

The Covariance Structure Model Analysis of the Factors affecting the Entrepreneur's Human Capital Pricing in Venture Capital¹

ANALYSE DES FACTEURS DU MODELE DE LA STRUCTURE DE COVARIANCE AFFECTANT LA FIXATION DU PRIX DU CAPITAL HUMAIN DE L'ENTREPRENEUR DANS L'INVESTISSEMENT-RISQUE

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Abstract: This paper carries on the analysis of the factors affecting entrepreneur's human capital pricing in venture capital, focusing on the much-dimensionality characteristic, then establishes a logical and comprehensive theory frame which can reflect all the factors affecting entrepreneur's human capital pricing. Further by using covariance structure model (CSM), we make an empirical analysis of these factors. The result shows, in venture capital the control rights of entrepreneur is the most important factor affecting the entrepreneur's human capital pricing, the scale of enterprise is the least one, with the enterprise management performance in the middle.

Key Words: venture capital, the entrepreneur's human capital pricing, factors, covariance structure model

Résumé: L'article présent, sur la base de l'analyse des facteurs affectant la fixation du prix du capital humain de l'entrepreneur dans l'investissement-risque, a établi pour ce problème multi-dimensions un cadre théorique logique et capable de refléter complètement ces facteurs influents. L'auteur adopte d'ailleurs la méthode analytique du modèle de la structure de covariance (CSM) pour effectuer une étude positiviste sur ces facteurs. Le résultat montre que, dans l'investissement-risque, le pouvoir de contrôle de l'entrepreneur est le premier facteur en jeu, la performance de l'entreprise le deuxième et la dimension de l'entreprise le dernier.

Mots-Clés: investissement-risque, fixation du prix du capital humain de l'entrepreneur, facteurs affectants

1. INTRODUCTION

Venture capital is a new-type operational model of capital, is a innovational course of institution, which is the integration of risk money capital and the dishomogeneous human capital of entrepreneur. The essence of venture capital is finance capital converging the human capital, is the perfect-combination of human capital and finance capital. In the whole system of venture capital the entrepreneur's human capital is the rare capital of venture capital. As the central system of two principal-agency relations, the entrepreneur can adjust all the productive ingredients quickly, which

leads to the efficiency brought by optimizing the resource distribution far beyond the one brought by the common production. Just as Stephen, the board of American high technology investment list corporation, said: "human is the most important ingredient to establish the high technology industry by making full use of venture capital, among which the entrepreneur's human capital is the key body and soul of all the systems of venture capital, accelerating the risk technology innovate and disperse, boosting venture capital develop, playing a key role."

The value of entrepreneur's human capital in venture capital is highly uncertain, with the heterogeneous characteristic increasing returns. It is these characteristics that determine that the factors affecting

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entrepreneur's human capital pricing disperse in more arrangements and at more dimensions, forming a huge and complicated cluster. There are some immeasurable latent factors following among these factors. These latent variables may possibly composite some theory conceptions, some research supposition, only can not directly be measured by existent method, but these variables can be explained by some measurable phenomena. In order to let us deeply understand these factors affecting entrepreneur's human capital pricing in venture capital, fully realize to price the entrepreneur's human capital, this paper hackles and trims these factors systematically. Specifically with 150 copies of questionnaires given out to 30 middle-small high technology enterprises and resulting in 78 sets of valid answers, this paper obtains investigative data, further establishes covariance structure model to make an empirical analysis.

2. THE FACTORS AFFECTING THE ENTREPRENEUR'S HUMAN CAPITAL PRICING IN VENTURE CAPITAL

In venture capital how to confirm the price of the entrepreneur's human capital is not simply the equilibrium of factor market, but the complicated course integrating the market choice and governance evaluation under some special restrictive condition. The market choice focuses on the human capital gift, the rarity of human capital and reining the risk of entrepreneur, forms the market price of entrepreneur's human capital at equilibrium. However this is the base of the entrepreneur's human capital pricing, final price depends on the compositive evaluation results of environment inside and outside of venture capital enterprise, including organize strategy, resource characteristic, management ability, entrepreneur's contribution, corporation government, manager's negotiation and the other factors outside enterprise. Therefore, in order to price the value of entrepreneur, the board or committee must both refer to the basic factors corresponding to the value of entrepreneur's human capital and consider the basic environment where the corporation exists.

