The research on financing decision-making of rural community construction

Zhaohan Ding¹, Xiaoyan Guo², Tingting Xue³

¹School of economics and management, Department of enterprise management, Beijing Jiaotong University, Beijing 100044, China
²School of accounting, Xingtai University, Xingtai 054001, China
³School of accounting, Xingtai University, Xingtai 054001, China

Abstract

Rural community is an effective place to resolve the problem of left-behind children, women and elderly. At the country level, the construction of rural community is advanced slowly. The main reason is the concern that project companies have over financing risks under construction. This issue was approached in this paper from the project company’s perspective. Firstly, the in-company and external surroundings were analyzed in SWOT, presenting four financing strategies that corresponded to the four stages of rural community construction. Secondly, we introduced the project company’s financing capacity and fund demand at each construction stage. The third section was related to the compositions of and the factors influencing the capital structure. Fourthly, the authors established a decision-making index system and set up the decision-making model of the capital structure.

Keywords: Swot, Financing Strategy, Decision-Making of Capital Structure.

1. INTRODUCTION

1.1 Introduction to rural community construction

The population structure in rural areas changes greatly, and the left-behind children, women and elderly continue to increase in scale. The diversified needs of rural people cannot be met by social management and public service (Fan, 2015). Against this background, the construction of rural community is a feasible means of settling the left-behind.

In 2006, the Chinese government formulated the strategy of rural community construction. Accordingly, 20,744 towns started to build up rural communities, which occupied 64.9% of all the towns in China; 236,000 villages started to implement rural community construction, accounting for 34.3% of all villages (Wang, 2015). Judged from the data above, we can draw the conclusions below: The construction center of Chinese rural communities is eastern coastal provinces and developed villages. Additionally, rural community construction is better in towns than in villages.

At the country level, rural community construction is advanced slowly. Rural communities are even not seen in some territories. The reasons are: On the one hand, there is little investment from national finance, and it is difficult for local governments to attract other investments to support rural community construction; On the other hand, real estate enterprises are always prudent in the face of financial shortage and lack of policy support.

1.2 Theories about financing decision-making

Financing decision-making is to use financing models to make decisions based on the amount of capital a company needs. To ensure the scientific nature of its financing decisions, a company should formulate feasible financing strategies, identify how much capital it needs, and establish a scientific capital structure (Wu, 2014). In this paper, SWOT is employed to analyze different financing strategies and select an optimal one among them. The engineering budget determines the capital demand in each stage of the project life cycle, followed by the use of
entropy theory to make capital structure decisions.

SWOT is an effective tool to analyze and choose strategies for an organization. It helps managers analyze the external surroundings and internal situations. In another word, the SWOT tool reflects a company’s strengths and weaknesses, and lists the possible opportunities and threats that the company may face, so that managers can distribute more resources to the strengths and opportunities of a project (Michael, 2013).

In real estate construction, we always utilize engineering budget, a common approach in large-scale engineering work (Xia, 2016), to determine the capital needs in each stage of the project life cycle. Due to the particularity of the real estate industry, capital demands cannot be decided by means of factor analysis, regression analysis, and percentage-of-sales which are applicable in manufacturing companies (Jing, 2015).

Capital structure is the proportion and time limitation of capital. Capital proportion can be divided into the proportion of equity capital and the proportion of debt capital. The time limitation of a company’s capital is either long-term or short-term. In addition to capital ownership, time characteristics are also indispensable to define capital structure.

Traditionally, capital structure decisions are made from single-factor analysis such as capital cost comparison, earnings per share analysis and corporate value comparison (Ouyang, 2010). But we should take many factors into account when making capital structure decisions. The entropy theory is a solution. In information theory, entropy is a standard to measure uncertainty. More information and less uncertainty mean the larger value of entropy (Chen, 2012). According to the particularity of entropy, we can calculate the entropy value to evaluate an index’s randomness and disorder degree. The discrete degree can also be represented by entropy. The bigger the discrete degree is, the more influential the index is on comprehensive evaluation results (Liu, 2004). The entropy theory is widely used in statistics and other disciplines.

