Abstract

Nowadays, leasing industry is considered as one of strategic options of economic development. Due to the nature of rental activities, leasing companies have very high profitability and also they face the greatest risks. Some of the most important risks of leasing companies include credit risk, business risk, residual value risk and exchange rate risk and among them, the most important risk is credit risk. The main concerns that leasing industry faces is credit risk. Credit risk models are of great importance, they will provide the knowledge necessary for possible loan losses and also they can provide appropriate credit decisions. Credit risk models can, by measuring risk and creating logical relationship between risk and return, provide asset pricing and can provide possibility of optimization of composition of credit portfolio and determination of economic capital for credit institutions to reduce the cost of capital.

This paper attempts to state the main concept of leasing including definition, explanation, history, types and benefits and then by stating applications of credit risk calculation models which consists of four methods entitled expert systems, neural networks, classification systems and credit rating systems, attempts to manage credit risk of leasing companies.

Keyword
Leasing, risk, risk management, credit risk

Introduction

Leasing industry is considered as strategic options of economic development. Investment amount in capital goods by leasing companies results in leasing importance increase of global economy. In recent years, most companies have used leasing as a tool to improve industry and production, new jobs and improve the people life. According to the importance of leasing industry, recognizing leasing market and creating improvement process are important discussions in this industry. Leasing companies try to grant facilities to customers so that they have good yields while having low risk. This is done when leasing companies are able to recognize customers including natural and legal and to classify them based on their ability and desire for complete and timely repayment of facilities using financial and non-financial criteria because facilities will be given for applicants who have less credit risks and debts repayment possibility will be more.

Obviously, designing proper models for measurement of leasing industry credit risk in line with improving credit granting process has important role in allocating resources and economic and social welfare development.

Literature

Designing a model for measurement and grading of credit risk for the first time in 1909 by John Moore on bonds. (Sharp 1998) credit risk quantification of credit institutes has been started in developed countries including America and Europe, Delarentis and Gennio studies (2001) can be mentioned in the field of credit risk in leasing. They concluded that leasing industry obtains benefits as a result of recycling high rates, in other words, credit risk is low in this industry. Matiyas Smith (2003) conducted another risk entitled (credit risk in leasing industry) based on information that were provided by Lease Europe Institute and included 40271 leasing contracts related two types of lease assets (Vehicles and Equipment). In this study, non-parametric simulation is used for evaluation of credit risk, named Boot Strap technique (the same model that Karry (1998) used for special debt groups). The results confirm that leasing a low risk activity and Ball committee must consider calculations related to capital adequacy and recognizing physical mortgages.
DEFINITION AND DESCRIPTION OF LEASING INDUSTRY

Leasing is a kind of financial operations that the best equivalent in Farsi is credit lease. In fact, leasing is a series of special credit activities in which a contract is signed base on agreement between two or more persons- including natural or legal- in order to use original and benefit of durable capital and consumer goods that are leasable. Therefore, leasing method is a set of economic transactions including purchase, lease and eventually sell (acquisition). This contract is signed between leasing company as owner or landlord and applicant of facilities as tenant. Landlord provides goods or needs of tenant (lease) using his financial resources from seller and lease it for time (loan repayment) mentioned in contract as lease to tenant. However, tenant can own lease at the end of contract and after settlement or refund it to landlord.

LEASING HISTORY IN WORLD

The beginning of leasing returns to 2000 BC, it is found that Sumerian had used forms of leasing for agriculture and manual tools. For the first time in ancient Rome, regulations were enacted by Justinian in the case of financing through leasing. Before the middle Ages, renting horse, wagon and carriage (transportation equipment) was among important business and service operations. In Medieval Europe, leasing for land and buildings finance for due to the limitations of goods was developed. The wagon trains were done using leasing in 1850 in England and the first recorded leasing company in world is Birmingham Coach Company, which was founded in 20th March 1855.

New Technology of Leasing began by founding United States of America International Leasing Institute in 1952 in San Francisco named U.S. leasing. Leasing was introduced in Germany in 1960 by deutsche leasing and in Japan by orient leasing. Leasing became popular in many countries including Iran during 1970 to 1975.

80s can be called years of International Leasing boom. International financial institution (IFC) depended to World Bank has an important role in design and establishment of leasing companies in the world. Leasing of Korea in 1977 was the first example of its success. IFC support measurements resulted in development of leasing industry in countries like Brazil, India, South Korea, and Turkey.

