

# Survival Analysis on the Timing of Foreign Banks into China from the Aspect of Traditional Real Option

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## Abstract

Foreign Banks are becoming more important to China as China's banking opens more. China needs to know all aspects of foreign bank's entry, but researches about the timing are few. According to the theoretical and empirical analysis, foreign banks in China have some monopoly power on their customer in the past and in the future. Therefore traditional real option theory can be used to analyze the timing. This article examines the entry timing of all foreign banks into China from 1978 using survival analysis under real option theory. The empirical model certifies that the entry timing is consistent with real option theory, but at the same time, it presents its own characteristics: policy is very important to the timing; although the uncertainty from the market delays the entry timing, but the delay is weakened by the attractive repay; powerful banks may enter earlier, but at the same time, they are not eager to enter because they have more delayability. China's authority can affect the timing of foreign banks' expanding in China through its influence on uncertainty, irreversibility, delayability and current cash flow.

**Keywords:** Real option, Entry timing, Foreign banks, Survival analysis

## 1. Introduction

From Dec. 11, 2006 on, China has fully opened its finance to foreign banks. More foreign banks come to China and more branches are established, and their business is enlarged to almost every financial area. From 2008, foreign banks have entered Chinese rural market faster than local banks. In June, 2013, fund distribution is opened to foreign banks, and in not more than one month, the main foreign banks have begun this business. In the near future, foreign banks may enter the treasury bonds future market and enter Shanghai FTA easier. Foreign banks have become an indispensable part in China's banking. The current situation urges us to know all aspects of foreign bank's entry thoroughly. But articles about "why" "where" "how" banks operate abroad are tremendous while those about "when" are few according to Fuentelsaz, Gome and Polo (2002). And the empirical articles about the timing are fewer. Ursacki and Vertinsky(1992) analyzed the timing of foreign banks into Japan and Korea during 1966 to 1986 under OIL theory using survival analysis. The conclusion is that banks with most powerful advantage will enter first. Rivoli and Salorio(1996) deemed that in an uncertain environment, according to real option theory, Ursacki and Vertinsky(1992)'s conclusion may be wrong. The ownership advantage may bring certain monopoly power and make the investment more delayable. Internalization advantage may make the investment more irreversible and delay the investment. Ding (2005) analyzed further the interaction between the three advantages and the timing of FDI. Following Rivoli and Salorio(1996), Blandon (2001) believed investment in banking faces uncertainty and irreversibility, but is undelayable because the ownership advantage is easy to be duplicated.

In dealing with timing, real option method is better than the traditional NPV rules in an uncertain environment. Buckley and Casson (1998), Rugman and Li (2005) appealed to the theoretical circles to use real option to research FDI problems under uncertainty. Real option theory can be divided into the traditional theory which regards the entrant as a monopolist and therefore does not consider competition and option game theory which studies the

tactical investment of the rational entrants banding real option and game theory. Which kind of real option theory can be used in analyzing the timing of foreign banks into China? Liu and Wang (2007), Duan (2008), Ding (2012a) proved that the incentive of foreign banks into China is “customer-following”. The relationship between banks and customer is formed through the interaction in a long period. Therefore it is difficult to be duplicated and foreign banks have some monopoly power on its customer. Therefore traditional real option theory is suitable (Note 1). On contrary with Blandon (2001), foreign banks into China have the ability to delay and therefore traditional real option theory is applicative. Blandon (2001) did not consider uncertainty which is a typical important factor. Ursacki and Vertinsky(1992) and Blandon (2001) use absolute variable “Asset Scale” , but most banks’ asset scale will increase as time goes on. Therefore the asset scale of bank who entered earlier and that entered later is not comparable. So we choose a relative variable “world ranking” according to asset scale. In our article, we will analyze the timing of foreign banks into China with more reasonable variables using survival analysis from the aspect of traditional real option.

This article is arranged as following: the second part introduces the traditional real option and the suitability on the timing of foreign banks into China. The third part sets up the survival model and explains the data and variables. The fourth part examines whether the timing of foreign banks into China is in accordance with real option theory using the data from 1978. The last part is conclusion.

## **2. Introduction of traditional real option theory and the suitability on the timing of foreign banks into China**

According to Dixit and Pindyck (1994), the investor is able to wait and it is also necessary to wait in an irreversible and delayable environment with exogenous uncertainty. In an uncertain environment, irreversibility and delayability make the immediate investment have some opportunity cost. If the investor invests immediately, he will lose the opportunity to invest later. And the worth of this option to defer is the opportunity cost of investment immediately, therefore when the income from the immediate investment is larger than the sum of the invest cost and the worth of the option to defer, the investment can be carried out, otherwise, the investor should wait. The worth of the investment is affected by current cash flow, uncertainty, irreversibility and delayability. If the current cash flow is more, the opportunity cost of waiting is more and investor is inclined to enter immediately. The uncertainty of future economy is huger, the market may fluctuate better or poorer. But the investor has the right to not to invest in a poor market, therefore, such option can worth more, and therefore the opportunity cost to invest immediately is larger and the investor may choose invest later. The more reversible the investment can be, the opportunity cost to invest right now will be less, and investor may be more willing to invest promptly. The more delayable the investment can be, the investor can have more opportunities to choose when invests, and the option to defer will worth more and the investor is more possible to invest later.