2. SWOT ANALYSIS OF COMPANY FINANCING

To formulate the correct financing strategy for a company, we should analyze the internal conditions and external surroundings in every stage of rural community construction. Subsequently, we can generate a scientific capital structure. In order to achieve this goal, we should analyze the strengths, weaknesses, opportunities and threats of a financing decision, which can be achieved by making SWOT analysis.

Internal financing strengths: low financing cost, low financing risk, high debt paying ability, high profitability.

1. Internal financing weakness: high asset-liability ratio, low liquidity ratio, low debt financing ability, high desired returns.
2. External financing opportunity: good macro-economic environments, high return rate of investment, good financing policy.
3. External financing threat: economic depression, strict financing policy, fierce financing competition.

![SWOT diagram](image)

Figure 1. SWOT analysis of financing decision

After analyzing external and internal situations, we have the following combinations:
(1) Combination SO: It is the combination which includes financing strengths and financing opportunities. When the company is in this ideal combination, we should utilize expansive financial strategy.

(2) Combination WO: It is the combination which includes financing opportunities and financing weaknesses. When the company is in this combination, we should overcome difficulties and utilize stable financing strategy.

(3) Combination ST: It is the combination which includes financing strengths and financing threats. When the company is in this combination, we should utilize defensive financial strategy.

(4) Combination WT: It is the combination which includes financing weaknesses and financing threats. When the company is in this combination, we should overcome the weaknesses and threats and utilize the contracting financial strategy.

3. MAKE AND CHOOSE FINANCIAL STRATEGIES

According to the analysis result of SWOT, we can draw the conclusion that the project company that takes charge of rural community construction usually utilizes the financing strategies as follow: expansive financial strategy, stable financial strategy, defensive financial strategy and contracting financial strategy. And the project life cycle can be divided into four phases: project planning and decision-making, project preparing, project constructing, project completion and acceptance. One financing strategy corresponds to one stage. The capital demand in each project stage is shown in the figure below.

![Figure 2. The Capital Needs at Each Stage of The Project Life Cycle](image)

3.1 The categories of financing strategy

According to the analysis result of SWOT, the categories of the financing strategy are: expansive financial strategy, stable financial strategy, defensive financial strategy and contracting financial strategy.

Expansive financial strategy: when the company utilizes expansive financial strategy, the investment scale increases quickly. In this scenario, the company reaps a majority of profits while attracting many external funds to finance projects.

Stable financial strategy: when the company utilizes stable financial strategy, the investment scale increases steadily. In this scenario, the company still earns some profits, but it combines internal financing with external financing.

Defensive financial strategy: when the company utilizes defensive financial strategy, the investment scale and income from investment remain unchanged, and the capital structure may change slightly if not remaining the same.
Contracting financial strategy: when the company utilizes deflating financial strategy, the investment scale either levels off or rises-up, and the external financing declines. The company repurchases shares to repay the investment.

3.2 The selection of financial strategy at different stages

A company’s internal resources and external risks vary at different stages of the project life cycle. It is essential for the company to adjust financing strategies to realizing its goal. According to the characteristics at different stages, the company will choose different financial strategies.

3.2.1 Project planning and decision-making

For an organization that is responsible for a project, project planning and decision-making is to set the project goal by analyzing the project environment, estimate the investment scale according to the project scale and standard, and make financing plans.

It is suitable for a company to utilize expansive financial strategy in this stage. The reason for it is that the enterprise that just starts a project is faced with high operating risks in an immature market, which means a better choice to finance the project with external capital.

3.2.2 Project preparing

Project preparing starts with the approval of the project feasibility report and ends with project implementation. This stage covers engineering design, negotiation, project bidding, contract signing and preparing for project implementation.

It is suitable for a company to utilize stable financial strategy. The company should raise equity capital from the capital market. Debt financing can serve as a supplementary financial strategy but should not occupy a large proportion, or else it will easily incur financial crisis.

3.2.3 Project implementation

Project implementation is to construct all kinds of houses and subsidiary facilities in the rural community and to equip them with electric lines and pipelines. The final goal of construction is to meet the needs of manufacturing, residing, studying and public activities.