2.1 Basic factors

Basic factors are the basic principle deciding entrepreneur's value, including the entrepreneur's management performance, the scale of enterprise, the entrepreneur's career rank and the human capital characteristic of entrepreneur and so on. Some civil scholars directly substitute the enterprise performance for the entrepreneur's management performance, however, there are some disputes among their researches. For example, Li Zeng-quan and Wei Gang did their research employing the data form more than

700 list corporations in 1999, and drew the conclusion that there were no obviously positive correlation between the gross value of entrepreneur's human capital and the revenue of enterprise's net capital. Whereas, Chen Zhi-guang and Chen Chao-long employing the data in 2000 drew the opposite conclusion. As a matter of factor there are few scholars research how the entrepreneur's career rank and market factor affect the entrepreneur's human capital pricing.

2.2 Governance factors

Except the basic factors the determined course of entrepreneur's human capital pricing also depends on the owners (including the characteristic of ownership and the structure of stock right), the board, the committee, the market of corporation control right and the public voice and so on. By inquiry civil scholars found the entrepreneur's human capital pricing in venture capital had relation with the enterprise characteristic, the value of entrepreneur in state-owned list corporation was much low than that in private-control corporation. Because the board was the key institution of inside governance, with exception of the characteristic of ownership and the structure of stock right, we should pay special attention to the relation between different board structure and the value of entrepreneur's human capital.

2.3 Weight factors

Weight factors are the summation of environment outside the enterprise in venture capital during the course of pricing the entrepreneur's human capital. It is the "background effect" during the course of determining the entrepreneur's human capital pricing. Hellmann once pointed out, in order to deal with the changeable investment risk better the entrepreneur's human capital in venture capital must invest much more time and money to increase its amount of human capital, therefore facing with the depreciation risk and increment chance. The entrepreneur's human capital pricing has a consanguineous relation with the region and industry where the risk enterprise locates.

3. THE EMPIRICAL ANALYSIS OF THE FACTORS AFFECTING ENTREPRENEUR'S HUMAN CAPITAL PRICING IN VENTURE CAPITAL

3.1 Basic fundamental of covariance structure model

3.1.1 Covariance structure model (referred to as CSM for short)

The covariance structure model is the multidimensional

statistical method testing the relation between the observed and latent variables, latent variable and latent variables. In CSM the observed and latent variables can be combined effectively. Its basic fundamental: firstly using the corresponding theory and knowledge, and forming the causality model among variables after reasoning and supposing, then testing the model by data.

Sign "X" denotes the observed variable of exogenous latent variable, "Y" is the observed variable of internal latent variable, "ξ" is the exogenous latent variable, "η" is the internal latent variable, "δ" is the metrical error of "X", "ε" is the metrical error of "Y", "ζ" is the special factor of "η". There are eight covariance structure matrixes in CSM, namely: "A_x" and "A_y" are the covariance structure matrixes of the observed variables; "Ω" and "Γ" are the covariance structure matrixes of the latent variables; "φ" is the covariance structure matrix of the exogenous latent variable; "Ψ" is the covariance structure matrix of internal latent variable error "ζ"; "Θ_δ" and "Θ_ε" are the covariance structure matrixes of error "δ" and "ε".

3.1.2 The components of CSM: two metric models and one structure model

1) Metric model: depicting the relation of observed and latent variables, its formula is following:

$$X=A_x \xi + \delta \quad Y=A_y \eta + \varepsilon$$

Here, "X" and "Y" are the ((q × 1) and (p × 1))vectors of observed variables, "ξ" and "η" are the ((n × 1) and (m × 1)) vectors; "A_x" and "A_y" are the ((q × n) and (p × m)) factor matrixes; "δ" and "ε" are the ((q × 1) and (p × 1)) error vectors of observed variables.

Suppose: "ε" and "η", "δ" and "ξ", "ε" and "δ" are all irrelevant.

2) Structure model: depicting the relation among latent variables, its formula is following:

$$\eta = \Omega \eta + \Gamma \xi + \zeta$$

Here, "η" is the (m × 1) vector of internal latent variable; "ξ" is the (n × 1) vector of exogenous latent variable; "Ω" and "Γ" are the ((m × m) and (m × n)) factor vectors, the elements of "Ω" reflect the correlation among internal variables; the elements of

"Γ" reflect the correlation between exogenous and internal variables; "ζ" is the (m × 1) error vector of exogenous latent variable, which means the structure equation can not forecast internal variable completely.

Suppose: "ξ" and "ζ" are irrelevant, what's more, there are no redundant equations.