### *2.1 Uncertainty faced by foreign banks in China*

Foreign banks in China will face uncertainty from the demand in the market. Foreign banks need to know well about the typical financial demand from local market, but in this aspect, foreign banks can not do better than local banks. Uncertainty from the policy changeability affects foreign banks much more than local banks. China is a reforming country, and the policy may change frequently. Local banks are familiar with the environment and can have more chances to interact with local authorities and can be surer about the future policy. Foreign banks also face the uncertainty from RMB exchange rate. Several years later after the exchange rate regime reform in 2005, RMB stops to appreciate persistently and begins to fluctuate up and down. This means that foreign banks face uncertainty from exchange rate fluctuation. Deposit insurance system hasn’t been established in China, the loss can not be limited and uncertainty is enlarged.

### *2.2 Irreversibility faced by foreign banks in China*

Reversibility is the ability to recover when the market condition becomes bad. In China, foreign banks face irreversibility. Irreversibility is influenced by the circumstances of the whole banking. If the banking is flourishing, it is easy to sell a bank. While the banking is declining, a bank can not be sold with a good price. But China’s bank bankruptcy system hasn’t been established for many years. Reasonable and ordered bankruptcy can avoid effectively the banking crisis and can make the investment of banks more recoverable.

There is much immaterial product in bank’s management. But this product is difficult to recover. Firstly, this product is difficult to evaluate. For example, how to evaluate the brand of a bank? Secondly, this nature of immaterial product make it is difficult to transact. The buyer needs to know the product to give proper price, but once the buyer knows the product, the secret will be let out. This is one of the reasons that some foreign banks want to operate in the form of sole proprietorship while not partnership. In China, the relationship between foreign banks and its customer can not be evaluated and is difficult to transact. The advanced experience of management and financial innovation ability also can’t be transacted. Surly there is irreversibility in China’s banking. But it is difficult to estimate the degree of irreversibility.

### 2.3 Monopoly and Delayability faced by foreign banks in China

Before 2004, the main business for foreign banks is kinds of foreign exchange business and little RMB wholesale business of some pilot foreign banks to foreign enterprises. The customers are mainly foreigners and foreign enterprises. Therefore, the intention for foreign banks is “customer-following” in that period. From 2004, foreign banks are authorized to supply whole sale RMB business to Chinese enterprises. From 2006, China’s banking open fully to foreign banks, the foreign banks can supply RMB retail business to many local person or enterprise and theoretically the incentive of “local market utilization” become more obvious. In this new market, foreign banks are equal and have no monopoly power on it new customers and the competence from the local and other foreign banks are fierce. But actually, several years later, foreign banks do not perform well in compete with China’s local bank in the new market, and its profit is still mainly from the old customers. Therefore, as Liu and Wang (2007), Duan(2008), Ding (2012a) proved, the main incentive for foreign banks into China is still “Customer-following” . “Customer-following” incentive means the main customers of foreign bank are the foreigners or foreign enterprises from its motherland, the relationship between them are formed in a long period and can not be replicated easily and therefore foreign bank has some monopoly power on its customers. Because in the past several years, foreign banks does not perform well, in the future, it is better for foreign banks to utilize their advantages such as wealth management, financial innovation, techniques on handling small business finance (Ding, 2012b) and avoid competence from local banks in the future. In these areas where they are competitive, they have some monopoly. As RMB internationalization is going on, foreign banks will take advantage of their broad branches abroad which are not sufficient for China’s local banks. They will also have some monopoly power on Chinese customer especially enterprises who want to go abroad. Therefore, in the future, foreign banks still has certain monopoly power on its customer. The monopoly is difficult to be replicated and therefore their investment including enter China newly or expand their business in China is delayable.

Foreign banks into China have some monopoly on their customer in the past and in the future (Note 2), and therefore have some dealyability. At the same time, there are exogenous uncertainty and irreversibility. Therefore the traditional real option theory can be used.