It is suitable for a company to utilize defensive financial strategy. In this stage, the sale increases steadily, and the company earns quantitative profits. With falling demand for additional investment, the company focuses more on profitability. The company should utilize debt financing instead of equity financing for its lower financing cost.

3.2.4 Project completion and acceptance

At the stage of project completion and acceptance, the construction quality and equipment installation quality are inspected together by the construction unit, design unit, supply unit and engineering quality supervision department. If the company passes the quality inspection, it will be issued a quality inspection certificate.

It is suitable for the enterprise to utilize contracting financial strategy in this stage. The market demand for products is down, and so are company profits. The company needn’t too much extra investment and instead focuses on the return from investment. No more finances are required for the company, with dividends paying to shareholders at the project end.

4. THE FINANCING ABILITY AND CAPITAL NEEDS

4.1 The development and the financing ability of a company

Enterprise development and enterprise financing ability are closely bonded to each other in the form of mutual
promotion and mutual constraining. According to the practical experience, the enterprise lifecycle includes four stages: initial period, development period, mature period, decline period. If the enterprise utilizes the correct management strategy in each period, its sales, scale, asset and reputation will increase accordingly, which will enhance the company’s financing ability. The stronger financing power will help the rise in sales, scale, asset and reputation. Conversely, if the enterprise is in poor management, the scale, asset and reputation will become worsened, weakening the financing ability. The connection between enterprise development and enterprise financing ability is shown in the figure below.

![Figure 3. Connection Between Development Stages and Financing Ability](image)

In the initial period of enterprise development, due to the correct management, the enterprise enlarges its sale, scale and asset. Accordingly, the ability of enterprise financing is upgraded, which corresponds to the increasing part of the initial period in Figure 3. The uptrend stops at the summit or critical point of the initial period. The enterprise’s financing ability will continue to increase till the critical point of the development period under correct management. However, if the management is wrong, the enterprise will have a decreased financing ability and even go bankrupt, which corresponds to the decreasing part of the initial period in Figure 3.

4.2 Capital demand prediction

In the rural community construction, we always utilize engineering budget to determine capital demand. Engineering budget is a plan which depicts the income and expenditure in the future. Engineering budget can evaluate the engineering investment by currency and reflect the economic achievement.

Engineering budget is made according to the items below: construction drawing, bidding documents, budget workbook, marketable price of materials, construction scheme.

The project life cycle includes four stages: project planning and decision-making, project preparing, project constructing, and project completion and acceptance.

The cost at the four stages are:

Project planning and decision-making: project feasibility study cost, project appraisal and decision-making cost.

Project preparing: the design cost of construction drawings, bidding cost, demolition cost, land purchasing cost.

Project constructing: major engineering constructing cost, auxiliary facility constructing cost, public service facility constructing cost.

Project completion and acceptance: supervision cost, quality inspection cost, acceptance cost.

Management cost and marketing cost cover all the four stages above.
5. THE ELEMENTS OF CAPITAL STRUCTURE

To meet the capital needs, the project company that takes charge of rural community construction utilizes the financing models like invested capital financing, common shares financing, long-term loan financing, common bond financing, commercial credit financing, and short-term financing bond. But it seems that none of the capital structures are scientific enough considering the random use of these financing models. So it is high time for us to analyze the advantages and disadvantages of prevailing financing models to facilitate the selection of scientific financing strategies.

According to the time limit, these financing models can be divided into long-term and short-term ones.

5.1 Long-term financing

In the process of long-term financing, the project company is the main body of financing. The investment activities and capital structure are adjusted according to the long-term needs of business operation, and the project company utilizes long-term financing methods to attract long-term capital from the capital market.

5.1.1 Invested capital financing

For invested capital financing, ordinary enterprises (exclusive of joint-stock enterprises) receive long-term capital from the entities of the government, other enterprises, individuals and foreign businessmen under agreements. Invested capital financing provides enterprises with an opportunity to obtain capital by direct capital investment instead of by stock. It is the elementary way for ordinary enterprises to obtain capital.

As an early financing method for Chinese enterprises, invested capital financing has both advantages and disadvantages. Below are the advantages: Firstly, the capital obtained through invested capital financing is equity capital. This kind of capital can improve credit standing and the capacity to borrow. Secondly, invested capital financing can help project companies obtain advanced facilities and technologies, so as to quickly increase the manufacturing capacity and reduce the financing risk.

