overall amount of capital put aside might be insufficient from an individuals perspective and in the second case, the amount of capital to cover risks might be insufficient from a market-wide (global) perspective. We will focus on the second case and show that increased interbank linkages caused by securitization lead to an increased systemic risk and hence to an augmented amount of required capital to cover these systemic risks in the market.

A survey from the European Central Bank from May 2004 (European Central Bank, 2004) studies the transfer of risk between several European banks. A summary of the transfer of the structured products (Asset-backed securities and synthetic collateral debt obligations) is given in Table 1 and shows that this last risk is non negligible since up to 30% (see Portugal) of a banks capital can be invested in CDO’s from other banks. In the next section we will concentrate on the effect of this change in linkages.

Based on the table above, we will model the effect of securitization on interbank linkages. We will assume that an economy consists of $N$ banks with equal interbank exposures

<table>
<thead>
<tr>
<th></th>
<th>protection buying</th>
<th>protection selling</th>
<th>number of institutions surveyed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of total assets</td>
<td>% of total assets</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>0.2 - 1.5%</td>
<td>0.1 - 1.8%</td>
<td>3</td>
</tr>
<tr>
<td>Spain</td>
<td>3 - 15%</td>
<td>n.a.</td>
<td>4</td>
</tr>
<tr>
<td>Ireland</td>
<td>1 - 10%</td>
<td>0.2 - 0.6%</td>
<td>6-9</td>
</tr>
<tr>
<td>Italy</td>
<td>0 - 6.5%</td>
<td>0.2 - 7.5%</td>
<td>4</td>
</tr>
<tr>
<td>Portugal</td>
<td>5 - 30%</td>
<td>n.a.</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 1: Summary of the transfer of structured products (ABS and synthetic CDO’s)
for all banks. We then assume that \( n \) banks \((n \in \mathbb{N})\) securitize a percentage \( \gamma \) of their debt and that \( m \) banks \((m \in \mathbb{N})\) buy tranches of this securitized debt accounting for some percentage of their book capital. This increase in capital from other banks will increase interbank linkages and therefore the systemic risk due to the fact that the loss distribution gets heavier tails with higher correlations.

In the next section we use a Monte-Carlo simulation with different linkage matrices representing different interbank linkages resulting from the risk transfer described above. We show how a small increase in such linkages and thus in correlations can require an increased amount of capital as a cushion for systemic risks. In doing this, we will also differentiate between complete and incomplete bank structures as introduced by Allen and Gale (2002).

### 3 The Model

In this section we present a latent variables version of the "infectious default" model by Davis and Lo (2001) to analyze systemic risk and financial stability. In the original version of Davis and Lo it is assumed that a given portfolio of \( n \) bonds may either default directly or as a result of infection, i.e. due to the default of some other bond. The static version of this model is

\[
Z_i = X_i + (1 - X_i) \left( 1 - \prod_{j \neq i} (1 - X_j Y_{ji}) \right)
\]

where \( Z_i = 1 \) if the \( i \)th bond defaults, and \( Z_i = 0 \) otherwise, \( X_i = 1 \) if the \( i \)th bond defaults directly and \( X_i = 0 \) otherwise, if \( X_j = 1 \) and \( Y_{ji} = 1 \) the infection occurs, for \( Y_{ji} = 0 \) no infection occurs.

We extend this model in two respects: First, we relax the assumption of homogeneous entities in the portfolio and second, we modify the "infection matrix" \( Y_{ji} \) to capture the true interbank linkages. Hence, the matrix \( Y_{ji} \) is not restricted to have values of 0 and 1 but
can contain all possible values in the interval \([0, 1]\).

In order to relax the assumption of homogeneous bonds, we use a Monte-Carlo simulation to obtain the default and loss distribution. Since we aim to present a model of systemic risk and not of an individual bank’s portfolio, we model bank defaults and inter-bank linkages. In other words, we are modelling a countries’ "bank portfolio" and not an individual banks’ portfolio.

We assume that each banks’ default probability \(\pi_i \ (i = 1, …, n)\) can be modelled with a latent factor \(S_i\) that follows some distribution with mean zero and variance one. All \(S_i\) are independent and identically distributed.