3.2 Test course

3.2.1 Inquiry samples

This paper investigates some venture capital institutions by lots of methods. Firstly, referring to 88 active venture capital institutions at home and abroad chosen by Wei Xin venture capital corporation from 2001 to 2005, including 49 national invest institutions and 33 foreign invest institutions. Secondly, referring to the corresponding china venture capital data researched by Zeroipo corporate in 2006. Thirdly, referring to Zhou Zhong-fu's research and inquiry. Because civil venture capital mainly muster in Beijing, Shanghai, Shenzhen, Guangzhou and Xi'an and so on, where he issued 58 questionnaires (including 8 offices or subsidiaries set up by foreign invest institution), and received 42 questionnaires, which were fit with the efficient numbers. At the same time he also paid a visit to 15 representative middle-small high technology enterprises dispersed in Changsha, Shenzhen, Guangzhou, Jiangsu, Shanghai, Chengdu etc, obtaining the first hand data. Fourthly, referring to the corresponding venture capital websites and corresponding achievements at home and abroad. Because there are differences among the phases of the development of venture capital, also there are differences among different industries we choose the middle-small high technology enterprises [5] which are in the period of growth and mature as our sample, which are on behalf of the venture capital enterprises mentioned in this paper.

3.2.2 Suppositions and choosing variables

1) Internal variables and their observed variables

① Internal latent variable 1: the value of entrepreneur's human capital

② Internal latent variable 2: the management performance of middle-small high technology enterprise.

Supposition 1: the value of entrepreneur's human capital is positive correlation with the management performance of enterprise.

Generally speaking, the development of enterprise is uncertain, the management performance is not easily brought forth in the annual finance report form. In CSM we choose the middle-small high technology enterprises as investigated objects, the sample data are from the period of development, expansion and nature of

middle-small high technology enterprises, which can obtain the data of management performance much better. We take the asset return, the net asset return, gross profit and return per share as the index of management performance.

2) Exogenous latent variables and their observed variables

① Exogenous latent variable 1: the scale of middle-small high technology enterprises, which reflects the complexity of entrepreneur's managing the labor in venture capital.

Supposition 2: the value of entrepreneur's human capital is positive correlation with the scale of middle-small high technology enterprises

In our paper, we choose the gross asset, gross operation income, gross capital stock and gross profit as the metric indicators of the scale of middle-small high technology enterprises.

② Exogenous latent variable 2: entrepreneur's control right

Supposition 3: the value of entrepreneur's human capital is positive correlation with the right of entrepreneur's controlling the enterprise.

Supposition 4: the value of entrepreneur's human capital is positive correlation with the proportion of entrepreneur's holding the stocks.

During the phase of foundation of middle-small high technology enterprise, the entrepreneur is paid relatively lower. With the development of middle-small high technology enterprise, the value of entrepreneur is

increased step by step according with the increase of entrepreneur's negotiation, here we suppose that the proportion of entrepreneur's holding the stocks (the stocks of his own in middle-small high technology enterprise) stands for the ability of entrepreneur's negotiation [6].

Supposition 5: the value of entrepreneur's human capital is positive correlation with entrepreneur's patriarchy.

Supposition 6: the value of entrepreneur's human capital is negative correlation with the number of stockholders in venture capital.

The more is the number of stockholders, the more is supervising the middle-small high technology enterprise, the more easily does form the effective supervise mechanism.

Supposition 7: the frequency of grading investment has a complicate influence on the value of entrepreneur's human capital.

The higher is the level of entrepreneur's management, the higher is the value of entrepreneur's human capital. The frequency of grading investment reflects how seriously entrepreneur treats the risk investment item, the better does the risk investment item develop, the more will entrepreneur invest on the middle-small high technology enterprise [7]. Hence we suppose the frequency of grading investment is positive correlation with the value of entrepreneur's human capital.

By the above suppositions we gather the investigated variables and their codes in table 1.

Table 1 Investigated variables and their codes

Type of latent variables	Code of latent variables	Code of observed variables	Unit
Internal variables	The value of entrepreneur's human capital (A)	The entrepreneur's annual salary (E)	Ten thousand Yuan
	The management performance of the middle-small high technology enterprise (B)	Asset return (F)	%
		Net asset return (G)	%
		Return per share (H)	%
		Gross profit (I)	Million Yuan
Exogenous variables	The scale of the middle-small high technology enterprise (C)	Gross capital stock (J)	Million Yuan
		Gross asset (K)	Million Yuan
		Operation earnings (L)	Million Yuan
	The right of entrepreneur's control (D)	The proportion of entrepreneur's holding the stocks (R)	%
		The entrepreneur's patriarchy (S)	Year
		The number of stockholders in venture capital (U)	Person
		The frequency of grading investment (W)	Year/time

3.2.3 Supposed CSM

After the above analysis we can easily obtain the supposed path model of the structure among the factors affecting entrepreneur's human capital pricing, just like

fig.1. In this figure every unobserved latent variable is measured by other observed variable, here the latent variables are in the ellipse, the observed variables are in the pane. Every arrow stands for one path, every path

stands for one supposition.

