Asset Securitization of Commercial Real Estate in the Era of Big Data

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Abstract
With the deepening of modern information technology process, the era of big data comes and promotes the development of various industries. Carrying out analysis work through big data becomes a new choice for investors to invest in the economic field. In the era of big data, the emergence of asset securitization is to accelerate the diversification development of commercial real estate, and create a new profit model for commercial real estate. Of course, asset securitization under the development of good environment is also concerned by all walks of life due to the risks. This paper focuses on the research on the problems of asset securitization of commercial real estate in the era of big data, puts forward the countermeasures to improve the development of asset securitization of commercial real estate in the era of big data, and gives reasonable suggestions based on the relevant literature.

Keywords: Big Data, Commercial Real Estate, Asset Securitization, Expected Loss Model, Deterministic Prepayment Model

1. INTRODUCTION
Asset securitization refers to the financing model that can issue securities that can be traded through the support of certain types of assets or specific cash flows (Keshavarz and Toloo, 2015). Asset securitization only includes the asset securitization in the narrow sense. The earliest development of asset securitization is in the United States in the early 70s of last century (Kao, 2013). The government national mortgage will trade the house loan in the form of asset securitization. Then, the asset securitization has an extensive development in the financial sector and the category. And the financial products about asset securitization are derived (Yuan, Bi and Moriguchi, 2010). Investors credit analysis, as the name implies, is that the asset securitization pays a certain security pension in the process of conducting. If investors can not return the principal and interest according the agreement of two sides after paying the security pension, which leads to capital risk of the commercial real estate and brings economic losses, it’s the investor credit risk (Tone and Tsutsui, 2010). The big data model is not carried out and the efforts and strict degree of auditing investors are not enough, which is difficult to consider whether the investment would infringe on the interests of the commercial real estate company. Of course, the investor credit risk is not just the investors own intentional acts. In the implementation of asset securitization, investors are likely to make mistakes on their predictions (Cook and Seiford, 2009). The security price decreases in the margin purchase or the security price increases after the security is fully sold, so investors cannot duly repay funds or securities and it is also possible that the follow-on capital repayment has big problem. Although the security pension is paid and there is item mortgage at the beginning of the deal, they still cannot repay the debt. Thereby it results in investors credit risk and ultimately it is passed on to the commercial real estate, which will cause the loss.

Based on the above elaboration of security deposit when expounding the characteristics of asset securitization, it can be seen that the security deposit presents a decline tendency when investors conduct a short selling or buying long transactions, namely, the investor’s investment ratio is higher, so if the price of his invested securities declines, the investor needs to improve the value of security deposit to guarantee the payment system of security deposit regulated by the commercial real estate (Ferrier, Kerstens and Eeckaut, 2016). Once there is a loss caused by the investor’s improper investment when the asset securitization expires, his account will be taken back by the commercial real estate, and then the natural risk will be transferred. The advent of the age of big data requires the commercial real estate company to formulate the security deposit system of asset securitization at all levels, and the investors at different levels are requested to pay the corresponding investment funds. But the majority of commercial real estate enterprises in our country only pay attention to trading currencies of asset securitization but neglect the establishment of security deposit system. In addition, for the securities market, it is actually the same as the stock market, and they are affected by the national government, external environment, laws and regulations, etc, leading to the changes in stock prices, which will cause risks and losses to the investors and commercial real estate. The price change without the limitation of time is often sudden, and the risk brought by it is also huge. Asset securitization risk is faced with external factors, including economic losses faced by asset securitization because the asset securitization itself is not perfect and the system
and mechanism need to be perfected in the commercial real estate management. The management of stocks, securities and other businesses with a high risk are quite strict, and their access mechanism and standard are more rigorous, so that the number of commercial real estate is still very small after it has developed for many years. It presents a situation which is monopolized by the commercial real estate which has been mature in the security market. If there is a lack of strong competitors, the operation of commercial real estate will lack a vitality, and focus too much on economic benefits but neglect to perfect system management, and reduce the risk in terms of business management. At present, seeing from the perspective of constructing asset securitization information platform of commercial real estate companies, there are a lot of problems, such as obviously obstructed information, delayed information, insufficient updating, etc. The main reasons are that commercial real estate companies are different from banks or other financial companies and other financing companies. There is a high difficulty in information collection of the commercial real estate companies, and the establishment of their own credit platform is not only imperfect but also needs to accept the supervision of relevant finance supervision and management departments. As a result, the difficulty in information collection of the commercial real estate enterprises imperceptibly becomes bigger and the risk of asset securitization of the commercial real estate increases. In particular, in the age of big data, the asset securitization transaction of large commercial real estate companies became mature.