LEASING HISTORY IN IRAN

The first Iranian leasing company was established in 1975/21/07 in partnership with Iran Credit Bank, International Ashby Company (France) and the private sector entitled Iran leasing company. The Second Leasing Institute was founded in partnership with Iran Industrial and Mining Development Bank and Société General Agricultural Development (French) entitled Ariya Leasing Company. These institutions were not active up to 1975/22/02. They were under the policy of nationalization and merger of banks after nationalization of banks. Thus, companies and institutions, including two mentioned companies were subject to operation review and implementation of Shariah law in activities of interest-free banking that one of its credit tools was determined (Hire-purchase) and they could develop leasing operations in country. Since the beginning of 80's, leasing industry was developed due to socio-economic needs, economic prosperity and increased supply of goods on the one hand and lack of sufficient purchasing power of people on the other hand, also, due to lack of financing consumers and general populace by banks. So that, the number of leasing companies was increased within a few years and this development was mainly related to Car Leasing. In February of 2004, by the efforts of Iranian Parliament, unorganized money market Law was adopted that covered country’s monetary and credit activities, including leasing and it was decided that the government approve its bylaws.

Based on its decision in July 2006, and prior to the adoption of bylaw “regulating unorganized money market Law” Parliament and Council of Money and Credit decided to increase interest rate of leasing companies 17 percent per year, in line with the policy of reducing interest rates of all monetary and banking institutions..

<table>
<thead>
<tr>
<th>TYPES OF LEASING METHODS</th>
</tr>
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<tbody>
<tr>
<td><strong>Classification criterion</strong></td>
</tr>
<tr>
<td>Accounting principles</td>
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<tr>
<td></td>
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<tr>
<td>Tax</td>
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<tr>
<td>Type of customer</td>
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</tbody>
</table>
Customer Tenants are individual customers and this type of leasing is in the form of closed end contract.

### Financing landlords

<table>
<thead>
<tr>
<th>Leverage</th>
<th>Landlord borrows from third party in order to buy leased asset but tenant must give leased property to provider and landlord is not committed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>With a single investment</td>
<td>Landlord borrows from third party but he is himself responsible for repayment and tenant is committed only for landlord.</td>
</tr>
</tbody>
</table>

### Acceptance of car residual price risk

<table>
<thead>
<tr>
<th>With open end</th>
<th>Tenant is responsible for residual price and ensures the asset residual value at the end of contract.</th>
</tr>
</thead>
<tbody>
<tr>
<td>With close end</td>
<td>Tenant delivers asset at the end of contract and is not responsible for unrealistic estimate of residual assets</td>
</tr>
</tbody>
</table>

### Possibility of termination

<table>
<thead>
<tr>
<th>Revocable</th>
<th>Tenant can terminate lease without any high costs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrevocable</td>
<td>Tenant cannot terminate lease unless he pay high costs.</td>
</tr>
</tbody>
</table>

### Side expenditures

<table>
<thead>
<tr>
<th>Repair and Maintenance</th>
<th>Tenant transfers paying taxes, insurance maintenance and repair costs to landlord</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net</td>
<td>Tenant pays taxes and insurance maintenance and repair costs himself</td>
</tr>
</tbody>
</table>

### Leasing types based on geographical region

<table>
<thead>
<tr>
<th>Domestic leasing</th>
<th>Tenant and landlord live in the same country.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overseas Leasing</td>
<td>Tenant and landlord live in two different countries.</td>
</tr>
</tbody>
</table>

### Others

<table>
<thead>
<tr>
<th>Sales aid lease</th>
<th>In this type of leasing, landlord gives asset to tenant in the form of buying facility leasing. This leasing help to production sel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct financing leasing</td>
<td>Landlord sells asset but record sell price as demands.</td>
</tr>
<tr>
<td>Sell and re-rent contracts</td>
<td>Tenant is firstly the owner of asset but sells it in order to release his money and then re-rent it in order to use it.</td>
</tr>
<tr>
<td>Combined leasing</td>
<td>It is a kind of operational leasing that tenant is considered as the owner of asset. Therefore, he benefits from tax benefits of ownership.</td>
</tr>
<tr>
<td>Free from tax leasing</td>
<td>It is kind of financial leasing and is special for USA fire departments. In this leasing, landlord is exempted from tax payment and reduces leasing cost.</td>
</tr>
<tr>
<td>Asset region value leasing</td>
<td>It is kind of operational leasing that creates buy option at the end of contract based on asset region value.</td>
</tr>
<tr>
<td>Comprehensive leasing</td>
<td>This type of contract control and harmonize leasing that will happen at future time.</td>
</tr>
<tr>
<td>Deferred Leasing</td>
<td>Payment of the first installment will be delayed until equipment reach income.</td>
</tr>
<tr>
<td>Urban Leasing</td>
<td>It is used in order to service for state governmental organizations.</td>
</tr>
<tr>
<td>Step leasing</td>
<td>Paying installments will increase in step form.</td>
</tr>
</tbody>
</table>

### Benefits of Leasing

**A) Speed**

One of the features of leasing industry is speed in decision making based on studying aspects of adequate recognition of field in addition to operation accuracy and technological knowledge, in a way that considering the least risk; it makes possible responding customers at the minimum time.

