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A Unified Framework for Credit Evaluation for Internet Finance Companies: Multi-Criteria Analysis Through AHP and DEA

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Internet finance is China's newest hot topic in its booming economy. Success story of entrepreneurial ventures such as Alibaba have paved way for numerous entrepreneurs to establish innovative start-ups and enterprises. Presently, number of up and coming small and medium enterprises (SMEs) is above 80% of all new enterprises in China, involving 39 major categories of industrial sectors. Such enterprises are hugely backed by Internet finance companies for funding and easy transactions. It is important to develop efficient methodology and improve existing ones for credit assessment so as to aid Internet finance companies in making effective and symmetric funding decisions. To evaluate the performance of SMEs effectively, we propose an Internet finance credit index system, which includes financial, credit, enterprise development and Internet financial status. We combine the Analytic Hierarchy Process (AHP) and data envelopment analysis (DEA) to form a unified evaluation framework, which has the ability to address the subjective (AHP) and the objective (DEA) concerns, respectively. The proposed framework can assist Internet finance organizations to develop a transparent, unbiased and

integrated framework for evaluating credit index of SMEs and start-ups. The result of our framework identifies the most important characteristics of SMEs and start-ups which contribute to overall credit rating, provides valuable references for Internet financial organization to make better resource allocation (funding decisions). The framework for credit evaluation also provides start-ups and SMEs an insight into improving their credit rating.

Keywords: Credit index; Internet finance; small-medium enterprises; data envelopment analysis; analytic hierarchy process; multiple criteria analysis.

1. Introduction

With the rapid advancement in information technology and for profit financial service industry, there is a manifold increase in the interaction between Internet and finance, hence giving rise to the increasingly popular and indispensable Internet finance industry. Internet finance is an extension and expansion of traditional financial services which additionally relies on Internet data as the basis and network as a platform. This has revolutionized an alternative platform of financing instead of relying on conventional banks or the traditional capital market. Thanks to the development of "big data", Internet finance companies can incorporate easily accessible online information of the concerned company's past performance and calculate its chance of defaulting on loans.

Based on the role Internet finance business plays, the existing model of Internet finance can be divided into the following three categories:

(1) Companies that provide customers traditional financial services with the help of Internet platform, for instance, online banking;
(2) Small Internet loan companies who rely on existing resources (such as e-commerce platforms), collect and analyze Internet data to get credit support and then provide credit services such as Ali finance (established by Alibaba group holding, an e-commerce giant in China, in 2011, to provide loans to vendors);
(3) The third kind of company is an intermediary of capital supply and demand that provides financial information services for both sides. The intermediary also provides Internet platform for financing, for instance, peer to peer lending (often abbreviated as P2P lending) where individuals or businesses are directly matched with potential money lenders through online service. In China, PPDAI is a leading online platform for peer-to-peer small unsecured loans.

The first type, mentioned above, is the extension of traditional finance service on Internet platform, while the latter two modes are expansions of financing via Internet — known as Internet financing. Internet financing provides a huge platform for solving the financing opportunities for small and medium-sized enterprises (SMEs), especially in developing countries. In China, the combined contribution of SMEs to GDP is more than 60% and they offer more than 80% of jobs in towns, playing a pivotal role in the economic development of China.[1]

For SMEs, Internet financing reduces transaction costs significantly and improves the ease with which these companies can operate. Credit efficiency scores and rating is an effective tool that Internet finance companies can and do adopt in funding SMEs, keeping a track of their past and current statuses and it aids in the improvement of the process and costs of Internet financing.

Development of new companies as well as evolving business environments will face new challenges inevitably. An important step in the development process of Internet finance is to build a uniform credit evaluation system. Due to lack of uniform standards of credit evaluation system, Internet banking faces many ambiguities and this may interfere with the transparency of Internet financing business. Also, due to lack of a standard credit evaluation system and poor management, many new online business enterprises as well as Internet finance companies do not focus on the prime performance factors and ultimately face bankruptcy, e.g., zhongdaiwang.com, bankrupted merely 28 days of online business that led to the shortest survival time record of Internet lending platform. Therefore, it is crucial to design a rational and effective credit metrics system for the development of SMEs and upcoming Internet finance companies.

At the micro level, credit evaluation is beneficial for SMEs to improve their credit under the constraints of credit indices and to solve their financing problem. At the macro level, it is beneficial for standardized development of Internet banking and promote coordinated economic development. In developed countries, Internet banking credit evaluation systems for SMEs are more developed, owing to their strong use of information systems and data analytics. In this paper, we concentrate on developing countries, primarily relying on data and Internet business practices in China.

There are three reported modes in the development of credit industry in developed countries[2]:

(1) Central credit register-based credit management system: information collection agency is part of the central bank and it is not for profit system. Business and personal credit information is mainly dispersed for banks to use for internal and national policies. This system is used by countries such as Germany and France.
(2) Membership-based credit management system: here the agency is responsible for credit businesses and individuals. The agency sustains operations and charge to provide information services to member banks, but not for profit services, such as in Japan.
(3) Market-oriented enterprise credit management system: here credit institutions operate according to market and for profit. It is managed and constrained under government's legislation. The market-oriented system helps to improve operation efficiency of agencies and in expanding their scope of services, while maintaining quality. Such a system is extensively used in Britain and the USA where Internet financing dates back to decades.

Credit index is an established system in developed countries based on the credit industry structure. The States established departments, laws and industry self-regulation protocols to supervise the credit standings of the companies. Relying on good credit guarantee mechanism, the development of Internet finance is better in developed countries. In developing countries, China for example, due to lack of legal and regulatory authorities, there are no corresponding credit rating systems and there are few studies about credit metrics. In China, SMEs financing problems are known to exist for a long time. Internet banking provides an efficient way to solve this issue with rapid development in recent years. The lack of systematic credit metrics, however is a hidden danger in China's Internet financial development. It promotes credit metrics reversely.

In terms of credit investigation, the "credit reporting industry regulations" have been adopted in China since December 2012. The regulations encourage transparent and open business credit information, and help in solving financing difficulties caused by asymmetric information for SMEs. The introduction of these regulations for SMEs in Internet banking created a basis for the design of credit metrics.

The design of credit index systems in developing countries is a recent and ongoing process, and data for SMEs is deficient. Therefore, the main method for SME credit index design is expert evaluation, analytic hierarchy process (AHP) and fuzzy mathematics.

The paper is organized as follows. Section 2 provides literature review. In Sec. 3, we identify the relevant criteria for evaluating SMEs credit in Internet finance industry. Based on these criteria, we construct a AHP-based credit evaluation system in Sec. 4. The credit rating results from the proposed model is validated in Sec. 5. Section 6 employs the DEA to derive the efficiency measures, which are combined with AHP to form a holistic evaluation approach. Numerical results are presented in Sec. 7 to validate the proposed model. Section 8 summarizes and concludes the paper with managerial implications.

