

## The Empirical Study on the Asset Portfolio Paradox and Related Issues

Sun zhaoliang, Ma Xiaonan

The Financial Department, Shandong Jiaotong University, Jinan, P.R. China, 250023

(E-mail: szl7628@163.com, maxn@sdjtu.edu.cn)

**Abstract** Based on the portfolio model and theory from the business perspective and practical case studies, This paper reaches a conclusion that diversification can be successful on certain condition. Finally, the paper does a empirical study by using the relatively well-developed retail companies in our country as samples. The results show that: whether state-controlled or private holding companies in the diversified process, although they diversified for different purposes, but if they do not follow these basic prerequisites, it would certainly bring the detriment of the company's value.

**Keywords** Asset portfolio; Bow-shaped curve; Diversification; Empirical study

### 1 Introduction

In 1952, Harry. Markowitz published a paper entitled "asset portfolio choice" "Journal of Finance", which firstly proposed the comprehensive system of portfolio theory: multi-asset portfolio will not reduce the portfolio's expected return, but it will spread portfolio risk. Take two kinds of assets for example, the expected return of the combinations of assets is a simple weighted average expected return of each asset, but the variance of the combinations of assets is:

$$\text{Var}(\text{combination}) = X_A^2 \sigma_A^2 + 2X_A X_B \rho_{AB} \sigma_A \sigma_B + X_B^2 \sigma_B^2 \quad (1)$$

As long as  $\rho_{AB} \neq 1$ , it will be able to spread out some of the risks. Based on this point, we will get the efficient frontier of investment, and the efficient frontier may be a bow-shaped curve. The significance of bow-shaped curve is that introducing a high-risk investment, we can get more expected return of asset portfolio than the previous expectation of a single project, but the risk is decreased. Ross. S. A argues that this surprising phenomenon is due to portfolio diversification effect. The asset portfolio actually play the role of "hedging", and as long as  $\rho_{AB} \leq 0$ , bow-shaped curve will certainly occur, and when  $\rho_{AB} > 0$ , the bow-shaped curve may appear, or it may not appear.

The asset portfolio theory give the investors quite a seductive results on the surface. But unfortunately, many companies use this theory to practical investment diversification, most of them had failed. In 2006, the China Enterprise Confederation announced a research report about the reason of the companies' failure in China. The report said that among the failure of collected companies, the vast majority of them lose business because of diversification, such as San Jiu Medical & Pharmaceutical, De Long Group, San Zhu Group etc. Even China's best PC company, Lenovo Group, also failed in diversification, and thanks to abolish diversification promptly and devote its mind to PC, the Group regain its market position. Similarly, diversified business practice is not satisfactory in Western countries. In 1994, Lang Xianping and R. Stulz co-published a paper named "Tobin's Q, the company's diversified operations, company performance" which reach a conclusion: the average Tobin's Q value of specialized companies in the United States is 40% higher than the mean of all the samples. At the end of the century, the well-known west companies enterprises began "go core business" wave. Is it a failure of portfolio theory? Or it does not apply to investment practise? So this is the paradox of asset portfolio theory. Many scholars have studied this paradox.

(1) (Bauer 1989) thought that the company is specialized intermediaries, and their knowledge structure is specific to a particular class or certain types of asset and service transactions. Just because of limitations of knowledge structure, the businesses which the company have to face is always a finite collection of sets, rather than the infinite set. So when the company conduct diversification of capital investment, they need to learn new knowledge and enhance the knowledge structure. The cost of this study are closely linked with the correlation between the investment projects. The smaller the correlation coefficient, the greater the cost of learning costs. When the marginal increase of learning costs is more than the marginal diversification benefits, the failure of diversification is inevitable.

So another problem has arisen: how to reduce the learning cost effectively? As we know, the main body of learning in the enterprise should be the natural person, such as the senior management personnel, including the business organizations of course, and the business transaction information which the

enterprise has to learn come not only from the market, but also from the enterprise inside. and the internal information is mainly provided by the accounting system, rather than directly from the operation of the market. (Xie Deren 1996) said that: Once the assets enter into the enterprise which is independent of the market, the measurement of the assets is naturally out of the market, and is conducted by the accounting system.

As can be easily seen from the discussion above, there are mainly two ways to reduce the learning cost: one is improving the corporate governance structure; the other one is perfecting accounting system (including the auditing system). But in our country, neither of the two conditions is qualified. (Zhang Weiyang 2001) thought that the Chinese managers generally lack the credibility because of the property order. And once the property rights are not well-protected, and the incentive mechanism is not well-sophisticated, diversification is a danger to the enterprises. Lang Xianping thought that it is not the fault of the property order, it is the lack of legal environment and harsh punishment which make the lack of fiduciary duty. No matter the two economic masters' view of the question, the conclusions are the very same: oppose Chinese enterprises to be diversified.

(2) According to the asset portfolio theory, the bow-shaped curve will certainly appear when  $\rho_{AB} \leq 0$ . In this sense, it seems that it is ideal when you invest in the business which  $\rho_{AB} \leq 0$ . But in reality, the business which  $\rho_{AB} \leq 0$  often produces an antagonistic effect. Lang Xianping (2006) takes Sony as an example. He analysed that the fall of Sony is just because of the diversified operations (primarily electronics and entertainment businesses) which conflict with each other and lead the company to collapse. So the correlation coefficient is not as small as possible when you select the combination of assets, and when the correlation coefficient is in the range of  $(0, \frac{\sigma_A}{\sigma_B})$ , the effects of combination are better.