**B) The possibility of efficient use of liquidity**

As much of applicants’ devices cost is provided trough leasing, therefore, releasing financial resources and liquidity, applicants can use it for resolving financial needs.

**C) Financial and tax benefits**

Leasing is lease during rental time and asset depreciation is recorded only in owner offices and tenant is not legally responsible in this case.

**D) Leasing anti-inflation**

Leasing is anti-inflation because it does not inject financial resources in market, and prevents from direct entrance of resources to market and Stock which are assigned as facility.

**E) Employment**

Leasing is one of the effective methods of employment, because it provides occupational conditions for experts or persons that are able to work but don’t have enough equipment. It helps employment and maintaining it through helping producer units.
F) Replacement
leasing make possible replacement of machinery, equipment and vehicles in order to match with industry and technology.

G) The possibility of machinery acquisition
in some leasing (credit leasing) tenant can own leased equipment, devices or machinery at the end of contract through paying low price (residual value) that is determined at the time of signing contract

LEASING CREDIT RISK
Credit institutions encounter different types of risks. There is no possibility for activity without accepting risks. Recognizing and analyzing risk, we can manage and control risk. Types of risks that leasing faces, include:

1. Credit Risk
2. Transaction or Operational Risk
3. Compliance or Legal Risk
4. Reputation Risk
5. Interest Risk
6. Liquidity Risk
7. Price or Market Risk
8. Foreign Exchange Risk
9. Strategic Risk

As mentioned before, the most important risk in leasing industry is Credit Risk.

AIMS OF CREDIT RISK MANAGEMENT
Credit risk concept for banks and credit institutes refers to the possibility of loss in a credit operation like deterioration or financial failure of borrower that result in losing assets of banks and credit institutes. Credit risks are among important risks that banks and credit institutes encounter. Effect of operation loss is non-predictable without following a proper management system of credit risk. In fact the aim of credit risk management is to prevent from this type of credit occurrences, inhibition from credit risk in Capital of Credit Financial Institutions, maintaining stability of assets and ensure from appropriate return therefore, this type of system will create credit Portfolio that its aim is to reach proper return of assets.

COMPONENTS OF CREDIT RISK
Credit risk is a risk that borrower is not able to payment of interest and principal debt based on contract terms. Credit risk means that customer belays in loan payment or does not pay, and this in turn will result in problems in cash flow and negative effects on liquidity and investment return.

Despite inventions in financial services, this type of risk is the main reason of credit and financial institutes’ success.

Credit Portfolio Management: one of the risk control mechanism in management of credit risk is to write policies and related rules with credit portfolio.

In credit portfolio management, it must be determined what limitations to be granted for customers, what is the weight of each fund in the portfolio composition. Observers must pay attention to legal policies that are approved by Board of directors and are executed by management. This importance is true on loan because it requires financial institute to follow from perfect system in order to manage and control credit risk, loan policies must reflect the way of managing credit portfolio and range of allocating credit facilities. This policy must contain complete flexibility against changes of conditions in financial institutes’ assets and market variable environment. Among the most important credit policies of managing credit portfolio, below cases are considered:

A) Limitation on not repaid loans
in this case, we must reduce possible losses through applying restrictions on unpaid loans, including reducing debt ceiling, obtaining additional obligations from borrower and guarantor and taking legal actions

B) Studying the credit diversity
In this case, we must consider issues such as correlation between the risk of non-repayment of loans and correlation between default losses and loans credit rating and credit instruments.

C) Distributing loans through classifying loans
Such as consumer- commercial loans, real estate

D) Loan pricing
Covering incurred costs due to default and monitoring loan and management fees must be considered and costs must be balanced consistent with changes in prices or competitive factors

E) Lending Jurisdiction
it must be determined based on credit institute size.

F) Estimation policy for the maximum losses resulting from default
Credit institutes must estimate the maximum amount of loans’ default and other credit tools in credit portfolio. The ratio of loan to market value of mortgage

G) Receipt
In loan policy, all commitments of parties must be inserted and proper reports for delivering to Board of directors must be identified that needs tracking and organized system in order to receive demands.