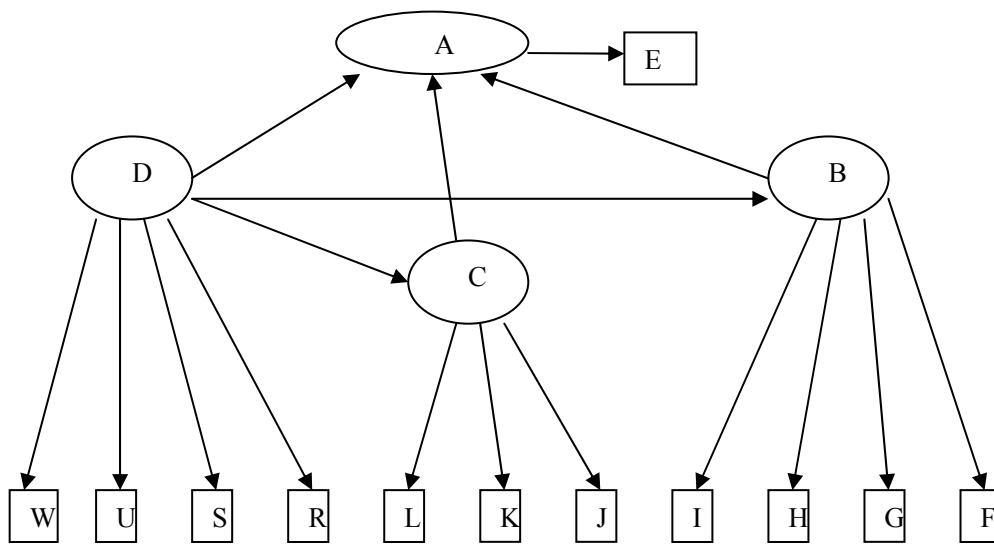


Fig.1 The supposed path model of the structure among factors affecting entrepreneur's human capital pricing

This model shows the value of entrepreneur's human capital is an internal latent variable, which is measured by annual salary. The management performance of the middle-small high technology enterprise is another internal latent variable, one the one hand, it affects the value of entrepreneur's human capital, and on the other hand, it is affected by the right of entrepreneur's control. The exogenous latent variables are the scale of the middle-small high technology enterprise and the right of entrepreneur's control, which affect the entrepreneur's value directly or indirectly.

3.2.4 Questionnaires

To obtain the data for establishing our model, we designed 150 copies of questionnaires given out to the top managers or directors in 30 middle-small high technology enterprises. These enterprises covered a broad market, including software, IT industry, medical and health, new material, modern making industry and so on. By structural conversation or E-mail, this paper investigated the personal information of the manager,

director, and other top-manager, including name, gender, position, diploma, salary, industry owned by his corporation, location, background of his enterprise, gross asset, gross capital stock, operation earnings, asset return, net asset return, return per share, gross profit, the proportion of entrepreneur's holding the stocks, patriarchate, the number of stockholders, the frequency of grading investment, corporation governance, the environment around the enterprise and so on.. At last we received 78 sets of valid answers up with the response rate of 52%. In order to enhance the measurement of multi-variable, we measured the basic data with 5 Likert-type scale, evaluating every variable respectively. What's more, we made a factor analysis on the basic factors and governance factors, eliminating the variables with the coefficient of factor weight beyond 0.3, obtaining the covariance matrix composed of 12 measurable variables. Because the data were tremendous, here we only listed the descriptive statistics of the data in 2001, just as in table 2 below. By the same method we can got the others.

Table 2 Descriptive statistics of the data in 2001

Variables	Mean value	Standard deviation	Number of samples
Gross asset	2.97	0.49	78
Gross capital stock	3.04	0.71	78
Operation earnings	1.98	0.65	78
Asset return	2.05	0.72	78
Net asset return	1.82	0.47	78
Return per share	3.46	0.63	78
Gross profit	2.24	0.70	78
Proportion of holding stocks	2.65	0.54	78
The patriarchate	3.37	0.62	78
Number of stockholders	2.70	0.59	78
Frequency of grading investment	3.13	0.58	78
Entrepreneur's annual salary	2.41	0.66	78

3.3 Test results

The model is simulated by AMOS4.0, which the results are evaluated by following indexes :

- 1) Chi-square, namely χ^2/df which is outputted in form of CMINDF. If the result is smaller than three, it means the goodness-of-fit is better.
- 2) Goodness-of-fit, GFI for short. The index is between zero and one. If the index is bigger than one point five, it means the data fit the model better.