2. Literature Review

Rapid development of Internet finance has provided a chance for SMEs to deal with financing and debit issues. Internet finance has enabled lower transition costs and improved efficiency of loan processing. However, a standard procedure to evaluate credit rating of SMEs is an essential issue in loan transactions and is of primary concern for Internet finance service. This paper develops a standard framework for credit evaluation of SMEs by building upon new and existing parameters of credit evaluation. There is considerable amount of literature on credit evaluation, credit scoring or rating. Table 1 summarizes relevant works and clearly positions our research in the literature.

Credit evaluation and ranking for enterprises are indicators of the probability of the enterprises paying back the loan, following the contract with the financer. The higher the credit rating, the lower the risk to provide a loan for the enterprise.

Table 1. Existing literature and our contribution.

Author	Method	Factors	Applications	Strength	Weakness
Yurdaku and Ic[4]	AHP	Credibility, financial ratios, revenue generation capacity, cost control capacity, other factors	Credit evaluation in Turkey	Long-term credit measurement by considering both qualitative and quantitative criteria	Needs expertise and knowledge of various banking functions and requires extensive discussion and brainstorming sessions.
Min and Lee[17]	DEA	Six ratios representing firm's financial characteristics	Manufacturing firms' credit scoring in Korea	Ex ante data is not required	Considers only financial ratio data.
Khashman[8]	Neural network	24 numerical attributes	To approve or reject credit application	Delivers optimum performance by automatic processing	Qualitative factors are not considered and requires strict data input.
Che *et al.*[18]	FAHP (development factors) and DEA (to calculate weights)	Solvency, operational performance, credit status with 16 second layer elements	To solve loan overdue problems of bank to SMEs	Multi-criterion	Lack of detailed design for loan decision-making to SMEs.
Yu *et al.*[10]	SVM	Credit dataset of 24 variables	Classification	High performance	Sensitive to the input parameters.
Our research	Unified framework using AHP and DEA	Financial status, credit status, enterprise development and the finance situation of Internet with 17 lower-level elements	SMEs and start-up credit evaluation conceding Internet finance	Multi-criterion, unified framework of qualitative and quantitative analyses	Design for SMEs and start-ups limited to business environment in China.

Scholars have proposed several approaches including multi-criteria decision-making,[3,4] data envelopment analysis (DEA)[5,6] and machine learning methods such as neural learning networks,[7–9] and SVM.[10]

AHP[11] has been used extensively to establish relative importance of parameters in existing literature.[12,13] AHP was proposed by Saaty[14–16] based on comparative comparisons. The advantage of AHP lies in dealing with complex systems when considering multiple subjective criteria. Yurdakul and Ic[4] used AHP in credit evaluation to provide decision-making model for banks to use in traditional loan allocation decisions to determine the credibility of manufacturing firms.

Data envelopment analysis is yet another proven reliable methodology to measure the relative efficiencies of enterprises or systems with multiple inputs and multiple outputs. Min and Lee,[17] proposed a DEA-based credit scoring method to calculate credit scores, with ex-post information, to evaluate audited manufacturing firming with credit portfolio data in Korea. Cheng *et al.*,[6] also used DEA as an alternative credit-scoring model. Khashman[8] used neural network to decide whether to approve or reject a credit application with their proposed evaluation process.

Building upon previous contributions in credit evaluation and ranking study, we address credit evaluation for SMEs, especially targeted at Internet finance industry. We build a framework with AHP and validate the framework by DEA to integrate the advantages of both the approaches. As far as we know the only research that ever used a similar idea, was conducted by Che *et al.*[18] However, in their research, Fuzzy AHP is used to decide credit index and sequentially, DEA is applied to decide the weight of each financial parameter. In this paper, we propose a unified framework so that the final loan allocation decision uses both AHP and DEA results in an integrative evaluation approach. Both DEA and AHP evaluation results have been used for decision-making aid within a unified framework which is quite different from earlier attempts.

The purpose of this paper is to propose a new approach for credit evaluation of SMEs and startup enterprises under Internet financing environment in China where Internet finance is blooming but there is lack of an efficient and standardized credit evaluation methodology. As opposed to the previous well-known methods such as SVM, neural network and intelligent programming method which require exact financial information (ex-ante and ex-post data) or solely using the AHP method, the method we proposed integrate both AHP and DEA results. The unified framework combines multi-criteria analysis with input–output data provided by some Chinese SMEs for research purposes.

Typically, managers are faced with ambiguity when presented with multiple inputs and outputs to consider in their evaluations. Our framework will allow Internet finance companies to adopt a uniform multi-criteria-based credit rating protocol. This framework will also communicate the importance of strategic resource allocation by SMEs to survive in the current as well as foreseeable online environment. The proposed framework can be easily adopted by Internet finance companies

to calculate credit indices of SMEs, designed to improve credit metrics system in China. This framework, with minor revisions, can also be adopted by other developing countries as well.

3. Design of Internet Finance Credit Index of SMEs

According to existing literature,[6,18,19,25] we found that currently there are two ways to design credit metrics. The first method is to classify the indices according to qualitative or quantitative index and then select one model to calculate weight. The other method is to classify the indices according to more than these two angles, and then calculate weights. Our model is built upon operations, financial as well as sales dimension, and is hence resonant with the second method. On the basis of the characteristics of the credit indicators, there are four aspects and 17 specific indicators designed in this paper. The index system is shown in Fig. 1.

Synthesizing existing theoretical researches and practical development of Internet banking,[8,9] we design Internet finance credit indicators for the SMEs based on four major firm aspects: financial status, credit status, enterprise development and Internet financial status. In this paper, in order to highlight the design for Internet financial indicators particularity,[10] Internet financial aspect will be considered separately. In practice, the indicators can be integrated into other aspects to ensure integrity.

3.1. *Financial status*

Financial status of a firm reveals its operating conditions during a given period. It is a comprehensive reflection of a firm's business activities. The financial status of SMEs are mainly examined through solvency, profitability and operational capabilities of the enterprises.

Solvency is the foundation of enterprises to repay the debt, and it is one of the most important factors in examining and ranking enterprise credit status. It is examined through Asset-liability ratio, current ratio, quick ratio and cash ratio.[8] The indicators need to be standardized before being inculcated in the design.[20]

For most of the indicator values that have been included in the discussions that follow, we have quantized the intervals into absolute values on a scale of 0–100 (easy to map and calculate and easily perceivable by a manger), so as to enable computation of relative ratios between any two given parameters. Since AHP requires experts to evaluate various elements by comparing them to each other two at a time, using absolute values in place of the intervals becomes necessary for calculations involved in developing the AHP framework.

