

CHAPTER V

EMPIRICAL ESTIMATION



In previous section, we develop the analytical model to mainly investigate the relationship between an entry of foreign banks and economic growth. That is, foreign participation in domestic market will encourage economic growth via decreasing interest rate on loans. Therefore, this section investigates this relationship empirically using Thai quarterly data. Two regressions are estimated to test the main research question, a relationship between a foreign entry and economic growth, as well as a transmission mechanism in our theoretical model, a relationship between a foreign entry and an interest rate on loans. Specifically, the following equations derived from the equation (38) and (30)¹⁰ are estimated based on Thai quarterly data between 1993 and 2004:

$$GROWTH_t = \alpha_0 + \sum_i \alpha_{1,i} FOREIGN_{t-i} + \alpha_2 LOAN_t + \alpha_3 INTL_t + \alpha_4 CRISIS_t + \alpha_5 MERGER_t + u_0 \quad (46)$$

$$INTL_t = \beta_0 + \sum_j \beta_{1,j} FOREIGN_{t-j} + \beta_2 INTB_t + \beta_3 CRISIS_t + \beta_4 MERGER_t + v_0 \quad (47)$$

where *INTL* and *INTB* are interest rate on loans and interbank rate, respectively. *FOREIGN* is the measure of foreign participation in the domestic banking market which, to save degrees of freedom, is represented as a ratio of measures rather than separated variables. *LOAN* is a logarithm of private credit. *CRISIS* and *MERGER* is used as a Thai financial crisis and merger of DTDB, IFCT and TMB dummy which trigger at the third quarter of 1997 and the forth quarter of 2004 respectively. *GROWTH* is defined as quarterly GDP growth.

For each equation, we estimate three regressions with various representatives for foreign participation in domestic banking market: (1) a share of a number of foreign banks branches and foreign-owned domestic banks; (2) a share of asset of foreign banks branches and foreign-owned domestic banks; (3) a share of asset of foreign banks excluding foreign bank branches and a share of asset of foreign full branches.

¹⁰ We assume that the relationship of variables in the equation (30) and (38) are linear.

In this chapter, raw data for each variable are discussed first and follow by hypotheses of the study. Then, the estimation results are reported and interpreted while technical details of the estimation are attached in the Appendix B.

5.1. Raw Data

In this section, we provide some remarks on raw data between 1993 and 2004. First of all, GDP is quarterly gross domestic product obtained from Table 88: Quarterly Gross National Product by Industry at 1988 Prices at the BOT economic data website¹¹. GDP growth is calculated on a quarterly basis. Both are shown in Figure 18.

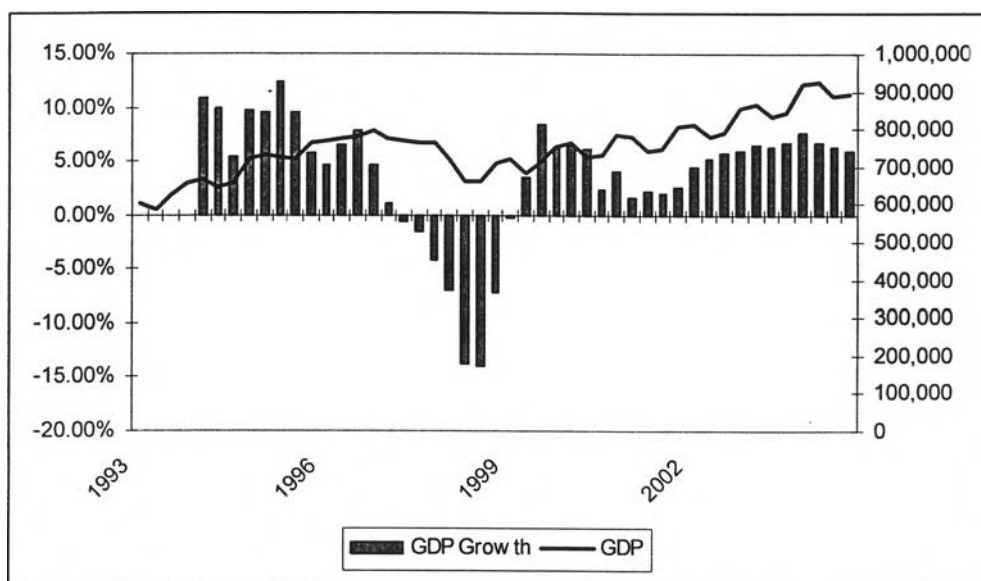


Figure 18 Thai quarterly GDP and GDP growth

Between 1993 and 1997, Thai GDP shot up drastically maybe due to financial liberalization policy. However, in July of 1997 Thailand suffered from financial crisis and GDP substantially contracted taking several years to recover.