Lang Xianping also did some success stories of diversification. Hutchison Whampoa is one of them. Hutchison Whampoa invests in seven major sectors, namely property development, container terminals, retail, manufacturing, telecommunications, e-commerce and holding. The relationship between the seven sectors is not significant. If you just look at the growth rate of the profitability in each sector, then the lowest growth rate is -50%, while the maximum is 200%. But if you look at the weighted average growth rate, then the growth rate of the asset portfolio is between -5%-20%. The earnings volatility is 10 times smaller. Just because of the complementarity of Hutchison Whampoa's assets, the business risk was cut down effectively. The success of Hutchison Whampoa proves that the asset portfolio theory is correct and can be practical.

## 2 The Empirical Study on Diversification in Retail Listed Companies

Since the barriers to entry of China's retail are relatively low, the policies and regulations are relatively perfect and the competition is very fierce. So the paper takes the retail companies as samples. In this way, we can get rid of non-market factors effectively, and will get the relatively authentic results.

### 2.1 Index design and data resources

(1) In the empirical study, it commonly uses Herfindahl Index ( $HI$ ), Entropy of Income ( $EI$ ) and the number of industries which the enterprises engaged in.

$$HI = \sum_{i=1}^N P_i^2 \tag{2}$$

$$EI = \sum_{i=1}^N P_i \ln\left(\frac{1}{P_i}\right) (i = 0, 1, 2, \dots) \tag{3}$$

In which,  $P_i$  is the business income share of  $i$ . In this paper, we use  $EI$  and the number of industries which the enterprises engaged in as Independent Variables.

(2) Generally, the index for corporate value is *Tobin's Q*, which is calculated as follows: *Tobin's Q* = (book value of debt + market values of shareholders' benefits) / book value of assets. In this paper, *Tobin's Q* values are directly from the RESSET Database.

(3) Sample selection. According to China Merchants Securities, this paper selected 51 retail companies in 2007 considering retail reports from the China Economic Information Network, in which 29 of them were controlled by the state, 18 of them were controlled by the private, 1 is a foreign-controlled company and the rest are owned by the employee stock ownership. As there is only one foreign-controlled company, in order to facilitate the study, this foreign-controlled company is classified as private-owned.

## 2.2 Regression model and the analysis of results

### 2.2.1 Model construction

According to the foregoing analysis, we can construct the simple linear regression model as follows:

$$\Delta \text{Tobin's } Q = \alpha + \beta_1 \text{DIVA}_i + \varepsilon_i \quad (4)$$

In which,  $\Delta \text{Tobin's } Q$  stands for the relative value of the listed companies, namely the actual Tobin's Q of the company subtract the average of Tobin's Q in the industry.  $\text{DIVA}_i$  stands for the index of diversification.

### 2.2.2 The analysis of regression results

In this paper, we got the regression results using the statistical software--SPSS12.0 (the  $\Delta \text{Tobin's } Q$  as the dependent variable; the  $\text{DIVA}_i$  as the independent variable), and the results are as follows:

**Table 1 Regression Results**

Independent Variables	Overall			State-owned			Private-owned		
	$R^2$	Coefficient	$T$ -value	$R^2$	Coefficient	$T$ -value	$R^2$	Coefficient	$T$ -value
$EI$	0.098	-1.18	-2.305 **	0.138	-1.434	-2.077 **	0.152	-1.519	-1.74 *
Number of Business	0.076	-0.253	-2.006 **	0.212	-0.5	-2.695 **	0.054	-0.196	-0.989

(\*--means significant at the level of 10%; \*\*--means significant at the level of 5%.)

As we can see from Table 1, the results of regression analysis are basically consistent with the results of relevant analysis and other scholars' conclusions, such as Jin Tian. (Yu Pengyi 2005), (Jiang Fuxiu, Liu Zhibiao 2006). Namely: diversified companies are not recognized by the market, and will damage the corporate value. Compared with the private-owned companies, the damage of diversification is more serious for the state-owned companies. The damage to the corporate value for the private-owned diversified companies is significant at the level of 10% does not mean that the private-owned companies have got the conditions for success, as the increase of the corporate value is the result of controlling the stock price.

### 2.2.3 The deficiency of empirical study

During the process of empirical study, as part of the listed companies did not disclose their industrial distribution data in details, the paper ignores those industries, and this may influence the results. From this point of view, we need further study to resolve.

## 3 Conclusion

The paper firstly introduces the asset portfolio paradox and sums up the research results of the scholars from China and abroad. Then using the regression model, the paper chooses the listed retail companies as samples and conducts the empirical study. The results are as the author expected. Finally, we can get the following conclusions:

(1) To some extent, diversification significantly influences the corporate value. For the chosen companies, the more diversified, the worse the companies performed.

(2) In China, the companies lack the conditions for diversification, such as the property structure, corporate governance structure and the accounting system etc.. So diversification is not the best choice for the company at present.

(3) Only if the conditions are qualified, the asset portfolio theory can be effective.

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