Asset-liability ratio is the ratio of total liabilities to total assets. According to relevant research data, asset-liability ratio is generally 40%–60% for most SMEs in China. We found the best value range and converted it into absolute value on a scale of 0–100, in accordance to some existing work.[21,22] The asset-liability ratio is set

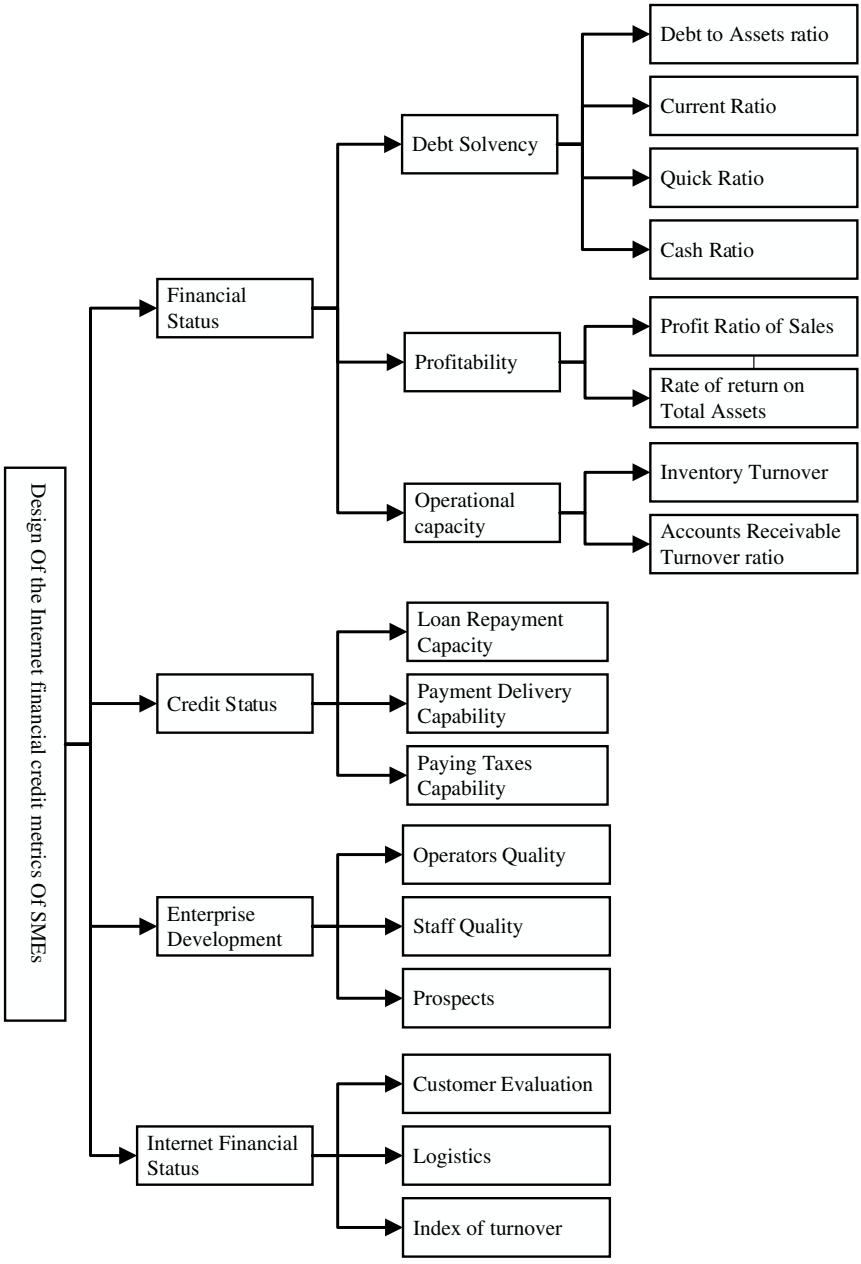

Fig. 1. The index system of Internet finance credit of SMEs.

as 0 when in between [0, 10] or [90, 100]; when the asset-liability ratio is between (10, 20] or [80, 90), the value can be set as 25; when the value is between (20, 30] or [70, 80), the index value is 50; when the value is between (30, 40) or (60, 70), the index is 75; and when the value is between [40, 60], we set a value of 100.

Current ratio and quick ratio are mainly used to measure the financial liquidity and short-term solvency of enterprises. Current ratio is the ratio of current assets to current liabilities and quick ratio is the ratio of the speed of moving assets to current liabilities. Quick ratio can avoid the phenomenon of poor fluidity caused by long cash time of inventory in calculation. Comprehensive consideration of the two indicators can measure the strength of short-term debt capacity of enterprises more precisely.

The critical reference value of current ratio is taken to be 2 and that of quick ratio as 1. When flow rate is less than or equal to 1, the value of indicator is 20; when between 1 and 2, the value of indicator is 60; when the flow ratio is greater than or equal to 2, the value of indicator is 100. When quick ratio is less than 0.5, the value of indicator is 20; when between 0.5 and 1, the value of indicator is 60; and when the quick ratio is greater than or equal to 1, the value of indicator is 100 (with reference to development in Ref. 21).

Cash ratio is used to measure corporate liquidity, i.e., the ability to pay current debts through calculation of the ratio of corporate cash and cash equivalent assets to current liabilities. Cash ratio is the ratio of the flow of monetary funds and financial assets to trading liabilities. The ratio should be generally greater than 20% for profitability. Overtop ratio indicates that the assets have been used reasonably and means low profitability. Overtop ratio can lead to increase in opportunity costs. If it is too low, it means that liquidity of assets of the company is poor. The indicator value is set as follows: when the cash ratio is between 40% and 60%, the indicator value is 100; when the ratio is between 20% and 40% or between 60% and 80%, indicator value is 60; when the cash ratio is less than 20%, or greater than or equal to 80%, the indicator value is 20.

Profitability refers to the ability to obtain profits. The competitiveness and growth potential of enterprises can be recognized by measuring this indicator. Profitability indicator is measured primarily by profit ratio of sales and return on assets (ROA). The profit ratio of sales is the ratio of sales to operating income. ROA is the profitability of assets, and it is the ratio of earnings before interest and tax to the average total assets. The bigger the value of the two indicators, the better it is for the SME. For consistency of calculation results, we set the indicator value to be 100 times of the original calculated indicator value. When the maximum profit ratio of sales and ROA is 100%, the indicator value is 100 (with reference to Ref. 22).

Operational capability index is the indicator to measure the proper running of the enterprises. In this paper, the index is evaluated by inventory turnover and accounts receivable turnover. Inventory turnover ratio is the ratio of operating income to average inventory balances. A high inventory turnover indicates that the business inventories were sitting for lesser time and the sales were stronger. Following Zhang *et al.*,[22] we assign the indicator a value of 100 when the inventory turnover rate is greater than or equal to 20.3. Similarly, when the inventory turnover rate is between 4.9 and 20.3, the indicator value is 60; and finally for the rate less than 4.9, we assign a value 20.

Accounts receivable turnover rate reflects the speed of accounts receivable turnover rate. It indicates average times of receivables converted to cash in a certain period. It is the ratio of sales revenue to accounts receivable average balance. Higher accounts receivable turnover rate will result in faster enterprise receivables, lesser bad debt losses, and higher liquidity of the SME. We take the SMEs' average value of 7.8 as benchmark. When the accounts receivable turnover ratio is larger than or equal to 24.3, the indicator value is 100; when the accounts receivable turnover rate is between 7.8 and 24.3 the indicator value is 60; when the accounts receivable turnover rate is less than 7.8, the indicator value is 20 (verified and as used in Ref. 23).