The defects of invested capital financing are high capital cost and the difficulty to transact equities among shareholders due to the unavailability of stocks.

5.1.2 Common share financing

Shares are valuable securities for project companies to obtain equity capital. Shareholders own the company by owning its shares. Usually, an enterprise only issues common shares — shares without special rights and obligations — to shareholders.

The advantages of common share financing are:

Firstly, common share financing has not burden of stable dividend. Project companies with many profits can allot dividends whenever they think it necessary; project companies with few profits or insufficient funds have no obligation to allot dividends.

Secondly, there is no due date of payment for common share financing. As a long-term capital, common shares are necessarily repaid only when the project company undergoes liquidation.

Thirdly, as there is no due date to repay stable dividend, this model is of low financing risk for project companies to obtain capital.

Fourthly, common share financing can improve the project company’s credit standing with much equity capital. Meanwhile, common share capital provides strong support for project companies to utilize debt capital.

The defects of common share financing are: Firstly, high capital cost and issue cost. Generally-speaking, the cost of common share financing is higher than debt capital’s. The main reason is that the common share financing has higher risk and demands higher return. Secondly, extra shareholders. When the project company utilizes common
share financing, new shareholders join the project companies, which will dilute the shareholding and reduce the dividend of each share. Thirdly, the issue of new shares will change stock prices.

5.1.3 Long-term loan financing

The long-term loan of a project company refers to the money borrowed from banks or other financial organizations whose time limit is always longer than one year. Long-term loan includes guarantee loan, mortgage loan and pledge loan.

The advantages of long-term loan financing are: Firstly, high-speed financing. Due to the short period of financing and simple procedures, long-term loan financing means quick access to funds for the project company. Secondly, low financing cost. The interest paid for the use of long-term loan can be repaid before tax, which lessens the expense of the project company. Therefore, the cost of long-term loan financing is lower than that of common share financing. Thirdly, highly flexible financing. The time limit, amount and interests of long-term loan will be re-negotiable between the project company and the bank if the project company cannot repay long-term loan. Fourthly, financial leverage. Its principle is the same as bond financing.

The defects of long-term loan are: Firstly, the large quantity of limiting conditions. These limiting conditions maybe influence the future financing and investing activities. Secondly, a small amount of capital. The common share financing or bond financing can help a project company collect much capital in one time, while long-term financing cannot do so.

The capital cost of long-term loan can be calculated as the formulas below:

\[ K_1 = \frac{(1-T)}{L} \left( \frac{I}{1-F} \right) \]  

5.1.4 Common bonds financing

Common bonds are issued by debtor to finance debt capital. This kind of financing model requests debtor to repay capital and interest in a definite date. Common bonds are valuable security. Issuing bonds is an important way for an enterprise to obtain debt capital.

According to the time value of money theory, the issuing price of common bonds is made up of two parts: the present value of bond and the present value of interest in each period, both of which are calculated on the basis of market rate. The issue price of common bonds can be calculated by the formulas below:

\[ \text{the issuing price of common bonds} = \frac{F}{(1+R_M)_t^n} + \sum_{t=1}^{n} \frac{I}{(1+R_M)_t} \]

F: Present value of bond

I: Annual interest, which is calculated by multiplying the present value of bond by annual interest rate

\( R_M \): Market rate at the time of issuing bonds
n: time limit of bonds

t: times the project company should repay interest

The advantages of common bonds financing are: Firstly, common bonds has low financing cost. The project company who issues common bonds can repay the interest before tax, so that the issuing company enjoys the benefit of lessening tax. Secondly, common bonds financing can utilize the financial leverage. Whatever the profit is, bondholders request stable interest, so that more profits can be allotted for shareholders or left by the company to utilize. In this way, shareholders and company increase their wealth. Thirdly, ensure the controlling rights of shareholders. The bondholders have no rights to take part in the company’s decision-making. So issuing bonds will not dilute the shareholders’ rights. Fourthly, adjust capital structure of company. When the company issues convertible bonds or repay the bonds in advance, the company can adjust capital structure.