### 3. Model, Variables and Data

This article use survival analysis to explain the timing of foreign banks into China. Let T be the time of survival between the start event that is “Chinese banking opening to foreign banks in 1978 ” and the terminal event that is the foreign banks established the first profit institution. At time t, the hazard ration is as following:

$$h(t) = h_0(t)e^{(\beta_1 \text{Uncertain}t + \beta_2 \text{Asset} + \beta_3 \text{Asia} + \beta_4 \text{GDPR} + \beta_5 \text{Policy})} \quad (1)$$

According to traditional real option theory, we choose such explaining variables (Note 3):

**Uncertainty:** this variable measures fluctuation from the market in the year when foreign bank establish its first profit institution. We use the variance of stock price index from Shanghai Stock Exchange to evaluate uncertainty. Stock price index can reflect all the expected and unexpected uncertainty from the future income. We compute the yearly variance according to the weekly return. This method is simple and widely used in articles such as Pindyck(1988), Episcops(1995), Folta(2002).

**Asset:** Bank with large asset scale may earn higher current cash flow which means that the opportunity cost to wait is large and may enter immediately. But large asset also mean the bank may have more monopoly power and therefore may defer the investment. So the influence direction is not assured. We don’t choose the absolute variable, but choose the relative variable “the word ranking” according to asset scale in the year the foreign bank built its first profit branch. The data comes from the “TOP 1000 World Banks” in July issue of the England magazine “the Banker”1985-2010.

**GDPR:** the growth rate of GDP. The higher the GDPR, the more active the economy, and the more financial demand, and the higher current cash flow, and therefore the bank are more eager to enter.

**Asia:** indicates the culture difference and the distance between the home country and China. If the home country is in Asia, this variable is given 1, otherwise 0. Foreign banks from Asia country may be more familiar with China because of the nearer distance and less culture difference, and therefore face lower uncertainty and is more possible to enter right now.

**Policy:** policy is a very important factor to influence the timing. From Table1, during the year 1993 and 1994, there are many foreign banks that entered China. In 1992, Deng Xiaoping’s South Tour Speeches clarified further the profound meaning of China’s reforming and opening policy and fastened the opening, and the uncertainty faced by foreign banks was reduced greatly. At the same time, the People’s Bank of China authorized more foreign banks branches to be established in more cities and the profitability of foreign banks was improved. If the foreign bank entered in 1993 or 1994, the variable is given 1, and otherwise, 0.

Table 1. Profit Branches of foreign banks

Year	1981	82	83	84	85	86	87	88	89	90	91	92	93	94	95
Total	1	1	1	2	7	12	14	15	16	17	19	24	38	48	52

Year	1996	97	98	99	2000	01	02	03	04	05	06	07	08	09	2010
Total	56	59	64	66	68	69	69	72	78	82	88	95	103	104	111

Source: China Financial Yearbook 1981-2010

According to traditional real option, the influence on the timing can be described as Table 2.

Table 2. Influence on the Timing

Explain Variables	Influence
Uncertainty	-
Asset	- +
GDPR	+
Asia	+
Policy	+

The data between 1978 till 2009 is 92. The data after 2010 is not included here. The new foreign banks which build its first profit institution in China after 2010 are almost Taiwan banks which are authorized according to “Economic Cooperation Framework Agreement”. These data may affect the accuracy of our model. In China, stock price variable can be obtained only from 1991, therefore the data about uncertainty are 77. Some banks do not appeared in the world ranking, so 73 data are left.

**4. Result**

*4.1 Overall Analysis*

According to Table 3, 25% foreign banks have entered before 1992 and 50% have entered before 1994. During the year 1992-1994, 25% have entered, which is a period foreign banks entered concentrately.

Table 3. Initial and overall survival analysis

Data	Survival time		
	25%	50%	75%
92	12	14	23

Chart 1 is a further overall conclusion using Kaplan-Meier survival estimate.  $n_t$  is the number of the foreign banks which have not failed and not cut out.  $d_t$  represents the failures during time t. According to Kaplan-Meier survival function, the estimation that the survival time beyond t is the continued product of the survival probability of the past periods.

$$S(t) = \prod_{j=t_0}^t \{(n_j - d_j) / n_j\} \tag{2}$$

Chart 1 is Kaplan-Meier survival estimation which describes the probability that foreign banks have not entered yet at time t during the year 1981 when the first foreign profit branch established and the year 2009. From Chart 1, in the year 1993 and 1994, the curve declines down sharply which means in these years, foreign banks entered faster.