3.2. *Credit status*

The past credit situation of enterprises is an important factor to judge the company's future credit. In this paper, we measure the enterprises' credit status by the ability to repay loan, payment delivery capacity and the ability to pay taxes.

The main indicators for loan repayment ability is the company's loan repayment rate. Loan repayment rate is the ratio of the loan amount repayable to the total loan. Analyzing the past behavior of loan repayment of enterprises can aid in calculating the correct indicator value, and provide basis for decision-making.

The leading indicator of the loan payment delivery capability is payment delivery rate. Payment delivery rate is the ratio of loans to loan items. We can recognize the credit status of enterprises in business activities by calculating this indicator.

The main indicators of the ability to pay taxes is tax payment rate. Tax payment rate is the ratio of taxes paid to tax items. The index will help us understand the tax status of enterprises and reflect the companies' tax credit.

Our results remain consistent with the quantitative methods of profitability indicators. When the maximum value of the three primary indicators of credit status is 100%, the indicator value is set at 100.

3.3. *Enterprise development*

One of the characteristics of SMEs is their fast growth. Therefore, the development status of SMEs needs to be evaluated. In this paper, we analyzed three areas: quality indicating operators, staff quality indicators and development prospect.[6] Since these three indicators are difficult to measure by a number of specific data, we apply five reviews (well, good, fair, poor, very poor) to determine the corresponding indicator value (100, 80, 60, 40, 20).

3.4. *The financial situation of Internet*

The credit metrics in this paper is designed for SMEs financed by Internet finance companies. Therefore, the status of Internet finance are assessed and the indicators are set in the index system. The indicators for Internet finance companies are listed

separately in the index system. In practice, the indicators included can be integrated in the relevant sections to ensure integrity.

Under Internet finance, the main index considered are customers' praise rate, logistics, delivery speed and order transaction rate. Customers praise rate refers to the number of customers' praise reviews of the corporate under Internet finance to the total number of customers. The indicator is conductive to evaluate the enterprise value in Internet finance. Logistics delivery rate is the rate of total number of items shipped to the items sold. By calculating the credit index, we can recognize the business processes efficiency under Internet finance. Orders turnover rate is rate of the orders to passenger flow volume enterprise within a certain time. The indicator reflects the enterprise acceptance by customers.

The three indicators are re-quantized in order to ensure consistency. The indicator value is scaled to 100 times of the original calculated value. An Internet finance index of 100% means the all credit indicator values are 100.

4. Construction of SMEs Credit Evaluation System Under Internet Finance

When constructing the hierarchy model of AHP, the decision making goal, factors and specific indicators are organized as target layers, criterion layers and index layers, respectively.[14,16] Some indicators are subdivided into two secondary index layers. The hierarchy model provides the basis for determining the weight coefficients.[26]

The hierarchical model is shown in Table 2.

Pairwise comparison is conducted to determine the weight of factors in each level in the AHP model.[24] The pairwise comparison matrix elements a_{ij} is based on 1–9 scale method given by Saaty.[14] The scale is shown in Table 3.

Based on the scale stated in Table 3, the pairwise comparison matrix is established with judgment of experts in Internet finance industry. The matrix is shown in Table 4 and can be denoted by a. In developing this matrix, we considered opinions of finance professors and managers of credit departments of Alipay (a major Chinese payment platform), and customer service managers of banks who are in charge of analyzing credit of SMEs, who filled out survey questionnaires (included in Appendix A) in the form of ratings on 1–9 scale. The survey was carried out in Hangzhou city.

Hereafter, the entire AHP procedure and calculations have been presented in Appendix B and Appendix C (in tables detailing step by step calculations).

The results of AHP calculation are shown in Table 5.

Using AHP to calculate the weights of credit indicators, we conclude Internet financial status and credit account for a large proportion in the designed credit metric for SMEs. The results also show the characteristics of SMEs credit index in Internet finance.

We calculate normalized weight of each indicator (weights of itself multiply by weights of indicator in the previous level). Table 6 gives the sorted indicators according to the value of total weight in the system.

Table 2. Hierarchy model of SME credit metrics under Internet finance.

Target layer	Criterion layer	Index layer	Secondary index layer
Design of Internet financial credit metrics of SMEs	Financial status	Debt solvency Indicator	Debt to assets ratio
			Current ratio
			Quick ratio
			Cash ratio
		Profitability indicator	Profit ratio of sales
			Rate of return on total assets
		Operational capacity indicator	Inventory turnover
			Accounts receivable turnover ratio
	Credit status	Loan repayment capacity indicator	Loan repayment rates
		Payment delivery capability indicator	Payment delivery rate
		Paying taxes capability indicator	Tax payment rate
	Enterprise development	Operators quality indicator	Use five quantification points (well, good, fair, poor, very poor) = (100, 80, 60, 40, 20)
		Staff quality indicator	
		Prospects indicator	
	Internet financial status	Customer evaluation	Customers praise rate
		Logistics indicator	Logistics delivery rate
		Turnover indicator Index	Turnover rate

Table 3. Scale for judgment.

Scale	Meaning
1	Equal importance of two elements
3	Moderate importance of one element over another
5	Strong or essential importance
7	Very strong or demonstrated importance
9	Extreme importance
2, 4, 6, 8	Intermediate values
Reciprocals	Factors i and j comparative judgments a_{ij} then j and i compare as a_{ji} and $a_{ji} = 1/a_{ij}$

Table 4. Pairwise comparison matrix.

	Financial status	Credit status	Enterprise development	Internet financial status
Financial status	1	1/3	2	1/3
Credit status	3	1	5	½
Enterprise development	½	1/5	1	¼
Internet financial status	3	2	4	1

Table 5. Weights of all indicators.

Target layer	Criterion layer	Weight	Index layer	Weight	Second index layer	Weights
Design Of Internet financial credit metrics Of SMEs	Financial status	0.138	Debt Solvency indicator	0.320	Debt to assets ratio	0.096
					Current Ratio	0.181
					Quick ratio	0.257
					Cash Ratio	0.466
			Profitability indicator	0.123	Profit ratio of Sales	0.333
					Rate of return on total assets	0.667
			Operational capacity indicator	0.557	Inventory turnover	0.333
					Accounts receivable turnover ratio	0.667
	Credit Status	0.335	Loan repayment capacity indicator	0.231		
			Payment delivery capability indicator	0.104		
			Paying Taxes Capability indicator	0.665		
	Enterprise Development	0.082	Operators Quality indicator	0.589		
			Staff Quality Indicator	0.159		
			Prospects indicator	0.252		
	Internet financial status	0.445	Customer Evaluation	0.334		
			Logistics indicator	0.142		
			Index of turnover indicator	0.525		

Table 6. Order of credit index importance.

Index	Normalized weight	Order
Turnover rate	0.2336	1
Tax payment rate	0.2228	2
Customers praise rate	0.1486	3
Loan repayment rate	0.0774	4
Logistics delivery rate	0.0632	5
Accounts receivable turnover ratio	0.0513	6
Operators Quality	0.0483	7
Payment delivery rate	0.0348	8
Inventory turnover	0.0256	9
Prospects	0.0207	10
Cash Ratio	0.0201	11
The quality of staff	0.013	12
Rate of return on total assets	0.0113	13
Quick ratio	0.0113	14
Current ratio	0.008	15
Profit ratio of sales	0.0057	16
Debt to assets ratio	0.0042	17
Total	1.00	

The results are demonstrated as follows.