A bank \(i\) defaults directly \((X_i = 1)\) if the realization of the latent variable \(S_i\) is below some threshold \(D_i\) as follows

\[
X_i = 1 \iff S_i \leq D_i
\]

so that \(\pi_i = P(S_i \leq D_i)\). Hence, \(X_i\) denotes a direct default. An indirect default, denoted as \(X_i^* = 1\), is given if there is a linkage between \(X_i\) and one or more other banks \(X_j\) that defaulted directly. Here, we extend the original model and allow \(Y_{ji}\) to contain any value in \([0, 1]\) representing the percentage of assets hold by another bank. If the percentages of assets deposited with other banks that directly defaulted exceeds a bank-specific threshold \(d_i\), bank \(i\) defaults (indirectly).

\[
X_i^* = 1 \iff \{Y_{ji}X_i\} \geq d_i
\]

Hence, obligor \(i\) defaults either directly or indirectly indicated by \(Z_i\) as follows \(Z_i = X_i + (1 - X_i)X_i^*\) which implies

\[
Z_i = 1 \iff X_i = 1 \lor X_i^* = 1.
\]
The important feature of this model is that linkages between bonds or banks can be modelled via a dependence matrix $Y_{ji}$ that can incorporate direct linkages that are asymmetric or symmetric. We believe that this approach is superior to the use of correlation matrices since these implicitly assume symmetric linkages. Indirect linkages are not taken into account for simplicity.\(^1\) We will also differentiate between complete and incomplete linkages (i.e. structures) as in Allen and Gale (2001) and in Upper and Worms (2002).

Assume the following infection matrix $Y_{ji}$ with 4 banks, called A, B, C and D:

$$Y_{ji} = \alpha \begin{pmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \quad (6)$$

This matrix represents the values of the linkages, i.e. $\alpha$ deposits of bank $j$ with bank $i$. More precisely, bank $j$ has deposits at bank $i$. Hence, the matrix states that bank A has deposits at bank D, that bank B has deposits at bank A, bank C has deposits at bank B and bank D has no deposits with any bank. If we assume further that only bank B defaults directly, the vector $X$ is given as follows

$$X = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} \quad (7)$$

Then, $Y_{ji}X$ yields

\(^1\)The inclusion of indirect linkages would increase the computational time of the Monte-Carlo simulation.
\[ X^* = Y_{ji}X = \alpha \begin{pmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} = \alpha \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix}. \] (8)

Hence, bank C defaults by infection, i.e. indirectly under the assumption that the loss of \( \alpha \) deposits leads to a default of bank C.

We now present four different matrices \( Y_{ji} \) (i.e. structures) of direct linkages. First, a complete and symmetric structure. Second, a complete and asymmetric structure. Third, an incomplete and symmetric structure and finally, an incomplete and asymmetric structure. We still assume for simplicity that the values of the linkages, i.e. the percentages of capital of bank \( i \) hold by bank \( j \) is equal among all linkages and denoted by \( \alpha \). This simplification is just for presentation purposes and will be relaxed later.

The four matrices \( Y_{ji} \) are presented below. The complete and symmetric structure for an equal linkage denoted by \( \alpha \) is given by the following matrix

\[ Y_{ji}^1 = \alpha \begin{pmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{pmatrix}. \] (9)

Evidently, this structure is characterized by symmetric one-to-one relationships between banks. Hence, to match these linkages with real data, the \( \alpha \)s have to be smaller in a complete structure than in an incomplete structure since the sum of linkages in a symmetric structure can easily exceed realistic values. Note that different percentages of linkages (\( \alpha_i \neq \alpha \land \alpha_i > 0, \forall i \)) would lead to a complete but asymmetric structure.

An example of such a matrix is given as follows:
An example of a complete and asymmetric structure for $\alpha_i = \alpha \ \forall i$ is represented by

$$Y_{ji} = \begin{pmatrix} 0 & 0.1 & 0.1 & 0.2 \\ 0.05 & 0 & 0.15 & 0.01 \\ 0.02 & 0.05 & 0 & 0.1 \\ 0.025 & 0.05 & 0.05 & 0 \end{pmatrix}. \quad (10)$$

This structure is complete since the linkages could also be represented by an upper-triangular matrix.

Finally, we present two examples for incomplete structures. An incomplete and symmetric structure is given by

$$Y_{ji}^3 = \alpha \begin{pmatrix} 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{pmatrix}. \quad (12)$$

where the matrix entries could be random but must follow $Y_{ji} = Y_{ij} \forall i, j$.