3) Root mean square error of approximation, RMSEA. If the number is smaller than one point zero eight, it means the goodness is better.

4) Non-normal fit index, NNFI, which is also named Tucker-Lewis index (TLI).If the number is bigger than one point nine five it is best; if the number is bigger than one point nine it is better.

5) Benter comparative fit index, CFI, the number is between zero and one, bigger than one point nine it is better.

Carry on testing the model by the chosen data from 2001 to 2005, the results as follows in table 3.

Table 3 The mean indexes of fitness of CSM

Index	CMINDF	GFI	RMSEA	TLI	CFI
Criterion	<3.000	>0.500	<0.080	>0.900	>0.900
2001	2.850	0.921	0.068	0.923	0.931
2002	2.824	0.918	0.059	0.916	0.926
2003	2.731	0.942	0.085	0.893	0.902
2004	2.654	0.781	0.037	0.920	0.916
2005	2.903	0.498	0.046	0.874	0.905

Seeing from table 3 all the fitness indexes get across the test at an remarkable level, the fitness results are relatively better. By the normalized path indexes we calculate the explain degree of latent variables affecting the entrepreneur's human capital pricing, as is showed in table 4.

Just as the table 4 all the model structures fitted by the data of every year are consistent, holding out the supposition of CSM. In the industry of venture capital from 2001 to 2005, the management performance of

middle-small high technology enterprise, the scale of enterprise, the right of entrepreneur's control explain the factors affecting the entrepreneur's human capital pricing at an upward trend, moreover, the explain degree increases step by step [8]. By further analysis the right of entrepreneur's control explains the factors affecting the entrepreneur's human capital pricing at the highest level, the scale of enterprise is lowest, and the enterprise management performance is in the middle.

Table 4 The explain degree of latent variables affecting entrepreneur's human capital pricing

Affected variables	2001	2002	2003	2004	2005
The management performance of middle-small high technology enterprise	4.34	8.28	11.02	13.48	16.12
<i>Asset return</i>	1.26	2.69	2.83	2.95	3.61
<i>Net asset return</i>	1.38	2.34	2.51	3.49	3.60
<i>Return per share</i>	1.98	4.76	6.05	7.34	8.32
<i>Gross profit</i>	1.54	3.17	3.63	4.21	4.38
The scale of the middle-small high technology enterprise	2.86	7.87	9.03	11.94	13.01
<i>Gross capital stock</i>	1.22	2.35	2.64	3.92	5.26
<i>Gross asset</i>	1.36	2.67	2.85	3.19	4.47
<i>Operation earnings</i>	2.53	5.63	7.92	9.04	10.81
The right of entrepreneur's control	12.31	16.65	18.39	20.64	24.01
<i>Proportion of holding stocks</i>	6.68	7.23	7.92	8.65	10.09
<i>The patriarchate</i>	5.34	5.67	5.01	5.39	6.02
<i>Number of stockholders</i>	0.15	2.12	3.49	4.21	5.53
<i>Frequency of grading investment</i>	2.12	2.56	2.71	2.92	3.01
Total explain degree	19.51	31.80	40.25	48.02	53.19

4. CONCLUSIONS

CSM has the great advantage of empirical analysis of the entrepreneur's human capital pricing, conceptualizing the immeasurable variables by marking the measurable ones, further studying the relation of

latent variables by the covariance relation of measurable variables. The test result is consistent with all the suppositions. From the above illustrations, the following two conclusions may be reached.

- 1) From 2001 to 2005, the influence on entrepreneur's human capital pricing by the management performance of middle-small high technology enterprise, the scale of enterprise, the right of entrepreneur's control increased year by year. This

was because our country implemented some special incentive mechanism for entrepreneur of venture capital industry, such as the distribution and transform of the control right, salary contract structure and so on. So this study provides some useful theory references for these policies further developing and amending.

2) Seeing from the result of 2005, operation earnings and return per share become the main observed variables, which means with the development of venture capital operation earnings has become the main indicator measuring the entrepreneur's management performance. With the large-extent increase of return

per share and operation earnings, the negotiation ability of entrepreneur's human capital in the middle-small high technology enterprise enhances. The distribution and transform of the control right of middle-small high technology enterprise is the better incentive mechanism for entrepreneur [9]. In order to develop the venture capital in our country better, from the point of entrepreneur's human capital, we should strengthen the entrepreneur's innovation, cultivate the enterprising spirit, perfect the entrepreneur's property rights, establish the entrepreneur's leading model, set up the entrepreneur's supervise mechanism.

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