Although commercial real estate has been developing in China for many years, both management and business development are extensive management, and the business development is relatively simple (Linh, Nanskei and Chomei, 2015). In view of the possible risks in commercial real estate, there is a lack of reasonable prevention mechanism, and the internal illegal behavior exists for a long time. Even if the development of big data era has improved industrial upgrading, some commercial real estate enterprises are still not aware of the impact of big data analysis on commercial real estate asset securitization. From the perspective of big data era, this paper analyzes the problems in the development of commercial real estate asset securitization, and gives solutions.

2. THE IMPACT OF BIG DATA ON ASSETS SECURITIZATION OF COMMERCIAL REAL ESTATE

Big data is a product of the development of modern information technology and an important weapon for industrial upgrading in the era of science and technology (Lampe and Hilgers, 2015). With the vigorous development of modern internet and internet of things technologies, enterprises and industries begin to explore the direction of industrial development and clarify their own shortcomings in business development by means of data analysis. However, as the industry has huge data in all aspects of the development of the field, it is difficult to achieve the purpose of analysis by means of traditional data analysis, so big data analysis appears. Big data analysis can analyze data systematically without omission of data to ensure the authenticity and scientificity of data analysis.

Big data is to analyze and invest the enterprise asset securitization model and the proportion of cash flow analysis and investment by means of the analysis and calculation of data (Deshpande, 2016). With huge amounts of data analysis and modern processing models, big data can enhance the analysis process, improve work efficiency and ensure the analysis of diversified information. In the development process of asset securitization, commercial estate enterprises, without the need for sampling analysis, can guarantee the data comprehensiveness and diversity through the big data analysis. The development of China’s real estate asset securitization has emerged in recent years. Compared with western countries, the application of big data in commercial real estate asset securitization in China achieved some results. At present, there is a large accumulation of social funds in the real estate market in our country, and the liquidity is obviously insufficient. As for the real estate market, it exposes itself to a more dangerous development environment. Through the way of big data analysis, the analysis of commercial real estate asset securitization is an important way to protect commercial real estate funds. Through big data analysis, it enhances the liquidity of asset securitization, analyzes the direction suitable for commercial real estate enterprise securitization and reduces the risks that asset securitization may face.

3. STRATEGIES OF THE DEVELOPMENT OF COMMERCIAL REAL ESTATE ASSET SECURITIZATION IN BIG DATA IS IMPROVED

3.1. Business Credit and Rigorous Examination

The advent of big data era can help commercial real estate companies conduct personnel analysis, establish strict audit standards through data analysis, and may require commercial real estate asset securitization investors to prepare the relevant credit information. Investors should handle their credit lines with their creditworthiness and repayment ability, so as to make the first check on asset securitization. When signing agreements with investors on asset securitization, we must strictly and carefully stipulate what investors should not do in accordance with the law. In the process of supervision, when the things that cannot be done in the
agreement are found, it is necessary to stop and cancel the business qualifications. For investors and commercial real estate common and orderly development, business credit is very necessary.

The application of commercial real estate securitization in the era of big data is difficult to complete by relying solely on the real estate industry or the industry’s own strength. It is required that the real estate enterprise should clear market access mechanism through the cooperation with the regulatory mechanism, and improve its own asset securitization products through the way of big data analysis. Through the analysis of big data, commercial real estate enterprises can screen out the unqualified assets securitized goods which have been or will be prepared in the future by means of massive data analysis, and reform and eliminate them, so as to protect the assets securitization of commercial real estate companies to develop rationally. In addition, during the process of asset securitization, it is suggested that enterprises and financial institutions should cooperate with each other to establish an assessment mechanism for the basic credit system of both parties, understand the basic conditions of customers and analyze whether customers have problems such as credit disorders, and ensure commercial real estate company's vested interests.

3.2. Learn from the Successful Experience of Developed Countries, and Establish and Improve Relevant Laws and Regulations

For improving the risk management of asset securitization, we can learn from the successful experience of the developed western countries to establish and improve relevant laws and regulations. For instance, Japan has incorporated commercial real estate assets securitization risk into the criminal law of the country, increasing the legal status of commercial real estate asset securitization and ensuring the rationality and safety of asset securitization. In this way, asset securitization can be law-based when it is exposed to risks and legal protection can be used to protect commercial real estate when it comes to the issue of asset securitization risks based on the law, so as to save the losses suffered. The United States, Britain and other countries not only achieved some success in improving the commercial real estate asset securitization in the era of big data, but also improved the laws and regulations in this area. The development of China’s perfect asset securitization can be combined with the actual situation in our country to summarize the successful experience of other countries in asset securitization in order to achieve early commercial real estate asset securitization and help enterprises to solve the facing problems in the process of the current development.