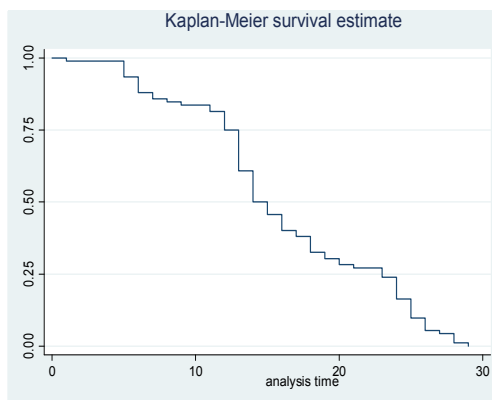


Chart 1. Overall KM survival estimate

#### 4.2 Result from the survival models

Table 4 represents the results of survival models. According to Model I which considers the variables of GDP growth rate and Uncertainty, the hazard ratio of GDPR is 1.204, statistically significant at a 0.05 level. It means that if the growth rate of GDP increase by 1%, the probability for foreign banks into China will increase by 20.4% and therefore the higher the GDP growth rate, the more possible the foreign banks will enter China. The hazard ratio of Uncertainty is about 0.997, statistically significant at a 0.01 level. It means that if the uncertainty increase by one unit, the probability for foreign banks into China will decrease by 0.3% and therefore the higher the uncertainty from the economy, the later the foreign banks will enter China. According to Model II which considers the variables of policy and Asia, the hazard ratio of Policy is much larger than 1, statistically significant at a 0.01 level. Policy is very important. The hazard ratio of Asia is 1.117 which means if the country is from Asia, the bank is more possible to enter early. But this variable is not significant. According to Model III which considers variable Assets, using the 73 data, the variable of Asset is not significant. But in these 73 banks, the ranking of banks from Hongkong is generally low. For example, the ranking of Bank of East Asia in 1987 when its first profit institution built in that year is 598. The ranking of Hongkong Liu Chong Hing Bank in 1992 is 780. While the ranking of most other foreign banks which entered in the same period is almost within 100, therefore Hongkong banks may affect the result. Because Hongkong is a part of China, the culture is similar to China, it is near to China, the economic communication is much, asset scale may be an unimportant influence factor. So we delete Hongkong banks. And 57 data are left, and then we get Model IV which still only considers variable assets. The ratio of Asset is 0.996, statistically significant at a 0.05 level, which means that the ranking is higher and the bank is more powerful, the bank will come to China earlier.

Table 4. Result of survival models

Variable	Model I	Model II	Model III	Model IV
GDPR	1.204 (0.013)**			
Uncertainty	0.997 (0.009)***			
Assets			0.9998 (0.738)	0.996 (0.011)**
Policy		2.730 (0.001)***		
Asia		1.117 (0.602)		
Sample Number	77	92	73	57
Failure Number	77	92	73	57
Loglikelihood	-262.316	-329.035	-248.717	-176.361
LRchi2	LRchi2(2)=10.8	LRchi2(2)=11.9	LRchi2(1)=0.11	LRchi2(1) = 8.34
Prob>chi2	0.045	0.0039	0.7354	0.0039

\*  $P \leq 0.1$ , \*\*  $P \leq 0.05$ , \*\*\*  $P \leq 0.01$

#### 5. Conclusion

The result from the survival model shows that the timing of foreign banks into China is accordance with the conclusion of traditional real option, but it also has its own characteristics. In China, policy and uncertainty from the policy exert profound influence on the timing. Uncertainty from the economy defer the entry of foreign banks, but the effect is weak according to the survival model (hazard ration is 0.997). Banks pay more attention to current cash flow which can be observed from the hazard ratio of GDPR that is 1.204. This means the opportunity cost to wait is larger than the benefit from defer and foreign banks may enter fast. According to traditional real option, powerful banks may obtain high current cash flow and eager to invest but at same time, they may also have some kind of monopoly power and are inclined to delay. In China, according to the models, the more powerful the foreign banks are, the more possible for them to enter immediately. But the effect is pretty poor (harzard ratio 0.996). It means that foreign banks want to share the high profit but meanwhile, they believe they can obtain customers even if they enter later because they are powerful and so they are not eager to enter China.

According to the empirical and theoretical analysis, foreign banks in China have some monopoly power on their

customers in the past. In the future, the same will be true. In the future, foreign banks need to develop areas that they have some advantage and try to avoid competence from China's local banks and other foreign banks. RMB's internationalization brings favourable circumstances for foreign banks. They can exploit their respective advantage on their abundant branches outside China and therefore can have some monopoly power on their customers. The investment for foreign banks in China is delayable in the past and in the future and the traditional real option can be used to analyze the timing. China's authority can affect the timing of foreign banks' expanding in China through its influence on uncertainty, irreversibility, dealayability and current cash flow.

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## Notes

Note 1. The suitability of traditional real option theory is discussed more detailedly in section 2, especially 2.3.

Note 2. This does not mean that they are monopolist in the whole China's banking. It only means that they have monopoly on "their" customers.

Note 3. Our model doesn't incorporate variables that reflect irreversibility because it is difficult to measure.