The defects of common bonds financing are: Firstly, high financing risk. Bonds have a definite day for company to repay. In another word, the company must repay the capital and interest in the definite day, which means higher financing risk for the company in facing operating difficulties. In this case, the company can even go bankrupt. Secondly, there are too many limiting conditions of bonds compared to those of long-term loan, and these limiting conditions are always strict. These limiting conditions prohibit enterprise from utilizing bond financing, and maybe do harm to the financing ability of the company. Fourthly, the financing amount is limited. When the company utilizes bond financing, the amount much not exceed the threshold regulated in law. The Commercial Law defines that the amount of issuing bonds shall not exceed 40% of an enterprise’s net asset.

If we don’t take time value of money into account, the capital cost of common bond can be calculated as the formulas below.

\[
K_b = \frac{I(1-T)}{B(1-F)}
\]

(2)

I: annual interest of common bond

T: the rate of income tax

B: the financing amount of common bond

F: the commission charge of common bond

5.2 Short-term financing

The time limit of short-term financing is not more than one year. It is always named as short-term debt financing.

5.2.1 Commercial credit financing

Commercial credit is the debtor-creditor relationship formed in delaying paying for the products or delivering the products. Commercial credit is a direct credit relationship.

The advantages of commercial credit financing are: Firstly, convenient utilization. Commercial credit happens with commercial trade. It is an autonomously financing model, and needn’t to be arranged regularly or go through the procedures. Secondly, low cost. The company has no cost if there is no cash discount. Thirdly, commercial credit financing has few limiting conditions. Commercial credit financing is flexible and elastic. If the company utilizes the long-term loan, there are always many limiting conditions. In Contrast, the limiting conditions of commercial credit financing are few.

The defects of commercial credit financing are: Firstly, the permitted time is short when the company utilizes business credit financing. In this position, it is difficult for the company to manage the capital integrally. On the contrary, if the company owes the payments for a long time, this behavior will deteriorate the enterprise’s credit. Secondly, if the company chooses cash discount, the payment time will be shortened. But no cash discount means higher capital cost. Thirdly, in the lack of law systems, companies tend to owe money to each other, which
increases social cost.

The purchase unit should obtain the cash discount provided by the sales unit as much as possible. If the purchase unit forgoes cash discount, the opportunity cost will be high.

\[
\text{The capital cost rate of forgoing cash discount} = \frac{\text{CD}}{1-\text{CD}} \times \frac{360}{N}
\]

CD: the percentage of cash discount.
N: the days of delaying in payments after forgoing cash discount.

5.2.2 Short-term loan financing

Generally-speaking, short-term loan financing is to borrow short-term funds from bank. Short-term loan always helps company resolve the short-term needs of funds. Short-term loan is an important way for a company to obtain short-term funds. Short-term loan includes credit loan, guaranteed loan and bill discounted.

The advantages of short-term loan are: Firstly, banks that are abundant in funds have the capability of providing sufficient funds for companies. To those seasonal and temporary needs of product, a company may need short-term loan to obtain enough capital. Especially for those companies with good reputation, they can borrow money from bank with low interest. Secondly, flexible short-term loan; the company can increase short-term loan when in need of capital and repay its debt with little need of capital.

The defects of short-term loan are: Firstly, high capital cost. The capital cost of short-term loan is higher than that of commercial credit loan. A company with short-term loan needspay higher interest cost than commercial credit loan. Secondly, short-term loan has many limiting conditions. When a company applies to borrow money from bank, the bank will investigate its financial conditions and operating conditions in advance. Some banks even require part of the controlling rights of the company.

5.2.3 Short-term bond financing

Short-term bond is also called commercial bill. It is always issued by the large-scale company or financial institutions. It is a new way for a company to obtain short-term capital without mortgage.