Although the development of asset securitization in commercial real estate enterprises is promoted under the era of big data, asset securitization can provide some protection against risks. However, at present, due to the lack of supervision and the lack of relevant laws and regulations, there are obvious problems of improper supervision in the field of internet finance in our country. Although the regulatory authorities in the area of enterprise asset securitization increase the access mechanisms, enhance punishment, and establish the strict compliance mechanism for relevant procedures, these can not really protect the rights and obligations of the right holders of asset securitization. Here the relevant laws and regulations of asset securitization should be proposed to improve, and a clear definition of corporate asset securitization rights and obligations of both parties should be made, so that once problems arise, either party can have the law to promote the normative development of the real estate industry.

3.3. The Risk Management Mechanism Should be Improved and the “Accountability” Should be Made for the Person who Violate the Mechanism so as to Cause Risks

The risk supervision mechanism of commercial real estate asset securitization should be implemented strictly. It is required that the salesman who deals with the asset securitization should handle the matter for the investor according to the handling mechanism formulated by the commercial real estate (Yan and Wei, 2000). For those who do not meet the requirements, the handling will not be carried out, in order to ensure the stability and repayment of assets securitization investors. For staff who did not supervise according to the regulations, the “accountability” system should be carried out. According to the extent and consequences of the violation, it should be punished accordingly. Everyone in commercial real estate should know the risk supervision mechanism by heart. With the emergence of asset securitization, the commercial real estate market has become more flexible and the economic benefits have obviously improved. However, the corresponding risk problems due to the characteristics of asset securitization are also more prominent. With the emergence of asset securitization, the commercial real estate market has become more flexible and the economic benefits have obviously improved. However, the corresponding risk problems are also more prominent. Only by seizing the time and using the analysis of big data can the commercial real estate asset securitization risk be solved and a strong and effective risk prevention mechanism be enhanced, so as to realize the strategic goal of commercial real estate in our country.

Improving the risk management mechanism is another major responsibility in the development of asset-backed securities in commercial real estate enterprises (Sueyoshi and Goto, 2011). Through the analysis of big data, it is possible to make clear the risks that may be faced in the development of enterprise securitization, to analyze the size, extent, advantages and disadvantages of the risks, so as to ensure the rational development of
asset securitization and avoid the problems that may be faced in the development of commercial real estate companies.

3.4. The Basic Information of the Customer's Information Basic Assets Information of Clients Should be Improved and Understood

For commercial real estate companies, commercial real estate companies should strengthen capital investment, personnel support and technical assurance in the field of internal internet, establish unique, scientific, systematic and standardized securitization criteria for commercial real estate companies, learn to use big data analysis, strengthen the analysis of asset securitization standards, and help commercial real estate companies to solve the current lack of assets and the issue of unequal information. At the same time, commercial real estate companies or the real estate industry can work with banks or several major data platform entities to establish a platform for sharing big data resources to make the underlying assets transparent. Meanwhile, commercial real estate companies can check by phone to verify. In the past, phone verification staff often used fixed procedures and patterns to inquiry customers, so that many customers could take advantage of it. Through standardized management, customer information verification must be treated very strictly. Finally, in the process of big data analysis, we conducted a comparative analysis and analysis of the information in the Internet field against the surveyed customers to ensure that the customer information is targeted and analyzed, so as to avoid the risks that commercial real estate securitization transactions may face.

3.5. The Understanding of Enterprises toward Asset Securitization Should be Enhanced.

Not only commercial real estate enterprises, but most of the industries and enterprises in our country have relatively strong interests and goals in asset securitization transactions. Therefore, there is neglect of asset securitization. For commercial real estate enterprises, on the one hand, asset securitization transactions can protect the liquidity of the enterprise funds, on the other hand, can help companies realize the benefits of assets through the investor’s transactions. Therefore, commercial real estate places more emphasis on the impact of asset securitization on the economic benefits of the enterprise, but there is a clear lack of understanding of the risk awareness, development awareness and application of Internet analysis technology in asset securitization. As a result, it will inevitably lead to lack of understanding of the enterprise securitization, which affects the smooth development of commercial real estate asset securitization. Therefore, it is suggested that the commercial real estate enterprise should first raise awareness of asset securitization, strengthen the asset and stock in the structure, risk, audit, supervision and other aspects of understanding, understand the principle that “a slight move in one part may affect the whole situation”, improve the asset securitization rationality in various fields, and then be able to protect their own development and achieve long-term benefits.

4. THE RELATED MODEL OF ASSET SECURITIZATION

4.1. Expected Loss Model

The value of the asset pool dispersity DS is determined.