The amount of loans is commercial banks' claims on private credit excluding interbank, export notes and credits for state enterprises, but including private investment and deposits at the specialized bank obtained from Table 8.1: Operation of commercial Banks¹². Similar to GDP, after crisis, credit growth is negative and reverts after 2002 as shown in Figure 19.

¹¹ Source: <http://www.bot.or.th/bothomepage/databank/EconData/EconFinance/tab85e.asp> (2005, May 1)

¹² Source: <http://www.bot.or.th/bothomepage/databank/EconData/EconFinance/tab08-1e.asp> (2005, May 1)

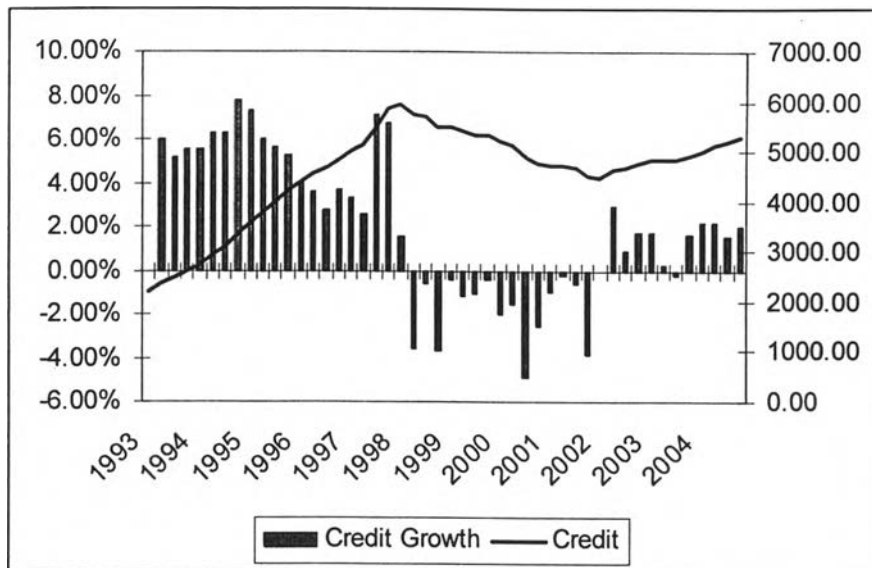


Figure 19 Credit growth and credit in Thailand

Two interest rates are used in the estimation: (1) interbank rate which is overnight interbank rate; (2) interest rate on loans which is MLR. Both of them are obtained from Table 29: Interest in Financial Market at the BOT economic data¹³. As depict in Figure 20, both interest rate are parallel over time and during economic recession both interest rates decrease greatly as a result of crisis.

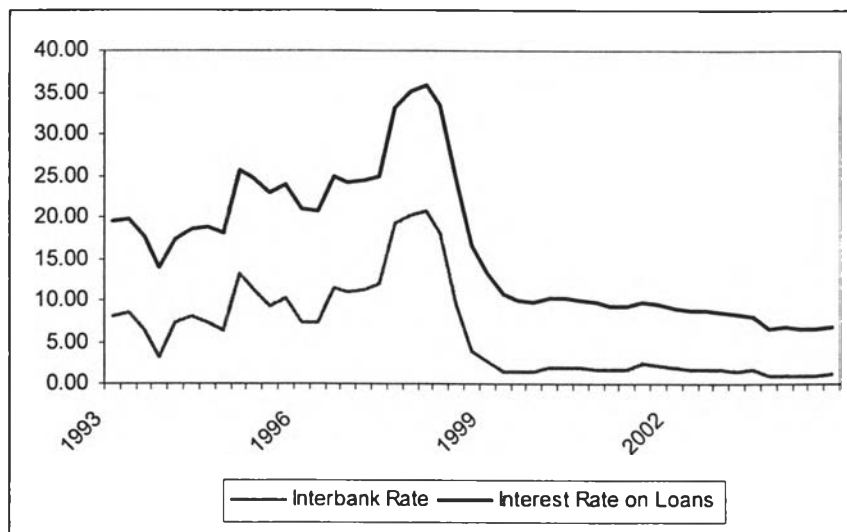


Figure 20 Interbank rate and interest rate on loans

A number of domestic and foreign banks are obtained from Table 1: Asset and Liabilities of Commercial Banks and Table 12: Number of Banks' Branches¹⁴ at the