The weight of Turnover rate, Tax payment rate and Customers praise rate represent more than half of all indicators. Turnover rate and customer praise rate, thus have a direct impact for the development of SMEs in Internet finance. The payment of taxes is important when considering business credit.

The Loan repayment rate, logistics delivery rate, accounts receivable turnover ratio, quality of the operators and payment delivery rate score similar weights, and the total weights of the five indicators are 1/4 of the total weights of all. Therefore, they also play a very important role.

In addition to the indicators of credit status and financial status, index values are also assigned to the financial and enterprise development (i.e., accounts receivable turnover ratio and operators quality). Four criteria level indicators have been reflected in the design of the indicator at this point.

The other nine indicators (inventory turnover, prospects, cash ratio, staff quality, ROA, quick ratio, current ratio, profit margin and debt to assets ratio) together accounted for about 1/4. These indicators represent information on SMEs' financial, development, and contribute to assess a company's credit standing.

5. Validation of AHP Credit Rating with Data

In this section, we take an Internet company in China to validate credit evaluation index with public data. The case company is in Fujian, China. The company's brand X (real brand name undisclosed due to proprietary issues) was founded in 1990, to become a leader in modern lifestyle enterprises and provides consumers with a wealth

Table 7. Partial data of company X.

Item	unit: Yuan	Item	unit: Yuan
Total liabilities	2208186085	Average total assets	6393490245
Total assets	6847731416	Operating income	2773490672
Current assets	5280508728	Average balance of inventories	561399041
Current liabilities	2117612755	Net sales	1277729652
Quick assets	3949474131	The average balance of accounts receivable	669854760.5
Money funds	2514560110	Praise (Five-Star)	84534
Trading financial assets	0	Total number of employee	95089
The total profit	471283105	Praise of shipment (Five-Star)	85152
Operating income	2773490672	Orders	2332
Earnings Before Interest and Tax	444947060	Traffic	87667

of products. In 2004, X become China's garment industry's first listed high-tech company. The company's management system centered on brand and orientation toward lifestyle industries. The company X's annual report and data of Online retail stores of brand X are collected, and partial data is shown in Table 7.

However, three indicators of the status of credit (loan repayment rates, loan delivery rate, and tax payment rate) are not public. Therefore, we use scenario analysis to make up the shortage of data, and there are three scenarios as stated below.

Scenario 1: The companies have good credit record. There are no overdue loans, payment arrears, tax evasion condition, or loan repayment rates, and loan repayment rates, loan delivery rate, and the tax payment rate values are all 100. In this scenario, index values can be calculated according to index system and index formula (Table B.1).

Scenario 2: Enterprises credit status is poor. There are loans overdue, payment arrears or tax evasions dictate its finances. Then, it is assumed that loan repayment rates, loan delivery rate, and tax payment rate values are 20% and corresponding index value is 20. In this scenario, index values can be calculated according to index system and index formula (Table B.2).

Scenario 3: Scenarios 1 and 2 are two extreme situations, and appear rarely in reality. In Scenario 3, we set the situation closest to reality. For example, due to capital chain factor, there appear some small amounts of overdue loans and loans in arrears, but rate of paying taxes is in good condition. In this case, we assume business loans repayment rate as 70%, loan delivery rate as 90% and tax payment rate as 100% and the corresponding index values are 70, 90, 100, respectively. In this scenario, index values can be calculated according to index system and index formula (Table B.3).

The case data validates that the design of indicators in this paper is operable. The final score of company credit evaluation can provide a basis for decision-making. We suggest that, when the credit score of company is 60 or more than 60, loans can be safely provided.

6. Integration of AHP and DEA

We looked at the 2014 Annual Income Statements of eight more medium Chinese Online Finance companies. For the sake of privacy, we do not state their names but instead denote them by Company A, B, C, D, E, F, G and H. Their consolidated income statement for 2014 is given in Tables B.4 and B.5.

For AHP analysis, we assigned the prior calculated weights of each criteria to the eight companies to come up with their priorities and rank them accordingly as given in Table 8. The company with the best credit rank, i.e., company G follows the subjective criteria set by our AHP framework to the core. Whereas, company E has the lowest AHP credit rank among all these eight companies.

Next, we perform the objective DEA, for which we categorized and combined the inputs and outputs of the companies as shown in Fig. 2.

We have eight companies, namely A, B, C, D, E, F, G and H, as our Decision Making Units (DMUs). Since, the number of decision making units is eight (since we have access to data of eight companies), so we add the operating costs, sales expense and management costs to together give a single input in the form of total monetary investment of the company. Likewise, we add the operating income, investment income and nonoperating income to together give a single output in the form of total monetary income of the company. The DEA software gives us the ranking and

Table 8. AHP result.

Rank	Company	Normalized priority score
1	G	0.30213
2	H	0.19906
3	A	0.13952
4	B	0.11942
5	F	0.09067
6	D	0.05188
7	C	0.05082
8	E	0.0465

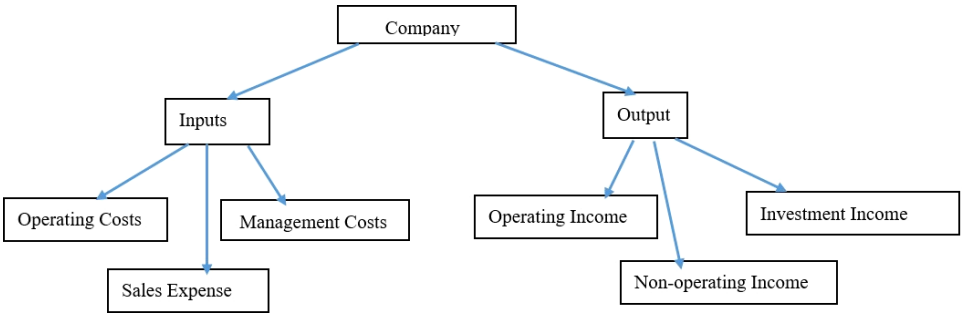

Fig. 2. Input and output of DEA model.

Table 9. DEA ranking of companies.

Rank	Company	Efficiency
1	F	1.00000
1	H	1.00000
3	G	0.68430
4	A	0.25546
5	B	0.25188
6	D	0.02189
7	E	0.00227
8	C	0.00064

efficiencies of each of the eight companies according to their 2014 annual income report data and uses no biases.

We have used DEA BCC model, specifies as an input oriented model. The Return to scale (RTS) is variable. The missing values and negative values of parameters have input as zero, for simplicity of calculations. For example, negative operating profits for company C (Table 10) simply means no profits (rather losses). Similarly, negative investment income of company B (Table 10) simply means the company incurred losses with respect to the investments made by it, which can be summed as no profits. Also, missing operating costs of company C (Table 10), as reported internally by the firm, indicated that no significant operating costs were involved in that particular year, due to surplus carry over from last year. The DEA results are reported in Table 9.