The financing cost of short-term bond is interest, and the interest is repaid on the basis of discount. The cost rate of short-term bond financing is calculated by the formulas below.

\[
\text{Cost rate of short-term bond financing} = \frac{r}{1-rn/360}
\]

r: coupon rate
n: terms of bill

The advantages of short-term bond are: Firstly, short-term bond has low financing cost. In western countries, the total of short-term loan rate plus issuing cost rate is lower than the interest rate of bank. The reason is that when the company utilizes short-term bond, deals are transacted directly between the issuer and the investor, which saves the transaction cost from the bank. Secondly, the high amount of financing. Generally speaking, the bank sets limitations on the circulation fund lent to a company. In western countries, the allowed amount should not be higher than 10% of enterprise asset. So it is inconvenient for those companies who need a huge sum of capital. Thirdly, short-term bond will upgrade the company credit. The companies who can issue short-term bond are always famous with high reputation when they do it in capital market.

The defects of short-term bond are: Firstly, short-term bond financing has high financing risk. The company must repay the short-term bond in due date. Any delay in the repayment will bring serious consequence to the company. Secondly, short-term bond has low elasticity. The company will issue short-term bond only when it has great need of capital. If the company has little need of capital, it is not suitable for it to issue short-term bond. Additionally,
even though the enterprise has enough capital, the enterprise cannot repay the short-term bond in advance. Thirdly, there are many limiting conditions in issuing short-term bond. As a result, companies with perfect reputation and powerful strength have the right to issue short-term bond, while those companies with bad reputation and weak strength are forbidden from short-term bond financing.

6. THE INFLUENCING FACTORS UPON CAPITAL STRUCTURE DECISION-MAKING

When the project company is in the process of financing, any financing model the company utilizes is influenced by many factors. In this paper, the DNA model is used to depict the relationship between these influencing factors.

Molecular biology argues that DNA is the core factor who controls the biological heredity. DNA has a special double helix structure. The characteristics of this spatial structure are: (1) Nucleic acids are the basic skeleton on the DNA outside. (2) The DNA molecular is made of two long, parallel chains of nucleic acid. (3) The bases of the two chains are connected by hydrogen bond, and the bases are formed into base-pairs. According to the gene model of DNA, the authors establish the gene model of capital structure.

We can draw conclusions from the figure 4:

(1) As is shown in the picture, there are two long chains whose structure is double helix. One is long-term financing, and the other is short-term financing. The company’s capital structure is simultaneously composed of the two financing models. These two capitals are both obtained from capital market.

(2) The DNA bases of company includes: Economic state of the country (ESC), State of capital market (SCM), Financing cost (FC), Financing risk (FR), Debt paying ability (DPA), Profitability (PTA). Among these bases, ESC and SCM, FS and FC, PTA and PBA are paired bases.

(3) Economic state of the country (ESC), State of capital market (SCM), Financing cost (FC), Financing risk (FR), Debt paying ability (DPA), and Profitability (PTA) connect the long-term financing chain and short-term financing chain. These six factors can form many arrangement modes, which mean various capital structures. So we should take different factors into account when making capital structure decision.

![Figure 4. Gene model of capital structure](image)

7.DECISION MAKING OF CAPITAL STRUCTURE BASES ON ENTROPY THEORY

There are many factors influencing capital structure optimization. They can be divided into external factors and internal factors. External factors are economic aspects. Internal factors are micro factors. So we should build decision-making index system of capital structure optimization, and use entropy theory to make decisions of capital structure. Our goal is to make the decision-making more credible and objective.

| Table 1 Decision-Making Index System of Capital Structure |
### Decision-making index system of capital structure

<table>
<thead>
<tr>
<th>External Factors</th>
<th>Economic state of country</th>
<th>State of capital market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing cost</td>
<td>Invested capital financing</td>
<td>Common shares financing</td>
</tr>
<tr>
<td></td>
<td>Long-term loan financing</td>
<td>Common bonds financing</td>
</tr>
<tr>
<td></td>
<td>Short-term loan financing</td>
<td>Short-term bond financing</td>
</tr>
<tr>
<td>Financing risk</td>
<td>OL</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>FL</td>
<td>D</td>
</tr>
<tr>
<td>Debt paying ability</td>
<td>R</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td>AR</td>
<td>LO</td>
</tr>
<tr>
<td>Profitability</td>
<td>Internal rate of return</td>
<td>Profitability index</td>
</tr>
</tbody>
</table>

#### 7.1 Decision making index system of capital structure

In constructing a project, capital is the first major issue worthy of careful thought. How can we obtain sufficient capital in low cost? How can we make the decision of capital structure? In order to provide scientific proof, we should have a set of scientific index to depict the capital structure. This index system includes external and internal factors. The indexes are included in the form above.