An incomplete and asymmetric structure is represented by

$$Y_{ji}^4 = \alpha \begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{pmatrix}. \quad (13)$$

where the off-diagonal matrix entries could be random without further restrictions.
The next section uses these four different structures for simulations with different values for $\alpha_i$ for all banks $N$. We will also investigate the effect, the number of originating banks $N$ and the number of buying banks $M$ has on the market-wide required economic capital. The number of buying banks $M$ is equal to the total number of linkages. For example, $M = 3$ in the last example representing an incomplete and asymmetric structure for $N = 4$. This value $M$ can be viewed as a measure of the concentration (diversification) of the risk transfer.

4 Simulations

We now perform a Monte-Carlo simulation of the model presented in section 3 in order to quantify the change in required economic capital resulting from increased interbank linkages.

The default probability ($dp$) is set to $dp = 1\%$ for all banks and the sample size of the normal distribution we draw from to obtain the default distribution for all banks is $n = 10,000$. We are aware of the fact that changing the copula has a considerable effect on the shape of the loss distribution and hence the EC (e.g. see Duffie and Singleton (2003)).

The MC simulation is performed for different number of banks $N$ in the economy, different linkage structures and different numbers of interbank linkages $M$ within the assumed structures.

The aim of the simulation is to evaluate the change in economic capital for different values of $\alpha$ that represent the percentages of deposits a bank holds of another bank. The threshold value $d_i$ that determines a default of bank $i$ is set to $d_i = 0.2$. We compute the $99.99\%$ quantile of the resulting default distribution and compute the economic capital.
for this quantile. This economic capital is computed under the assumption that there are no linkages ($\alpha = 0$) and different degrees of linkages, i.e. $\alpha = 0.050, 0.075, 0.1, 0.2$ for each assumed structure of linkages. Results are presented in Table 2 and show that the additional economic capital necessary increases with increasing $\alpha$ and increasing number of linkages (diversification) $M$. The additional economic capital decreases with increasing number of banks $N$.

For the complete and symmetric structure (top panel) and no linkages $\alpha = 0$, the EC is 49%, 19%, 14% and 5.5% for $N = 4$, $N = 10$, $N = 20$ and $N = 100$, respectively. For example, the EC for $N = 10$ increases from 19% ($\alpha = 0$) to 29% ($\alpha = 0.05$). Since it is a complete structure, linkages for higher $\alpha$ are not plausible since the sum of deposits held by each bank would well exceed any realistic level. This is especially true for $N = 100$ where we only report results for $\alpha = 0$.

For the complete and asymmetric structure, the EC is smaller for the largest reported values of $\alpha$ for $N = 4$ and $N = 10$ than for the complete and symmetric structure.

We now focus on the incomplete structures. Here, we assume different values of $M$. Columns three and four show that the number of linkages $M$ for $N = 20$ banks matters for $\alpha > 0$. For example, for $\alpha = 0.2$ and $M = 10$, the EC is 29% while for $\alpha = 0.1$ and $M = 20$, the EC is 19%.

We can conclude that a larger number of banks and a larger number of linkages yield lower values of EC. This diversification effect has an important implication. The higher the number of (equal) linkages between banks, the lower is the resulting difference between the sum of economic capital put aside by each bank and the optimal economy-wide economic capital required as a cushion against extreme (systemic) risks.

In other words, if banks do not explicitly account for increased linkages with other

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2We abstract from absolute losses and recovery rates. However, this is just for presentation purposes since the Monte Carlo simulation can also be used to compute a loss distribution of the banking sector.
### Table 2: Simulation Results, EC\((q = 99.99\%)\)