¹³ Source: <http://www.bot.or.th/bothomepage/databank/EconData/EconFinance/tab29e.asp> (2005, May 1)

¹⁴ Source: http://www.bot.or.th/bothomepage/databank/Financial_Institutions/New_Fin_Data/CB_Menu_E.htm (2005, May 1)

BOT financial institutions database. A number of foreign banks are adjusted to include four foreign-owned Thai banks and they are subtracted from a number of domestic banks. Foreign banks' assets are compiled from various sources. Asset of foreign full branches are acquired from Table 1: Asset and Liabilities of Commercial Banks and that of foreign-owned banks are obtained from each company financial statement at SETSMART¹⁵. Similar to a number of foreign banks, the four foreign-owned Thai banks' assets have to be added to foreign banks' assets and subtracted from that of domestic banks. However, SETSMART only provide financial statements between 2002 and 2005. The data of foreign-owned domestic banks asset between 1997 and 2001 are obtained from Herberholz (2002).

From Figure 21, before the crisis, Thailand is quite restricted its banking sector but in 1997 BOT announced a new guideline for equity holding in financial institution. Afterward, a number of domestic banks gradually decrease because foreign banks acquired four domestic banks: Bank of Asia, Thai Danu Bank, Radhanasin Bank and Nakornthon Bank and in 2004 IFCT, DTDB and TMB merged together.

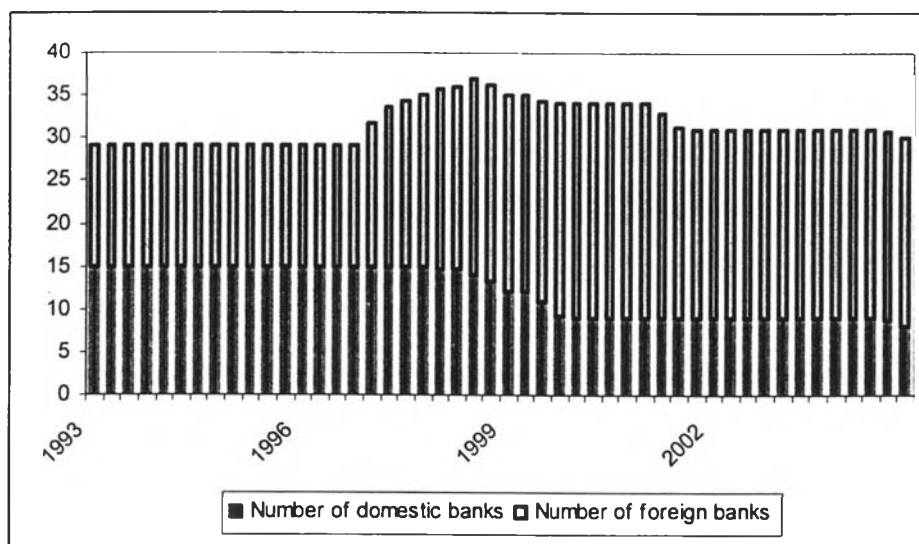


Figure 21 A numbers of domestic and foreign banks

From 1997, foreign banks in term of number is greater than domestic banks, but in term of assets shown in Figure 22 foreign banks are very small compared to domestic banks. We doubt that a number of foreign banks may not be appropriate representative because it does not reflect actual foreign participation in term of market share and credit granted.

¹⁵ Source: <http://www.setsmart.com> (2005, May 1)