#### 7.1.1 The external indexes of capital structure

The external indexes mainly include the economic state of the country and the state of capital market, both of which can influence the capital structure of the company. The economic state of the country influences the financing state of the project by influencing the financing policy in the country. The capital provided by the capital market and the interest cost determine the capital amount a company can possibly obtain.

#### 7.1.2 The internal indexes of capital structure

For the same project, different capital structures means different capital costs, financing risks, repayment capacity and profitability. So we should take these factors into account. The details of these factors are shown below.

(1) Capital cost

The capital cost includes cost of equity capital and cost of debt capital. It is called comprehensive cost. The calculation formulas are:

\[ K_w = \sum_{j=1}^{l} (K_j \cdot W_j) \]  

In the formulas, \( K_w \) is the rate of comprehensive cost; \( K_j \) is cost of the jth capital; \( W_j \) is the proportion that the jth capital occupies of the total capital; \( j \) is the type of capital.

(2) Financing risk

Financing risk is the loss of repaying capacity and decrease of capital return. Different capital
structures correspond to different financing models and financing risks. Financing risks can be depicted by DOL and DFL.

Firstly, DOL (the degree of operating leverage) is an important parameter to measure operating risk. In another word, if the DOL is high, the operating risk is also high. DOL can be calculated by the formulas below.

\[
DOL = \frac{Q \times (P-V)}{Q \times (P-V) - F}
\]  \hspace{1cm} (4)

Q: quantity of sales;

P: sale price;

V: variable cost per unit sale;

F: total fixed cost

Or \(DOL = \frac{S-C}{S-C-F}\)

S: operating income

C: total variable cost

F: total fixed cost

Secondly, DFL (the degree of financial leverage) depicts the impact degree of debt upon return. DFL can be calculated by the formulas below.

\[
DFL = \frac{EBIT}{EBIT-1}
\]  \hspace{1cm} (5)

EBIT: profit before tax;

I: interest.

If DFL is high, the pressure of debt repayment is also high, which means high financial risk.

(3) Debt paying ability

Debt paying ability is expressed by QR and LOAR.

QR means Quick Ration, and it is the remainder of quick assets divided by liquid liabilities. The calculating process can be expressed by the formulas below:

\[
QR = \frac{QA}{CL}
\]  \hspace{1cm} (6)

QA: quick assets;

CL: current liabilities.

QR is used to measure the company’s capacity of repaying short-term debt.

LOAR is debt-to-assets ratio, and it is calculated by the formulas below:
LOAR=$\frac{TL}{TA}$ (7)

TL: total liabilities;
TA: total assets

LOAR is used to measure the company’s capacity of repaying long-term debt.

(4) Profitability of company

Different capital structures involve different financial indexes. In defining capital structure, we should take the feasibility of financial index into account. Internal rate of return and profitability index are chosen. The calculating process of the internal rate of return is formulas below:

$$\sum_{t=1}^{n} \frac{NCF_t}{(1+r)^t} C=0$$ (8)

NCF$_t$: net cash flow in the $t$th year
r: internal rate of return
n: the service life of the project
C: initial investment

The calculation formula of profitability index is:

$$PI=\frac{\sum_{t=1}^{n} \frac{NCF_t}{(1+K)^t}}{C}$$ (9)

NCF$_t$: net cash flow in the $t$th year
K: discount rate
n: the service life of project
C: initial investment

7.2 Decision-making of capital structure bases on entropy theory

Provided that $A= (A_1, A_2, \ldots, A_n)$ is the synthesis of capital structure decision-making optimization, $f= (f_1, f_2, \ldots, f_m)$ is the synthesis of goals, the value of the $i$th goal and the $j$th project is $a_{ij}$.