<table>
<thead>
<tr>
<th>structures</th>
<th>(N = 4)</th>
<th>(N = 10)</th>
<th>(N = 20)</th>
<th>(N = 20)</th>
<th>(N = 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>complete symmetric</td>
<td>(M = 12)</td>
<td>(M = 90)</td>
<td>(M = 380)</td>
<td>(M = 380)</td>
<td>(M = 9900)</td>
</tr>
<tr>
<td>(\alpha = 0)</td>
<td>0.49</td>
<td>0.19</td>
<td>0.14</td>
<td>0.14</td>
<td>0.055</td>
</tr>
<tr>
<td>(\alpha = 0.05)</td>
<td>0.49</td>
<td>0.29</td>
<td>0.14</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>(\alpha = 0.075)</td>
<td>0.49</td>
<td>0.59</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>(\alpha = 0.10)</td>
<td>0.99</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>(\alpha = 0.20)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>complete asymmetric</td>
<td>(M = 6)</td>
<td>(M = 45)</td>
<td>(M = 190)</td>
<td>(M = 190)</td>
<td>(M = 4950)</td>
</tr>
<tr>
<td>(\alpha = 0)</td>
<td>0.49</td>
<td>0.19</td>
<td>0.14</td>
<td>0.14</td>
<td>0.055</td>
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<td>0.14</td>
<td>-</td>
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</tr>
<tr>
<td>(\alpha = 0.075)</td>
<td>0.49</td>
<td>0.34</td>
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<td>-</td>
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</tr>
<tr>
<td>(\alpha = 0.10)</td>
<td>0.74</td>
<td>-</td>
<td>-</td>
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<tr>
<td>(\alpha = 0.20)</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>incomplete symmetric</td>
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<td>(M = 10)</td>
<td>(M = 10)</td>
<td>(M = 20)</td>
<td>(M = 20)</td>
</tr>
<tr>
<td>(\alpha = 0)</td>
<td>0.49</td>
<td>0.19</td>
<td>0.14</td>
<td>0.14</td>
<td>0.055</td>
</tr>
<tr>
<td>(\alpha = 0.05)</td>
<td>0.49</td>
<td>0.24</td>
<td>0.14</td>
<td>0.16</td>
<td>0.055</td>
</tr>
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<td>(\alpha = 0.075)</td>
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<td>0.14</td>
<td>0.16</td>
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<td>(\alpha = 0.10)</td>
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<td>0.14</td>
<td>0.19</td>
<td>0.055</td>
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<tr>
<td>(\alpha = 0.20)</td>
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<td>0.59</td>
<td>0.29</td>
<td>0.34</td>
<td>0.075</td>
</tr>
<tr>
<td>incomplete asymmetric</td>
<td>(M = 3)</td>
<td>(M = 5)</td>
<td>(M = 5)</td>
<td>(M = 10)</td>
<td>(M = 10)</td>
</tr>
<tr>
<td>(\alpha = 0)</td>
<td>0.49</td>
<td>0.19</td>
<td>0.14</td>
<td>0.14</td>
<td>0.055</td>
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<td>(\alpha = 0.05)</td>
<td>0.49</td>
<td>0.29</td>
<td>0.14</td>
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</tr>
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<td>(\alpha = 0.075)</td>
<td>0.49</td>
<td>0.29</td>
<td>0.14</td>
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<td>0.055</td>
</tr>
<tr>
<td>(\alpha = 0.10)</td>
<td>0.49</td>
<td>0.29</td>
<td>0.14</td>
<td>0.14</td>
<td>0.055</td>
</tr>
<tr>
<td>(\alpha = 0.20)</td>
<td>0.99</td>
<td>0.39</td>
<td>0.24</td>
<td>0.24</td>
<td>0.060</td>
</tr>
</tbody>
</table>

\(d_i = 0.2\)

\(M\) is equal to the number of interbank linkages due to the CDO issuance. For example, in the complete symmetric structure \(M = N^2 - N\). For \(N = 4\), \(M\) is equal to 12.

banks, the risks associated with this are minimized the larger the number of banks is and the more these banks are linked to each other. However, this last assumption only holds for equal or similar linkages. Extreme asymmetries, i.e. extreme heterogeneity of the values \(\alpha_i\) would lead to different results.
5 Conclusions

This paper shows how banks can reduce their capital requirements by transferring risks to other market participants. We focus on the case that these risks are transferred to other banks thereby increasing the interbank linkages. We develop a model for the whole banking sector that accounts for these linkages and shows how these linkages can increase extreme or systemic risks and thus pose a threat to the stability of the financial system. We analyze this effect for different linkage structures of the banking sector and find that risks can increase significantly especially if the linkages are complete and symmetric rather than incomplete and asymmetric. In addition, the larger the number of banks, the lower is the increase of systemic risks.

This paper is a first step to develop global models of systemic risk and financial stability.

Future research could also calibrate this model to real data of the banking sector of the European Union or different individual countries.
References


Abstract
This paper shows under which conditions debt securitization of banks can increase the systemic risks in the banking sector. We use a simple model to show how securitization can reduce the individual banks’ economic capital requirements by transferring risks to other market participants. This can increase systemic risks and impact financial stability in two ways. First, if the risks are transferred to unregulated market participants there is less capital in the economy to cover these risks. And second, if banks invest in asset-backed securities, the transferred risk causes interbank linkages to grow. This results in an increasing systemic risk for which the economic capital put aside is insufficient.

We develop a modified version of the infectious defaults model of Davis and Lo (2001) and use this model to quantify the augmented systemic risk of increased bank linkages in the banking sector.
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