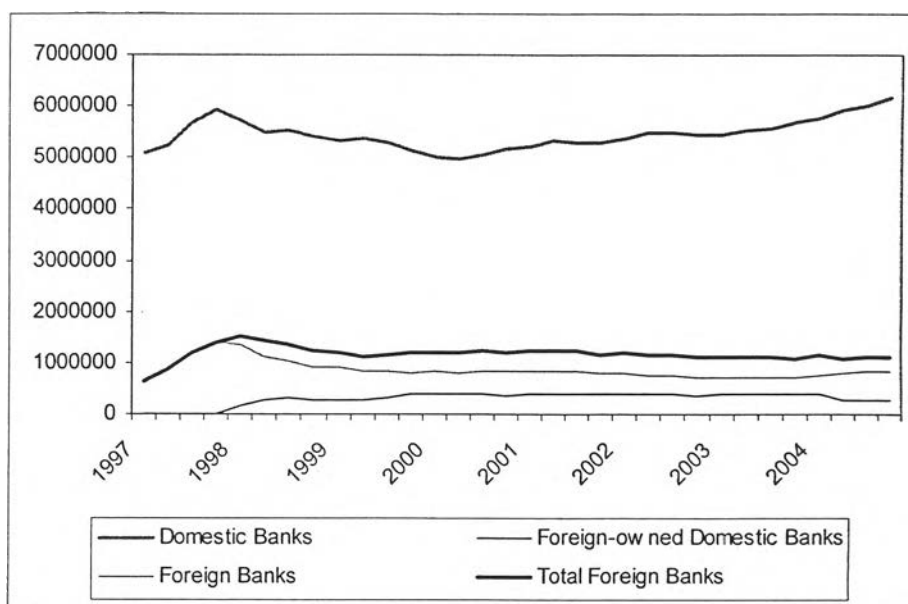


Figure 1 Assets of domestic, foreign, foreign-owned domestic and total foreign banks

5.2. Hypotheses

In this section, only are sign of relationships between dependent variables, economic growth and interest rate on loans, and explanatory variables are discussed. Our hypotheses are based on the result of our theoretical model.

5.2.1. Regression on Economic Growth

For the first equation, every representative of foreign participation is expected to positively relate to economic growth though several transmission channels discussed in the third chapter and shown by the theoretical model. Also, credits that are equivalent to domestic investment should have a positive relationship to economic growth by our classical sense. Obviously, crisis is expected to have a negative impact on economic growth. Besides, merger of three domestic banks would increase their overall efficiency and competitiveness in term of, for example, higher market share and economy of scale. As a result, efficiency of banking sector would improve and thus drive economic growth. So a positive relationship between them is anticipated.

As the theoretical model suggests, an interest rate on loans is a price of loans which is a factor of production. If its price decreases, firms' demand for input will rise and their production thus increase resulting in economic growth. A negative relationship between economic growth and interest rate on loans is therefore expected.

5.2.2. Regression on Interest Rate on Loans

The purpose of the second regression is to verify the transmission channel of interest rate through which foreign entry affects economic growth. Certainly, we expected that foreign entry will reduce interest on loans as the result of our model because foreign banks, a lower cost banks, will reduce overall cost of banking sector and banks can consequently sell product, says loans, in a lower price, says an interest rate on loans. Also, interbank rate normally parallel to an interest rate on loans. Opposite cases of growth equation are expected for both dummy variables. Interest rate on loans is depressed during recession because both demand and supply for loans contract. Besides, merger of three banks will improve banking sector efficiency and thus lower the overall cost. As a consequence, banks can therefore offer loan services in a lower price so a negative relationship between merger dummy and interest rate on loans is expected. The summary of our hypotheses is shown in Table 3.

Table 3 Hypotheses of relationship between dependant and explanatory variables

	Growth	Interest rate on loans
Foreign participation	Positive	Negative
Credits	Positive	-
Interest rate on loans	Negative	-
Interbank rate	-	Positive
Crisis	Negative	Negative
Merger of three banks	Positive	Negative

5.3. The Estimation Results

All regressions are estimated by ordinary-least square method with distributed lagged variables of foreign participation. Technical details of the estimations and tests are discussed in the Appendix B. The estimation results of the equation (46) are shown in Table 4.

The regression (1.1) indicated that a number of foreign banks in domestic loan market significantly discourage economic growth while a share of foreign banks' asset significantly increase growth. However, a share of a number of foreign banks may be misleading because foreign full branches, foreign-owned banks and foreign-owned domestic banks are not distinguish despite their highly differences in asset size and scope of activities. As a result, this would make a sign of coefficient credit term incorrect. Comparing these two measures, Demirgüç-Kunt et al. (1999) also stated that the number measure is an appropriate measure if the number of banks determines

competitive conditions. For example, domestic banks adjust their operation of their activities as soon as foreign entry occurs to prevent the foreign entrants from gaining market share. The share penetration measure is appropriate if foreign banks start to have an impact on domestic banks after gaining substantial size. In Thailand, a number of foreign banks do not reflect the competitive conditions in that the market share of foreign banks is still low in term of credit though the number of them is higher than that of domestic ones.