We then combine the AHP/DEA results in a matrix for a detailed visualization and analysis of the credit standing of the eight companies, and decide which of these companies should be funded by an Internet Finance Company. Figure 3 shows the combined performance.

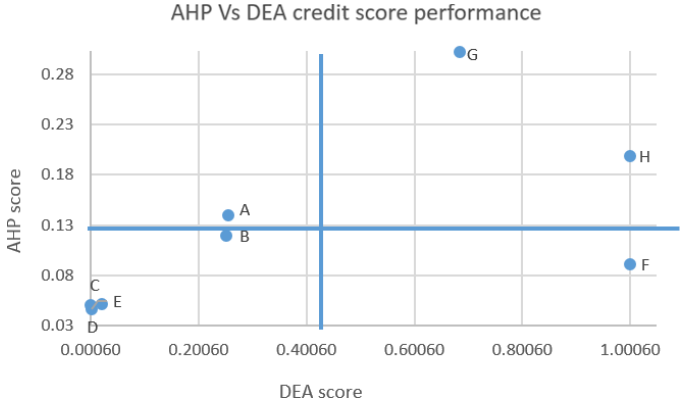

Fig. 3. AHP/DEA combined performance.

7. Numerical Results

In Fig. 2, we have categorized the four quadrants based on the mean AHP score and mean DEA score. The mean DEA score for the eight companies is 0.2402 and the mean AHP score is 0.125. On the objective scale, company C has the lowest DEA efficiency score of 0.000642, while both company F and company H have the highest DEA score of 1. On the subjective scale, company E has the lowest AHP priority score of 0.0465, while company G has the highest AHP priority score of 0.30213.

The first quadrant is the "low risk" zone and denotes the best credit rating zone for a company since any company in this quadrant has excellent AHP score (meaning, it has performed good on our AHP framework) and also has a good DEA ranking (according to its 2014 annual performance). So, companies G and H have a good overall credit index which have reflected its annual performance in 2014 and hence should be given top priority over the remaining companies, while being evaluated by Internet Finance company. In other words, Internet Finance Company should be aligned towards financing companies G and H, which have the highest credit standing among all the eight companies.

A company in the second quadrant has good subjective scores according to our AHP framework but has a comparatively poor DEA ranking according to its 2014 annual performance. So, company A has a modest overall AHP credit index and moderate DEA efficiency scores. Internet Finance Company should wait and look into the future performance of company A and then decide on whether or not to finance company A.

The third quadrant is the "high risk" zone and denotes the worst situation for a company since any company in this quadrant has poor priority score according to our AHP framework as well as poor DEA efficiency score according to its annual 2014 performance. So, companies B, C, D and E have a poor overall credit index which reflected its poor annual performance in 2014. Hence, Internet Finance Company should not finance companies B, C, D and E because they will most likely default in their loans repayment.

Company F in the fourth quadrant has a good DEA score according to its 2014 annual performance but a somewhat low credit ranking according to our AHP framework. So, Internet Finance Company should use its conditional judgement on whether to incorporate slight risk and finance company F which has otherwise consistent industry performance.

Thus, we can see that an Internet finance company, if presented with the above mentioned companies A, B, C, D, E, F, G and H as prospective companies for funding, can take a decision as described above, by using our AHP framework and factoring the DEA results as well.

From the above analysis, we see that company B, C, D, E, G and H have consistent and comparable performance on our multi-criterion framework. So, Internet finance company should clearly finance companies G, H and deny companies B, C, D, E. Company A performs fair on the AHP model but defaults in its DEA scores.

Internet Finance Company should wait for future performance data on company B. For company F, however, Internet Finance Company can sanction a loan with some minimum level of risk associated. Thus, while making a funding decision, Internet Finance Company should calculate the average AHP score of prospective SMEs according to our subjective AHP framework and their parallel DEA score according to the objective DEA input/output model and then decide to fund the company with least defaulting risk on loans.

8. Conclusions and Managerial Implication

The undertaken study is based on Internet finance development in China. The paper is designed to focus on the establishment of a hierarchical model to develop credit index ratings and determine the weights of individual parameters. The final score can be used to determine whether Internet Finance Company should finance a specific SME/start-up. We have provided a standard and comprehensive credit index rating system based on the subjective judgements in form of an AHP model and provided a uniform framework, in combination with objective DEA performance.

Internet finance companies can use this model, when deciding when and why to provide loans to an SME and also coordinate with existing partners. We believe individual managers at different levels of SMEs in China as well as other developing countries can also use this standard framework to improve their credit ranking as well as maximize their individual profitability. However, the tentative users of the proposed method can do so completely at their responsibility and neither the authors nor the publishers can take any liability for the exact outcomes. For precise formulation, it might be worthwhile to consult a competent lawyer, familiar with the specific country's legal issues and bindings.

There are several limitations in this research that offer opportunities for future research. The computations carried out in the paper, to analyze and apply the developed framework to practical situations, is that we have worked with a small data sample of only eight companies. This is because of limited data available which might be a potential source of sampling bias. We have used Internet financial information provided by these eight startups for consultation and research purposes. AHP is influenced by subjective factors, which is another limitations of the approach. In further research, we can improve the indicator system to overcome the effect. Also, in practical evolution in enterprises, the enterprises need to provide relative data. The quality of the operators, the quality of staff and prospects are evaluated on person to person opinions, and hence partiality and bias cannot be completely avoided. As a result, the question of external validity might arise out of our analysis. But, in developing the pairwise comparison matrix for the AHP framework, we considered opinions of finance professors and managers of credit departments of Alipay, and customer service managers of banks who are in charge of analyzing credit of SMEs in varied fields, so the actual framework is expected to be pretty uniform.

Also, in this paper, we base our calculations on average social standards, which may be a limitation for some special industries. An interesting future research scope may be to specifically analyze different industries and come up with a model to further consolidate the entire Internet Finance and SME community. Furthermore, we have primarily focused on companies and business environment in China. Further studies involving other developing nations, such as India, Brazil, Thailand, etc. can be pursued to come up with a semi-global approach to credit index rating and open up international transactions between Internet Finance companies and SMEs.

Appendix A. Survey to Develop Pairwise Comparison Matrix

The survey is divided into five parts. For each part, the following instructions are given below:

For the first blank, put the parameter, you think is more important to the other.

For the second blank, please use the following 1–9 rating scale and decide on the best number to describe the relative importance of the parameter chosen in the first blank to the other parameter:

Scale	Meaning
1	Equal importance of two elements
3	Moderate importance of one element over another
5	Strong or essential importance
7	Very strong or demonstrated importance
9	Extreme importance
2; 4; 6; 8	Intermediate values

Part I

To evaluate financial credit performance, which indicator do you think is more important compared to another? And how about their relative importance?

1. Financial status versus Credit status?_____is_____than the other.
2. Financial status versus Enterprise Development?_____is_____than the other.
3. Financial status versus Internet financial status?_____is_____than the other.
4. Credit status versus Enterprise Development?_____is_____than the other.
5. Credit status versus Internet financial status?_____is_____than the other.
6. Enterprise Development versus Internet financial status?_____is_____than the other.

