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Research on Construction of Pricing Model of Top Management Team: A Review Based on New Ventures

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Abstract: Top management team has a huge influence to survival and sustainable development of new enterprises. From a new perspective of the human capital options, this paper illustrates characteristics of human capital options of TMT from newly established enterprises and introduces the binomial model into the human capital options of the TMT so as to build a pricing model adapting the TMT of new enterprises.

Key words: New venture, top management team, human capital option, binomial model

INTRODUCTION

The human capital options of the top management team of newly established enterprises mean that the current human capital investment (such as training, incentive, etc.) can make the enterprise gain the strategic investment or the right to choose investment and the enterprise can use the option or not in accordance with the foreseen circumstances. While the expected cash brought by TMT (top management team)'s human capital investment is greater than the human capital investment cost, enterprise should grasp the opportunity to further investment and not vice-versa. The human capital options of the team of senior executives of new enterprises are important connections of human resources management in newly established enterprises. Researches on human capital options are just unfolding in recent industrial researches. Balkin and Logan (1988) believes that human capital pricing method of large enterprises is not suitable for newly established enterprises, as the latter have so many different features. Chandler *et al.* (2000) discriminates culture characteristics and emphasizes the effect of incentive mechanism in particular. Heneman *et al.* (2000) finds the significance of CEO or empire-builder post characteristics, cultural factors and organizational learning capacity in the human capital pricing. Graham *et al.* (2013) thinks that TMT's human capital pricing should be consistent with corporate goals and competitive advantages. Balkin and Swift (2006) are particularly concerned the problems of equity allocation and salary of TMT in new enterprises and also point out that the risk investments have important effects on executive team.

In conclusion, the existing researches show that human capital pricing of the team of senior executives

from new enterprises is as important as it in large enterprises. They can significantly influence the acquisition of outside talent and the cohesion of the top management team in an organization. At the same time, we should see the researches of human capital pricing of TMT from new enterprises are scattered and short of integrity and systematic frames.

FACTORS AFFECTING HUMAN CAPITAL OPTIONS OF TMT OF NEW VENTURES

The top management team of new ventures is a collection of core employees with unmatched value, which would be an important part of the core competitiveness of the enterprise. It is necessary to consider many factors when the human capital of the top management team of an enterprise is priced. Generally speaking, there are the following three major aspects needed to be considered: the new enterprise itself, the external market environment and the team of senior executives (Li and Tiezhu, 2004).

New ventures itself: The new venture is a platform for the top management team to create value. It is of little significance without the pricing for the top management team. And even the same team may create different value in different enterprises. The profits and value that a team makes in a well-functioning large enterprise is quite different from the profits and value that the same team makes in a relatively bad-functioning new enterprise. However, the shareholders cannot judge the value of the core top management team only by the quality of their enterprise. Specifically, the following changes will be caused by the management team on the condition that other factors are unchanged: Firstly, the addition of the

value of the enterprise. The involvement of the TMT can improve efficiency of the enterprise, eliminate its potential threats and help it to achieve its strategic objectives; secondly, the enterprise has to burden the acquisition cost for TMT, so the shareholders firstly must pay some fees for the team can work for their enterprise. The shareholders have to bear the costs.

Market environment: Because of the increasing globalization of the economic development, the growing fierce market competition, the complicated and changeable demand of consumers and the development of the Internet technology, the traditional modes of corporate management are facing serious challenges. It is definitely an extremely difficult question for the entrepreneur's lack of experience, skills and resources to make their new enterprises outstanding in the fierce market environment. Neither can we reward those incomplete managers only because the enterprise has not made profits due to the prosperity of the relevant industry, nor can we punish the competent managers because of the downturn in the industry.

Top management team: Undoubtedly, the team of senior executives is very important to the enterprise and even it sometimes is the key to decide the success or failure of the enterprise. Which aspects on earth can we study the human capital value of the team? This paper holds that the impacts of the team of senior executives on the human capital options can be interpreted from the following two aspects: firstly, the investment of the team of senior executives in a new enterprise can greatly help the enterprise identify and seize the market opportunities and guide it to reach its expected strategic objectives; secondly, If the members of the team of senior executives leave, the strategy for the development of the new technology or product may be stopped or even fail. Therefore, the value of top management team not only shows the cash flow brought about by the development of the new product or the new technology, more importantly, it also shows in the value of the options.

RESEARCH ON CONSTRUCTION OF BINOMIAL MODEL OF TMT'S HUMAN CAPITAL OPTIONS

Binomial Model is based on the assumption of non-arbitrage and the basic assumption of risk neutral world, which means the price movement of securities, has two possible directions---increasing or decreasing during a given time (Yi and Yuan, 2002; Wang and Zhang, 2003; Raymond and St-Pierre, 2010). The model derivation is relatively simple and the binomial pricing model of the

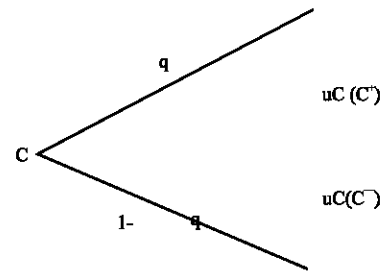


Fig. 1: One-period binomial model calculation

human capital options is suitable to deal with more complex options since it can subdivide the given time period into smaller time units. The expected return of assets in the market is risk-free rate and options value is the discounted value of the expected revenue by the risk-free rate when fixing the price for options. Note that the model supposes the value of human capital has only two changing conditions: Rising and falling.