Table 4 Estimation result: Economic growth

The regressions are estimated with OLS with distributed lagged variables of foreign participation using Thai quarterly data. In regression (1.1) a measure of foreign participation is a sum of a number of foreign bank branches and foreign-owned domestic banks. In regression (1.2) a share of asset of foreign bank branches and foreign-owned domestic banks is used. In regression (1.3) a foreign participation is represented by a share of asset of foreign banks excluded foreign bank branches and an asset share of foreign full branches. The regression (1.2) and (1.3) are estimated between 1997 and 2004 time period. White heteroskedasticity-consistent standard errors are given in parentheses. Constant and lagged variables are not included.

	(1.1)	Growth (1.2)	(1.3)
Number of foreign banks / total number of banks	-0.713054 (0.342280)**		
Foreign banks' assets / total banks' assets		1.399621 (0.728790)***	
Foreign-owned domestic banks' assets / total banks' assets			0.398275 (0.848288)
Foreign full branches' assets / total banks' assets			1.941218 (0.690113)*
Log(Loan)	-0.099908 (0.110760)	0.259877 (0.194771)	0.113057 (0.157816)
Interest Rate on Loans	-0.015835 (0.006591)**	-0.022151 (0.008266)**	-0.024693 (0.004867)*
Crisis	-0.001392 (0.029835)		
Merger	0.038975 (0.013752)*	0.038347 (0.016736)**	0.026047 (0.022323)
Adjusted R ²	0.779843	0.799833	0.816466
F Statistic	19.15389*	24.97502*	23.24289*
A number of Observation	42	29	31

*, ** and *** indicate significance levels of 1, 5 and 10 percent respectively.

On the contrary, the result from the second regression, as we expected, suggests a significant positive relationship between economic growth and asset share of foreign banks. In the regression (1.3), foreign full branches have a significant positive effect on economic growth while foreign-owned domestic banks don't though the coefficient is positive. This may be the case because foreign-owned domestic banks might have yet fully reformed and still have costs structure equivalent to domestic ones so that the impact of their entry is insignificant. It may take some times for these

hybrid banks to improve their efficiency and, specifically, reduce their operational costs greatly enough to significantly affect economic growth.

For all three regressions, an interest rate on loans negatively relates to economic growth as our analytical model suggests that the lower the cost of factor input, the higher the production. We further investigate an impact of foreign participation in domestic banking market on interest rate on loans in the equation (46) and the results are shown in Table 5.

Table 5 Estimation results: Interest rate on loans

The regressions are estimated with OLS with distributed lagged variables of foreign participation using Thai quarterly data. In regression (1.1) a measure of foreign participation is a sum of a number of foreign bank branches and foreign-owned domestic banks. In regression (1.2) a share of asset of foreign bank branches and foreign-owned domestic banks is used. In regression (1.3) a foreign participation is represented by a share of asset of foreign banks excluded foreign bank branches and an asset share of foreign full branches. The regression (1.2) and (1.3) are estimated between 1997 and 2004 time period. White heteroskedasticity-consistent standard errors are given in parentheses. Constant and lagged variables are not included.

	Interest rate on Loans		
	(2.1)	(2.2)	(2.3)
Number of foreign banks / total number of banks	-10.78013 (5.009946)**		
Foreign banks' assets / total banks' assets		-14.87469 (14.94372)	
Foreign-owned domestic banks' assets / total banks' assets			24.68671 (17.17171)
Foreign full branches' assets / total banks' assets			-25.05276 (14.50039)
Interbank Rate	-0.032419 (0.028785)	0.777803 (0.032322)*	0.377592 (0.164315)**
Crisis	0.820896 (0.393291)**		
Merger	-0.060111 (0.350930)	0.183053 (0.198359)	0.299991 (0.268517)
Adjusted R ²	0.980667	0.974774	0.986088
F Statistic	273.6465*	81.79766*	155.6455*
A number of Observation	44	27	25

*, ** and *** indicate significance levels of 1, 5 and 10 percent respectively.

We find significant negative impact of a foreign entry on an interest on loans in regression (2.1). The incorrect sign on interbank rate may be because the aforementioned reason that a number share is not appropriate measurement. In the regression (2.2) foreign asset share has a negative impact on interest rate on loans though insignificant. In the regression (2.3) foreign branches have a negative impact on interest rate on loans and foreign-owned domestic banks have a positive effect although both of them are insignificant. Intuitively, the foreign participation is limited due to the restriction on a number of offices so than their operational efficiency is

depressed. Besides, that foreign-owned domestic bank which does not face such restriction has no significant impact might be the case because their operations are however relatively inefficient at the time. This issue will be investigated in the next section.