Part II

To evaluate financial status, which indicator do you think is more important compared to another? And how about their relative importance?

7. Debt solvency versus Profitability?_____is_____than the other.
8. Debt solvency versus Operational capacity?_____is_____than the other.

9. Profitability versus Operational capacity?_____is_____than the other.

With respect to debt solvency, which is more important, and how important?

10. Current ratio versus Quick ratio?_____is_____than the other.
11. Current ratio versus Cash ratio?_____is_____than the other.
12. Quick ratio versus Cash ratio?_____is_____than the other.

With respect to profitability indicator, which is more important, and how important?

13. Profit ratio of sales versus Rate of return on total assets?_____is_____than the other.

With respect to operational capacity indicator, which is more important, and how important?

14. Inventory turnover versus Accounts receivable turnover ratio?_____is_____than the other.

Part III

To evaluate Credit Status, which indicator do you think is more important compared to another? And how about their relative importance?

15. Loan repayment capacity versus Payment delivery capability?_____is_____than the other.
16. Loan repayment capacity versus Paying Taxes Capability?_____is_____than the other.
17. Payment delivery capability versus Paying Taxes Capability?_____is_____than other.
18. Financial status versus Enterprise Development?_____is_____than the other.

Part IV

To evaluate enterprise development, which indicator do you think is more important compared to another? And how about their relative importance?

19. Operator's quality versus Staff quality?_____is_____than the other.
20. Operator's quality versus Prospects?_____is_____than the other.
21. Staff quality versus Prospects?_____is_____than the other.

Part V

To evaluate Internet financial status, which indicator do you think is more important compared to another? And how about their relative importance?

22. Customer evaluation versus Logistics?_____is_____than the other.
23. Customer evaluation versus Index of turnover?_____is_____than the other.
24. Logistics versus Index of turnover?_____is_____than the other.

Appendix B. Tables

Table B.1. Index calculation table in Scenario 1.

Second index layer	Formula	Calculation results	Index value	Weights	Final results
Debt to assets ratio	Debt to assets ratio = total liabilities/ total assets * 100%	0.322	75	0.0042	0.32
Current ratio	Current ratio = current assets/current liabilities	2.494	100	0.008	0.80
Quick ratio	Quick ratio = liquid assets/current liabilities	1.865	100	0.0113	1.13
Cash ratio	Cash ratio = (monetary fund + trading financial assets)/current liabilities * 100%	1.187	20	0.0201	0.40
Sales profit	Sales margin = gross profit/ revenue * 100%	0.170	17	0.0057	0.10
Return on assets	ROA = EBIT/Average total assets * 100%	0.070	7	0.0113	0.08
Inventory turnover	Inventory turnover = Revenue/average balance of inventories	4.940	60	0.0256	1.54
Accounts receivable turnover ratio	Accounts receivable turnover ratio = net sales/average accounts receivable balance	1.907	20	0.0513	1.03
Loan repayment rates	The loan to repay the loan repayment rate = text/Total items * 100% loans	1.000	100	0.0774	7.74
Payment delivery rate	Payment delivery rate = payment has been delivered items/total items * 100% of the purchase price	1.000	100	0.0348	3.48
Tax payment rate	Tax payment rate = tax already paid on the items/total items * 100% tax	1.000	100	0.2228	22.28
Operators quality	(well, good, fair, poor, very poor) = (100, 80, 60, 40, 20)	/	80	0.0483	3.86
The quality of staff		/	60	0.013	0.78
Prospects		/	80	0.0207	1.66
Praise rate	Praise rate = number of Praise customers praise/total number of * 100%	0.889	89	0.1486	13.23
Logistics delivery rate	Good delivery logistics delivery rate = number/total number of * 100%	0.895	90	0.0632	5.69
Orders turnover rate	Orders turnover rate = number of people/traffic * 100%	0.027	3	0.2336	0.70

Note: Final credit score core: 64.80.

Table B.2. Index calculation table in Scenario 2.

Second index layer	Formula	Calculation results	Index value	Weights	Final results
Debt to assets ratio	Debt to assets ratio = total liabilities/ total assets * 100%	0.322	75	0.0042	0.32
Current ratio	Current ratio = current assets/current liabilities	2.494	100	0.008	0.80

Table B.2. (*Continued*)

Second index layer	Formula	Calculation results	Index value	Weights	Final results
Quick ratio	Quick ratio = liquid assets/current liabilities	1.865	100	0.0113	1.13
Cash ratio	Cash ratio = (monetary funds + trading financial assets)/current liabilities * 100%	1.187	20	0.0201	0.40
Sales profit	Sales margin = gross profit/ revenue * 100%	0.170	17	0.0057	0.10
Return on assets	ROA = EBIT/Average total assets * 100%	0.070	7	0.0113	0.08
Inventory turnover	Inventory turnover = Revenue/average balance of inventories	4.940	60	0.0256	1.54
Accounts receivable turnover ratio	Accounts receivable turnover ratio = net sales/average accounts receivable balance	1.907	20	0.0513	1.03
Loan repayment rates	The loan to repay the loan repayment rate = text/Total items * 100% loans	0.200	20	0.0774	1.55
Payment delivery rate	Payment delivery rate = payment has been delivered items/total items * 100% of the purchase price	0.200	20	0.0348	0.70
Tax payment rate	Tax payment rate = tax already paid on the items/total items * 100% tax	0.200	20	0.2228	4.46
Operators quality	(well, good, fair, poor, very poor) = (100, 80, 60, 40, 20)	/	80	0.0483	3.86
The quality of staff		/	60	0.013	0.78
Prospects		/	80	0.0207	1.66
Praise rate	Praise rate = number of Praise customers praise/total number of * 100%	0.889	89	0.1486	13.23
Logistics delivery rate	Good delivery logistics delivery rate = number/total number of * 100%	0.895	90	0.0632	5.69
Orders turnover rate	Orders turnover rate = number of people/traffic * 100%	0.027	3	0.2336	0.70

Note: Final credit score: 38.00.

Table B.3. Index calculation table in Scenario 3.