7.2.1 The normalization of decision-making index

According to the index system which have been chosen above, we find that the index system includes benefit indexes and cost indexes. After normalizing all the indexes, we can identify the importance of special attributes. In order not to let the minimum benefit index and the maximum cost index become zero after range transform, we should utilize the modified range formulas. The calculation formulas is:

$$r_{ij} = \frac{(a_{ij}-\min_j x_{ij})}{(\max_j a_{ij}-\min_j a_{ij})}d_1 + d_2$$

$$r_{ij} = \frac{(\max_j a_{ij}-x_{ij})}{(\max_j a_{ij}-\min_j a_{ij})}d_2 + d_1$$ (10)
\(d_1, d_2\) are the modified coefficients, we should define this coefficient according to the fact and model. The value of is 0.8, and the value of is 0.2.

### 7.2.2 Decision-making of capital structure bases on entropy theory

Assuming that one project has \(m\) capital structures, and the decision-making issue has \(n\) evaluation indexes, the values of the \(i\)th project and the \(j\)th index are \(\text{are} x_{ij}\). If we normalize \(x_{ij}\), the result is \(r_{ij}\).

After normalization upon, so we can obtain a group of discrete distribution values:

\[
p_{ij} = \frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}} \quad (i=1,2,\ldots,m; \ j=1,2,\ldots,n)
\]  

(11)

According to the concept of entropy, the uncertainty of relative importance can be measured by entropy:

\[
E_j = -\sum_{i=1}^{m} (p_{ij} \cdot \ln p_{ij})(j=1,2,\ldots,n)
\]  

(12)

According to the extremum property of entropy, when \((i=1, 2, \ldots, m)\) are equal, we obtain the maximum entropy. The formulas is:

\[
E_{\text{max}} = \ln m
\]  

(13)

Definition 1: the relative entropy of the \(j\)th index can be expressed by the formulas below:

\[
H_j = E_{\text{max}} - E_j
\]  

(14)

According to the property of entropy, \(H_j \in [0,1]\). When the relative entropy is less, every index will be more accessible and balanced. So we choose relative entropy to quantify the amount of information provided by each index.

With relative entropy based normalization, we obtain the entropy coefficient:

\[
w_j = \frac{1-E_j}{E_{\text{max}}} \quad (j=1, 2,\ldots,n)
\]  

(15)

In this formula,\(=\frac{1}{\ln m} \sum_{i=1}^{m} (p_{ij} \cdot \ln p_{ij})\)

Entropy coefficient has the special meaning of the stimulation degree of each index coefficient after the decision-making object is determined. Meanwhile, we can’t ignore people’s subjective initiative, which meansexpert opinions in this paper. Accordingly, we calculate the comprehensive coefficient as:

\[
w_j = \frac{w_j^{\lambda_j}}{\sum_{j=1}^{m} w_j^{\lambda_j}}
\]  

(16)

With it, we can build the decision-making model of capital structure optimization:

\[
G=R \ast W = \begin{bmatrix} r_{11} & \cdots & r_{1n} \\ \vdots & \ddots & \vdots \\ r_{m1} & \cdots & r_{mn} \end{bmatrix} \ast \begin{bmatrix} w_1 \\ \vdots \\ w_n \end{bmatrix} = \begin{bmatrix} g_1 \\ \vdots \\ g_m \end{bmatrix}
\]  

(17)

According to the formulas above, we can obtain the value of different projects, and we should make decision accord to the value of \(g_i\). The bigger the value of \(g_i\), the more optimized the project is.
8. CONCLUSION

As far as we have analyzed above, we can draw the following conclusions:

Firstly, after the SWOT analysis of financing decision, there are four financing strategies, each of which corresponds to a stage of rural community construction. These four financing strategies are: expansive financial strategy at the stage of project planning and decision-making; Stable financial strategy at the stage of project preparing; Defensive financial strategy at the stage of project constructing; Contracting financial strategy at the stage of project completion and acceptance.

Secondly, we can define the financing capacity by the development stages of a company. Meanwhile, the capital demand at each stage can be defined by engineering budget.

Thirdly, according to the capital ownership and time characteristic, the financing models can be divided into two groups. One is long-term financing, and the other is short-term financing, both of which are influenced by many factors.

Fourthly, under the guideline of the entropy theory, we build up the decision-making index system of capital structure and its model.

REFERENCES

Chen Y.X. (2012). The construction comprehensive benefits analysis bases on entropy theory SIP.