In brief, the relationship of each variable is summarized as follows:

- One percent increasing (decreasing) in a number share of foreign banks results in 0.007% decreasing (increasing) in GDP growth and 0.108% decreasing (increasing) in interest rate on loans.
- One percent increasing (decreasing) in an asset share of foreign banks results in 0.014% increasing (decreasing) in GDP growth and insignificant impact on interest rate on loans.
- An asset share of foreign-owned domestic banks has no significant effect on GDP growth and interest rate on loans.
- One percent increasing (decreasing) in an asset share of foreign branches results in 0.019% increasing (decreasing) in GDP growth and insignificant impact on interest rate on loans.

The fact that there is no significant relationship between foreign asset and interest rate on loans could not imply that the channel of interest rate on loans does not exist. But the insignificant results could imply that foreign banks in Thailand faced a high restriction to establish a new branch so that they cannot fully optimize their operation and lower their costs. However, there exist other channels of growth as the result of the growth regression shown.

5.4. Costs of Foreign-owned Domestic Banks

As an asset share of foreign-owned domestic banks has no significant effect on interest rate on loans and economic growth, we further explore the overhead cost per asset of foreign-owned domestic and domestic banks as proxy for managerial costs of loans. In the sense of our model, an entry of foreign banks in a form of acquiring domestic banks that have relatively higher costs will not result in decreasing in an interest rate on loans as foreign-origin banks do. Shown in Table 6, the overhead cost

per asset of foreign-owned domestic banks is higher than that of domestic banks. Despite the relatively higher cost of foreign-owned banks, that our estimation indicated no significant effect of their entries may be due to the fact that the critical condition discussed in our model is still satisfied. Alternatively, this type of entry is merely a change in bank owner that would not affect operational efficiency at the time of acquisition but these banks are likely to give a priority on improving their operational efficiency and cut their costs though it may take some times.

Table 6 The overhead cost per asset of domestic banks and foreign-owned domestic banks

All data are obtained from SETSMART. The ratios are computed by non-interest expenses over total asset. The data for DTDB in 2004 is not available due to the merger of DTDB, IFCT and TMB.

	Overhead cost per asset			
	2004	2003	2002	Average
Domestic bank				
BAY	1.80%	1.73%	1.76%	1.76%
BBL	2.16%	2.12%	2.11%	2.11%
BT	1.89%	1.15%	1.48%	1.48%
KBANK	1.94%	2.19%	2.14%	2.14%
KTB	1.60%	1.59%	1.71%	1.71%
NBANK	1.54%	1.00%	1.19%	1.19%
SCB	1.84%	2.11%	2.04%	2.04%
SCIB	1.44%	1.05%	1.34%	1.34%
TMB	2.05%	1.88%	1.75%	1.75%
Average	1.72%	1.81%	1.65%	1.72%
Foreign-owned domestic bank				
BOA	2.78%	2.57%	2.73%	2.69%
DTDB	N/A	2.25%	2.41%	2.33%
SCNB	5.87%	4.75%	4.73%	5.12%
UOBR	3.33%	3.02%	3.01%	3.12%
Average	N/A	3.15%	3.22%	3.18%

In conclusion, the finding that foreign entry and economic growth are positively related is consistent with our model as well as other literatures. We also add that foreign participation in term of asset share of foreign branches as well as total foreign banks encourages economic growth. However, the channel of interest rate on loans does not applicable for Thailand although decreasing in interest rate could encourage economic growth. This may be the case because foreign branches face a high restriction on opening new branches while foreign-owned domestic banks which do not face such limitation still have a relatively higher costs, says low efficiency that may take sometime to improve in order to significantly affect the economy positively. Nevertheless, our result confirms that in Thailand there exist other transmission

channels between foreign entry and economic growth rather than channel of interest rate on loans.

On the other side, we find the reverse outcome when a number of foreign banks are used as a representative of foreign participation which may not be appropriated. Using this proxy, for instance, a large bank in term of asset such as BBL is count as one bank as a small foreign full branches despite their difference in domestic market influence. Therefore, in the case of Thailand, we suggest that an asset share of foreign banks is more proper to be used as a proxy of foreign participation than a number share of foreign banks, parallel with the suggestion of Herberholz (2002).