Then, we introduce the computational method taking the one-period binomial model for example.

C represents the expected present value of cash flow brought by the human capital investment in Fig. 1 and $\mu C(C^*)$ represents the value after the human capital rising T years later.

The expected sales revenue in the future which brought by the technology transfer or technology commercialization after human capital investment can be got by multiplying unit cost of product with the expected sales. $uC(C^-)$ represents the profit value which is decreasing due to the human capital loss. The ascertainment of should consider the influence of every member in TMT on the final value of strategic decision:

$$uC(C^-) = V_1\alpha_1 + V_2\alpha_2 + V_3\alpha_3 + \dots + V_n\alpha_n \quad (1)$$

Where, n is the number of members from TMT, α_i is the demission rate of every member. We can estimate the future demission rate of every member in TMT according to the actual demission rate of every member in TMT over the years, while combining the indicator of worker's attitude, working achievements from the members of the team of senior executives with the incentive degree to the TMT from the enterprise and the work satisfaction:

$$V_i = uC + L - W - R - VX \quad (i = 1, 2, 3, \dots, n) \quad (2)$$

This equation represents the proceeds creating by the human capital after members leaving. L represents the demission damage of the members in TMT, which is provided definitely in the labor contract of enterprise. W represents the salary and bonus of executive members. R

represents the replacement cost of human capital, which is called the cost to rehire workers, including recruit, instate, cultivate and so on. VX is the lost value of human capital value, which is caused by the member quitting and then there is, $C(1+r)_t = qC^+ + (1-q)C^-$.

$$q = \frac{C(1+r)^t - C^-}{C^+ - C^-} \tag{3}$$

where, q is the risk-free probability and r is the risk-free rate. We can conclude that nation debt are regarded as the risk-free rate according to the enterprise itself and historical data of related investments.

As a corollary, if making V^+ is the option value brought by the investment of human capital when the cash flow is rising. X is the capitalized cost of human capital including salary, bonus, training investment and so on. We can calculate the final option value:

$$V = \frac{qV^+ + (1-q)V^-}{(1+r)^t} \tag{4}$$

By the above equation, we can learn the value of the human capital options as long as we know the risk-free rate of q, X, C^+ , C^- . The study simply explains the principle of binomial pricing model of the human capital options from TMT in new ventures. The principle also can be extended to the N stage of the pricing model of human capital.

APPLICATION EXAMPLE

Supposing TMT of a newly established enterprise develops a technology, whose planning period is two years and company elevated cost of relevant training and learning is 50 million at the beginning of the first year. If the technology develops successfully, TMT will launch high-tech products after a year. But the investment of the development of this technology is 1000000 Yuan and the anticipated income is 3000000 Yuan. We estimate that the 10% according to the investment data of the risk-free rate is 5% and weighted average cost of capital is products available for reference provided from similar enterprises in the market. The cash flow of this project is showed in Fig. 2.

Alteration in the value of the whole team is determined by CEO, artisans and operators in the new enterprise. This example finally gets the whole team value by the option value, which is created by three executives in the future. Supposing the attrition rate within the project planning period of executive of CEO, technical managers, production managers is 5%, followed by 7%,

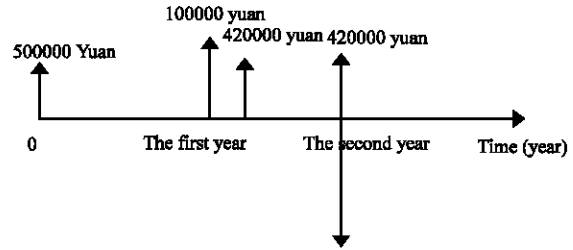


Fig. 2: Cash flow of investment projects

3% and the average wastage rate for the team is 5% that we can get. At the same time, the contract clearly stipulates that a one-time payment of salaries of CEO, technical managers and production managers from enterprise are 200000, 120000 and 100000, while the contract clearly stipulates that executives should pay ten month’s salary as penalty when they leave their office automatically. The replacement cost after the executive running off is 150000 Yuan. According to the Binomial model from TMT, we can calculate as follows:

- Supposing V_{21} is the value creating by human capital of TMT after CEO leaving their office when the new enterprise is founded in the second year. V_{22} is the value creating by human capital of TMT after technical managers leaving their office. V_{23} is the value creating by human capital of TMT after production managers leaving their office. Firstly, CEO can make an integrated evaluation for the feasibility of investment to promote the development of high-risk technology and can’t go so far as to miss the opportunities to gain a high return. Secondly, technical managers will cause the development of the whole technology products to fail and lead the future value of human capital is zero once leaving their office. It is because the knowledge they master can’t be imitated. Whether production managers leave their office will affect the yield of new technology products. Once production managers leaving their office, the output of high- tech products will decline, which means value loss of human capital of the whole TMT is the loss caused by the difference between the expected yield and effective productions, (Raymond and St-Pierre, 2005) Loss in this example is 1200000 Yuan. Calculating V_{21} , V_{22} and V_{23} from this:

$$V_{21} = C^+ + L - W - R - VX = 300 + 16.67 - 20 - 15 = 2816700 \text{ Yuan}$$

$$V_{22} = C^+ + L - W - R - VX = 0 + 10 - 12 - 15 = -170000 \text{ Yuan}$$

$$V_{23} = C^+ + L - W - R - VX = 300 + 8.33 - 10 - 15 - 120 = 1633300 \text{ Yuan}$$

Thus, as we know, value of C_2^+ is known, which is 3000000 Yuan and We can figure out that:

$$C_2^- = V_{21} \cdot \alpha_1 + V_{22} \cdot \alpha_2 + V_{23} \cdot \alpha_3 = 281.67 \cdot 5\% + (-17) \cdot 17\% + 163.33 \cdot 3\% = 14.08 - 1.19 + 4.90 = 177900 \text{ Yuan}$$

We also figure out that:

$$C_1^+ = \frac{qC_2^+ + (1-q)C_2^-}{1+R} = \frac{95\% \cdot 300 + 5\% \cdot 17.79}{1+10\%} = 2599000$$

Yuan by the C_2^+ and in C_2^- the second year. The departure of production managers doesn't have influence on the output of high-tech products because production projects don't run. Therefore, $V_{13} = C^+ + L - W - R - VX = 300 + 8.33 - 10 - 15 - 0 = 2833300$ Yuan. In the same way, we can figure out $C_1^- = V_{11} \cdot \alpha_1 + V_{12} \cdot \alpha_2 + V_{13} \cdot \alpha_3 = 281.67 \cdot 5\% + (-17) \cdot 8\% + 283.33 \cdot 3\% = 213900$ Yuan and then:

$$C = \frac{qC_1^+ + (1-q)C_1^-}{1+R} = \frac{95\% \cdot 259.9 + 5\% \cdot 21.39}{1+10\%} = 2254300 \text{ Yuan}$$

Thus, from previous study, we can easily figure out that:

$$q_1 = \frac{C(1+r) - C_1^-}{C_1^+ - C_1^-} = \frac{225.43 \cdot (1+5\%) - 21.39}{259.9 - 21.39} = 90.27\%$$

$$q_2 = \frac{C_1^+(1+r) - C_2^-}{C_2^+ - C_2^-} = \frac{259.9 \cdot (1+5\%) - 17.79}{300 - 17.79} = 90.4\%$$

according to the related count of the expected revenue of the first year and the second year, while the option value brought by the human capital investment of new enterprise in the second year is:

$$V_2^+ = \max\{300 - 100 \cdot (1+5\%) - 42, 0\} = 1530000 \text{ Yuan}$$

The option value of human capital when the cash inflows decline is: $V_2^- = \max\{17.79 - 100 \cdot (1+5\%) - 42, 0\} = 0$ Yuan and the option value of the first year on this basis is:

$$V_1 = \frac{q_2 V_2^+ + (1-q_2) V_2^-}{1+r} = \frac{153 \cdot 90.4\% + 0 \cdot (1-90.4\%)}{1+5\%} = 1317300 \text{ Yuan}$$

Moreover, we can calculate the option value brought by the human capital investment of new enterprise in the first year:

$$V = \frac{q_1 V_1^+ + (1-q_1) V_1^-}{1+r} = \frac{37.27 \cdot 90.27\% + 0 \cdot (1-90.27\%)}{1+5\%} = 320100 \text{ Yuan}$$

In conclusion, the human capital value of new enterprises what we get by option pricing model is 320100 Yuan. That is the option value of human capital of TMT in a typical new venture.

CONCLUSION

Above all, methods of traditional human capital assessment relatively ignore the actual value of human capital; especially the uncertainty of TMT's human capital value is a kind of failure to understanding the value of strategic decision brought by the investment of human capital, which causes the underinvestment in executive human capital. It will possibly not only make enterprises miss good investment chance and preemptive opportunities, but also affect TMT's enthusiasm seriously, which cause the drain of talent and store up problems for the long-term development of enterprises and especially the new enterprises, (Wang *et al.*, 2007; Xie *et al.*, 2008). From the perspective of uncertainty creating value, option pricing models try to unearth the uncertainty about the value of advanced human capital of the TMT from new enterprises. The profound analysis of efficient pricing avoids the horrific outcomes of underinvestment in human capital. This study is only a preliminary, exploratory study. The study of top management team from new enterprise and its pricing is a new topics and worthy of scholar's further exploration.

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