Second index layer	Formula	Calculation results	Index value	Weights	Final results
Debt to assets ratio	Debt to assets ratio = total liabilities/total assets * 100%	0.322	75	0.0042	0.32
Current ratio	Current ratio = current assets/current liabilities	2.494	100	0.008	0.80
Quick ratio	Quick ratio = liquid assets/current liabilities	1.865	100	0.0113	1.13
Cash ratio	Cash ratio = (monetary fund + trading financial assets)/current liabilities * 100%	1.187	20	0.0201	0.40
Sales profit	Sales margin = gross profit/revenue * 100%	0.170	17	0.0057	0.10
Return on assets	ROA = EBIT/Average total assets * 100%	0.070	7	0.0113	0.08

Table B.3. (*Continued*)

Second index layer	Formula	Calculation results	Index value	Weights	Final results
Inventory turnover	Inventory turnover = Revenue/average balance of inventories	4.940	60	0.0256	1.54
Accounts receivable turnover ratio	Accounts receivable turnover ratio = net sales/average accounts receivable balance	1.907	20	0.0513	1.03
Loan repayment rates	The loan to repay the loan repayment rate = text/Total items * 100% loans	0.700	70	0.0774	5.42
Payment delivery rate	Payment delivery rate = payment has been delivered items/total items * 100% of the purchase price	0.900	90	0.0348	3.13
Tax payment rate	Tax payment rate = tax already paid on the items/total items * 100% tax	1.000	100	0.2228	22.28
Operators quality	(well, good, fair, poor, very poor) = (100, 80, 60, 40, 20)	/	80	0.0483	3.86
The quality of staff		/	60	0.013	0.78
Prospects		/	80	0.0207	1.66
Praise rate	Praise rate = number of Praise customers praise/total number of * 100%	0.889	89	0.1486	13.23
Logistics delivery rate	Good delivery logistics delivery rate = number/total number of * 100%	0.895	90	0.0632	5.69
Orders turnover rate	Orders turnover rate = number of people/traffic * 100%	0.027	3	0.2336	0.70

Note: Final credit score: 62.13.

Table B.4. Income statements of Company A, B, C and D in 2014 (parameter values in Yuan).

Parameters	Company A	Company B	Company C	Company D
Operating income	5048784415	20,385,061,873.00	5027	3530
Operating costs	2,325,440,004.58	13,330,774,051.00		2821
Business tax	63,251,191.26	86,278,301.00	5027	709
Sales expense	2,207,412,841.73	5,469,247,530.00	112	344
Management costs	365,532,075.83	580,520,009.00	215	370
Financial expenses	−28,272,436.31	78,395,406.00	226	164
Losses on assets	25,451,273.09	116,994,586.00	1036	1500
Net change in fair value	0	−24,555,628.00	0	0
Investment income	7,523,506.85	−371,424.00	770	1294
Operating profit	97,492,972.04	697,924,938.00	−28	
Income	0	0	735	1249
Non-operating income	85,652,844.59	70,491,843.00	48	311
Operating expenses	79,330,407.78	54,502,925.00	687	938
Net loss disposal of non-current assets	3,911,865.71	28,607,347.00	1	2
Total profit	103,815,408.85	713,913,856.00	15	10

Table B.5. Income statements of Company E, F, G and H in 2014 (parameter values in Yuan).

Parameters	Company E	Company F	Company G	Company H
Operating income	50049	4,502,477,062.70	54,436,426,792.08	70,012,233,316.53
Operating costs	34616	3,377,765,696.17	36,399,991,138.52	65,860,012,763.73
Business tax	15434	15,918,305.78	185,388,696.48	21,350,557.67
Sales expense	10564	969,717,406.44	10,074,550,860.62	1,424,135,692.44
Management costs	1941	183,807,884.18	3,163,230,547.49	1,567,206,371.47
Financial expenses	1299	60,120,005.11	154,886,533.97	417,447,374.48
Losses on assets	2664	158,605,923.28	176,432,072.84	98,337,224.51
Net change in fair value	278	0	0	1,264,729.85
Investment income	3150	−31,617,158.02	107,739,750.69	2,281,230,447.18
Operating profit	−340	−295,075,316.28	4,389,686,692.85	2,890,844,831.00
Income	2351	0	0	0
Non-operating income	548	319,200,664.91	463,408,540.37	183,295,423.19
Operating expenses	1802	2,234,178.57	67,209,778.97	166,028,413.59
Net loss disposal of non-current assets	28	944,944.92	34,465,173.86	56,868,219.05
Total profit	120	21,891,170.06	4,785,885,454.25	2,908,111,840.60

Appendix C. AHP Calculations

The following tables of AHP calculations, follow from Table 4: Pairwise comparison matrix leads up to the results obtained in Table 5. Weights of all indicators.

Calculating the mean of row values of pairwise comparison matrix, and then, averaging provides the weight of indicators. The weights of each factor constitute the feature vector c as given in Table C.3.

Table C.1. Calculation of columns.

	Financial status	Credit status	Enterprise development	Internet financial status
Financial status	1	1/3	2	1/3
Credit status	3	1	5	½
Enterprise development	1/2	1/5	1	¼
Internet financial status	3	2	4	1
Total calculation	7.5	3.53	12	2.08

Table C.2. Standard pairwise comparison matrix.

	Financial status	Credit status	Enterprise development	Internet financial status
Financial status	0.13	0.09	0.17	0.16
Credit status	0.4	0.28	0.42	0.24
Enterprise development	0.07	0.06	0.08	0.12
Internet financial status	0.4	0.57	0.33	0.48

Table C.3. The feature vector of factors.

	Financial status	Credit status	Enterprise development	Internet financial status	Mean of row values
Financial status	0.13	0.09	0.17	0.16	0.138
Credit status	0.40	0.28	0.42	0.24	0.335
Enterprise development	0.07	0.06	0.08	0.12	0.082
Internet financial status	0.40	0.57	0.33	0.48	0.445

$$c = \begin{bmatrix} 0.138 \\ 0.335 \\ 0.082 \\ 0.445 \end{bmatrix}.$$

Furthermore, the consistency test of Pairwise comparison matrix must be conducted.[27] The consistency test process is as follows:

(1) Calculate the empowerment vector,

$$ac = \begin{bmatrix} 1 & 1/3 & 2 & 1/3 \\ 3 & 1 & 5 & 1/2 \\ 1/2 & 1/5 & 1 & 1/4 \\ 3 & 2 & 4 & 1 \end{bmatrix} \begin{bmatrix} 0.138 \\ 0.335 \\ 0.082 \\ 0.445 \end{bmatrix} = \begin{bmatrix} 0.56 \\ 1.38 \\ 0.33 \\ 1.86 \end{bmatrix}.$$

(2) Each empowerment vector component is divided by the feature vector component,

$0.56/0.138 = 4.06$
$1.38/0.335 = 4.12$
$0.33/0.082 = 4.03$
$1.86/0.445 = 4.18$

(3) The maximum eigenvalue is calculated as,

$\lambda = (4.06 + 4.12 + 4.03 + 4.18/4) = 4.10$

(4) Consistency index CI,

$\text{CI} = (4.10 - 4)/(4 - 1) = 0.03$

(5) Consistency ratio CR is given by,

CR = CI/RI, where, RI is Random Index (shown in Table C.4).

CR = 0 indicates complete consistency.
CR < 0.1 indicates satisfactory consistency.
CR > 0.1 indicates serious inconsistencies.

Pair-wise comparison matrix needs to be amended, and then re-checked. Finally, index weights in criteria layer are shown in Table C.4.

$\text{CR} = \text{CI}/\text{RI} = 0.03/0.9 = 0.03$

The weights of the rest of the indicators can be calculated in the same way.

Table C.4. Random index.

n	1	2	3	4	5
RI	0	0	0.58	0.90	1.12

Table C.5. Index weights in criteria layer.

Indicators in criteria level	Weights
Financial status	0.138
Credit status	0.335
Enterprise development	0.082
Internet financial status	0.445

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