Table 1. Moody asset pool dispersity numerical table

<table>
<thead>
<tr>
<th>Unit value</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
<th>3.5</th>
<th>4.0</th>
<th>4.5</th>
<th>5.0</th>
<th>5.5</th>
<th>6.0&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispersity value</td>
<td>1.0</td>
<td>1.2</td>
<td>1.5</td>
<td>1.8</td>
<td>2.0</td>
<td>2.2</td>
<td>2.3</td>
<td>2.5</td>
<td>2.7</td>
<td>2.8</td>
<td>3.0</td>
</tr>
</tbody>
</table>

In a asset pool, if n assets are distributed to m industries, then the calculation formula of DS is:

\[ DS = \sum_{k=1}^{m} G_k \left( \min_{i=1}^{n_k} \left\lfloor \frac{F_i}{\bar{F}} \right\rfloor \right) \]

Among them, \( \bar{F} = \sum_{i=1}^{n} F_i / N \), \( F_i \) represents the nominal value of the \( i \)-th asset, \( n_k \) represents the number of debtors in the \( k \)-th industry, \( G_k \{x\} \) represents the corresponding relation.

The alternative asset dispersity numerical value ADS is obtained by matching the first two links of the loss distribution (that is mean and standard deviation).
\[ ADS = \frac{\sum_{i=1}^{n} p_i F_i \left( \sum_{j=1}^{n} (1 - p_j) F_j \right)}{\sum_{i=1}^{n} n_i (1 - p_i) (1 - p_j) \sum_{j=1}^{n} n_j (1 - p_j)} \]  

(2)

Among them, \( p_i \) represents the default probability of the \( i \)-th asset, then \( 1 - p_i \) represents the recovery probability of the \( i \)-th asset.

If further assume that all pairwise default correlation coefficients within departments are \( \rho_1 \), and all pairwise default correlation coefficients across departments are \( \rho_2 \), then the above formula can be simplified as:

\[ ADS = \frac{n^2}{n + \rho_1 n(n - 1) + (\rho_1 - \rho_2) \sum_{j=1}^{n} n_j (n_j - 1)} \]  

(3)

The expected loss (EL) of the asset pool is:

\[ EL = \sum_{j=1}^{DS} P_j L_j \]  

(4)

\[ P_j = \frac{DS^j \lambda J(1 - PD)^{DS-j}}{j!(DS-j)!} \]  

(5)

In the formula, \( DS \) represents the dispersity numerical value, \( PD \) represents the default probability related to asset pool, \( L_i \) represents the loss in the \( i \)-th scenario.

4.2. Deterministic Default Model

Traditional methods simulate the term structure of default by using S type function. The famous S type function is a generalized Logistic function, which is defined as:

\[ F(t) = \frac{a}{1 + be^{-(t-c)}} \]  

(6)

\[ \frac{dF(t)}{dt} = c(1 - F(t))F(t) \]  

(7)

4.3. Stochastic Default Model

The default rate of Levy portfolio is the default rate that models the cumulative default rate at the portfolio level, that is, the default loan ratio at \( t \) moment follows:

\[ P_d = \{ P_d(t) = 1 - \exp(-\lambda_d t), t \geq 0 \} \]  

(8)

Mean value \( \mu_d \) and standard deviation \( \sigma_d \) are:

\[ E[1 - \exp(-\lambda_d t)] = \mu_d \]

\[ Var[1 - \exp(-\lambda_d t)] = \sigma_d^2 \]  

(9)

Assume that \( \lambda_d \) is the Gamma process \( G = \{ G_t : t > 0 \} \), \( \lambda_d, \sim \) Gamma\((aT, b)\), \( t > 0 \) of shape parameter \( a \) and scale parameter \( b \). So the cumulative default rate at maturity is \( 1 - \exp(-\lambda_d T) \), \( \lambda_d, \sim \) Gamma\((aT, b)\).

4.4. Deterministic Prepayment Model

The idea of deterministic prepayment originated from the previous Public Securities Association, and the corresponding marginal and cumulative prepayment formula is as follows.

\[ cpr(t) = \begin{cases} \text{at} & 0 \leq t \leq t_{00} \\ \text{at}_{00} & t_{00} \leq t \leq T \end{cases} \]  

(10)

For the given \( t_{00} \) and cumulative prepayment ratio on maturity date CPR(T), there is:
Therefore, if $t_{00}$ and CPR($T$) are determined, the marginal and cumulative prepayment curves can be determined.

5. CONCLUSIONS

With the development of commercial real estate in the new era and the maturity of the securities market, asset securitization has been launched. At the same time, foreign securities companies settled in our country and increased their competition with commercial real estate in our country. As a result, commercial real estate in our country is facing obstacles and it is inevitable to promote the development through business innovation. I hope the research on the problems existing in commercial real estate asset securitization under the big data era will help commercial real estate to establish and improve risk prevention mechanisms.

REFERENCES