H) Financial information
Credit extension is possible when accurate and complete information of calculation are obtained that represent financial and credit status. As, customers’ credit capacity is determined based on their financial status, therefore, loan policies to customers must include instructions and defined standards on the way of reporting financial statements, reporting period, auditing practices and selecting auditor so that financial information obtained from clients t be reliable
Credit risk is the primary reason of bankruptcy in these institutions due to limited regulatory environment, existence of minimum prescribed standards and guidelines and given the asset combination of financial and credit institutions. The proper functioning of credit risk management of banks and credit institutions is based on identification of risk inherent factors in lending operations.

The main credit risk management policies can be placed in three categories:

1. Includes intake and risk reduction policies, under this policy, credit institution tries to reduce credit risk, lending certain sectors and non-lending to venture investments and diversification of assets combination and reducing expected returns.
2. Includes asset classification policies. Institute assets are classified according to accessibility through conducting future assessments based on these policies. Classifying assets, analyzing credit portfolio status and taking appropriate measures in order to optimize their composition will be provided.
3. Set of policies includes identifying the range of non-refund losses for loans and determining savings for covering losses

In evaluating the performance of loans with losses loans with performance, status - consistency - loans loss saves- management's ability to monitor, tracking and receiving deferred loans, the adequacy of loan policies effectiveness and lending practices- adequacy of identification process effectiveness- monitoring and reducing risk of credit portfolio.

THE SCOPE AND APPLICATION OF CREDIT RISK MODELS

A) Credit approval

Decision making in the field of approving or rejecting loan demand by customer is among the main functions of credit risk models.

B) Determining Credit Rating

Rating of each credit tools represents the degree and rate of credit risk or in other words, the likelihood of non-repayment of principal and interest at determined deadline.

C) Credit pricing

Credit risk models determine risks of all bonds and loans thorough estimating probability of non-repayment and size of potential losses of non-payment and by the way, make possible pricing and determining interest rate.

D) Timely financial warning

One of the credit risk models functions is on time warning of events in credit portfolio of credit institutes and banks in order to quick remedial measurements.

E) Receipt methods

If credit model predicts that borrower will face with short time liquidity problems, in this case, it can provide the opportunity for payment of principal and interest loan instead to reject credit or reduce it.

THE POPULAR MODELS OF CREDIT RISK MEASUREMENT

Among the common credit risk models in bank and credit institute systems, below models are mentioned:

A) Expert systems

Expert systems and judgment analyzes: one of the common expert systems is five credits that is used in banks lending administrations. Main components of this system include:

1. Character and reputation of credit recipient
2. Capital
3. Capacity and profitability
4. Mortgage
5. Conditions of economic period and its effect on profitability

B) Neural systems

artificial neural network tries to learn the relationship between inputs (financial ratios, economic trends, quality management and ...) and outputs (Credit status of borrower) by repeating sampling from past information set of input/ output through imitating human nervous and brain system. The main benefit of neural network over expert system is that when data are not complete or have parasites, data are estimated logically from past learning.

C) Grading systems and Credit Rating Systems

Credit scoring system based on accounting information: Financial analysts of different financial systems compare potential borrower with industry scale and make decisions based on comparing company and industry ratios process. In general, there are four methodological forms for credit ranking models, including:

1. potential Linear Model
2. Logit Model
3. Probit Model
4. Discriminant analysis Model
Altman Z Model: Edward Altman studied for the first time the effects of financial ratios different combinations for predicting companies’ financial distress in 1986. Using this model in bank causes that if Z ranking of Borrower Company is less that critical limit, loan request will be rejected. Altman selected five ratios in final model that seemed are statistically important for predicting bankruptcy, including:
1. Ratio of flow capital to total assets
2. Ratio of retained earnings to total assets
3. Ratio of income from interest and taxes to total assets
4. Ratio of capital market value to book value of total liabilities
5. Ratio of sales to total assets

CONCLUSION
Leasing needs special attention of policy makers and practitioners of state economic systems as a new industry. Declaring this industry as one of the important methods for funding in domestic and international economy can solve problems of production, investment and economic projects. According to the importance of leasing industry in economy and its different benefits, it leads to economic prosperity through increased demand, increased production, increased employment, price stability and lower inflation and improves product quality and increase competitiveness in global markets through strengthening domestic manufacturers and providing competition requirements.

This is important based on government policies to join world trading organization (WTO) and governments must reduce costs of leasing companies’ services through supporting leasing industry, determining rules and regulations of allocating low cost resources, providing tax cuts, enacting supportive laws and regulations like other countries and make possible for society to take advantage. Therefore, credit managers of leasing companies can estimate probability of default risk before lending using models and do appropriate measures for protecting portfolio of facilities from losses.

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