CHAPTER 4

The Empirical Results

From those models of capital inflows, the data are used to find the appropriate results. The annual data from 1976-1995 are tested in each model of capital inflows which are foreign direct investment model, portfolio foreign investment model and foreign other loans model.

The Results of the Determinants of Capital Inflows

The Model for Determinants of Foreign Direct Investment

The model shows the relationship between Foreign Direct Investment and other variables which affects in determining investment. These are Gross Domestic Product, yield from investment, the amount of population, labour cost in Thailand, the stability of government and tax incentives.

$$FDI = \beta_0 + \beta_1 \, GDP_t + \beta_2 \, y_t + \beta_3 \, POP_t^d - \beta_4 \, MW_t + \beta_5 D1 + \beta_6 D2$$

where:

FDI	=	Inflows of Foreign Direct Investment to Thailand.
GDP_t	=	Gross Domestic Product at constant price at time t
Y_t	=	Yield from investment at time t
MW_t	=	Minimum Wages in Thailand at time t
POP_t^d	=	Population in Thailand at time t
D1	=	Political situation ;D1 = 1 if political shock, and D1 = 0, otherwise
D2	=	Withholding tax ;D2 = 1 if exemption from tax, and D2 = 0, otherwise

The Foreign Direct Investment Results

The study of the relationship of inflows of foreign direct investment with the variables are gross domestic product, minimum wages, population, yields from investment, and the dummy variable which are political side and the exemption from withholding tax.(Table 4.1) The equation was estimated using ordinary least squares with the following results(t statistics in parenthesis)

$$FDI = 1,139,666 + \underset{(4.31)}{0.52} GDP_t - \underset{(-3.41)}{0.04} POP_t + \underset{(1.62)}{1347.14} MW_t - \underset{(-3.83)}{19.66} y_t$$

$$+ \underset{(-2.95)}{32,041.29} D1 - \underset{(-0.09)}{853.92} D2 \qquad (4.1)$$

$$R^2 = 0.88 \qquad F\text{-stat} = 16.26 \qquad D.W. = 1.44$$

It showed that important variables explaining the inflows of foreign direct investment are gross domestic products (GDP) with the significant at 5 percent level($t_c = 2.09$) and it has the positive sigh as expected. The population, yields from investment and political situation (D1) are significant at 5 percent level but they have the opposite sign to the assumption. For minimum wage and the second dummy variable, not only have the opposite sign but also are not significant with t-statistics value of 5 percent level.

The R^2 of 0.82 in equation (4.1) showed that the variables included help to explain 82 percent of the inflows of foreign direct investment. The F statistics was significant at the 1 percent level of 4.62, therefore, we can conclude that all of the independent variables have effect on foreign direct investment. However, when we consider the R^2 and F statistics together with t-statistics of those variables, this model is still unsatisfied. Thus, we have tried to adjust the model in many ways including the independent lagged model and finally found that the appropriate model in explaining the inflows of foreign direct investment should be

$$FDI = -511,353.0 + \underset{(4.30)}{0.01} POP_{t-1} - \underset{(-3.23)}{2,202.36} MW_{t-1} + \underset{(3.4)}{3.31} y_{t-1} \quad (4.2)$$

$$R^2 = 0.81 \qquad F\text{-stat} = 21.93 \qquad D.W. = 1.06$$

Table 4.1 Foreign Direct Investment Variables

Year	GDP$_t$ (Million Baht)	MW$_t$ (Baht)	POP$_t$ (Person)	Y$_t$ (Million Baht)	D1	D2
1976	765,200	21.11	43,213,711	1,613	1	0
1977	814,000	22.86	44,272,693	1,638	1	0
1978	928,800	26.80	45,221,625	1,661	0	0
1979	978,100	34.42	46,113,756	1,972	0	1
1980	1,024,900	44.17	46,961,338	2,049	0	1
1981	1,085,500	52.78	47,875,002	3,406	1	1
1982	1,143,600	58.86	48,846,927	2,714	0	1
1983	1,207,400	60.97	49,515,074	2,714	0	1
1984	1,276,900	62.90	50,583,104	2,902	0	0
1985	1,336,200	66.50	51,795,651	3,591	1	0
1986	1,410,200	66.50	52,969,204	2,762	0	0
1987	1,544,400	68.88	53,873,172	3,663	0	0
1988	1,749,600	69.67	54,960,917	6,372	0	0
1989	1,962,900	74.15	55,888,393	9,317	0	1
1990	2,191,100	83.00	56,303,273	13,923	0	0
1991	2,367,900	92.88	56,961,030	20,984	1	0
1992	2,546,800	105.69	57,788,965	21,009	0	0
1993	2,773,800	116.32	58,336,072	29,316	0	0
1994	3,047,000	124.33	59,095,419	34,680	0	0
1995	3,274,744	132.54	59,460,382	39,901	0	0

Sources: GDP$_t$ is collected from International Financial Statistics Yearbook 1995

MW$_t$,POP$_t$,y$_t$ and D2 are collected from the Bank of Thailand

D1 is collected from Siam Almanac 1995

Notes: GDPt at constant price(1990 year base)

MW$_t$ and y$_t$ are in nominal term

The R^2 of 0.81 suggested that a good deal of variance the model is explained. The F-statistics is significant at the 1 percent level ($F_{3,16}=5.29$) and this allows us to reject the null hypothesis that all of the coeffecients of the independent variables in equation 4.2 are equal to zero . Thus, we can conclude that all of the independent variables have effect on foreign direct investment. The D.W statistics of 1.06 is not in the region of any serial correlation . Equation (4.2) indicated that the variables using to explain the foreign direct investment are the population, the minimum wages and yield from investment.

All the t statistics are significant at 5 percent level and all those variables have the expected sign. It can be interpreted each variable in equation (4.2) as the change in one person of population will cause the change in inflows of foreign direct investment 0.01 million baht in the same direction. The change in one baht of minimum wages of Thai labor will cause the change in inflows of foriegn direct investment 2,202.36 million baht in the opposite direction, and the change of 1 million baht of yields from investment will cause the change in inflows of foreign direct investment of 3.31 million baht in the same direction.

We found that both dummy variables have no relationship with the inflows of foreign direct investment. The political situation in Thailand(D1) has no relationship with the inflows because foreign political situation or each country's political shock may have more power.Chapter 3 has some explanations of such foreign political situation.

For domestic political shock, the latest coup in the government of General Chatchai Chunhawana did not cause the decrease in the amount of foreign direct investment inflows from the previous year, and next year the amount of inflows is still increase. It shows the low relationship between domestic political situation and inflows of foreign direct investment. For the exemption from withholding tax or D2 is not also relate to the inflows. The reason can be explained that the part of fund which firms borrowed from parents companies did not have any affect from incentives like exemption from tax on interest or withholding tax.

The Model for Determinants of Portfolio Investment

The model below shows the relationship between Portfolio Foreign Investment and other variables affecting in portfolio foreign investment.Those

variables are Gross Domestic Products, interest rate differential , yield from investment in the market, exchange rate which measure from the deviation and let them in squares form and the stability of government.

$$PFI = \alpha_0 + \alpha_1 GDP_t + \alpha_2 r_t^d + \alpha_3 y_t^p + \alpha_4 ER_t - \alpha_5 D1$$

where:

PFI	=	Inflows of Portfolio Investment to Thailand
GDP_t	=	Gross Domestic Products at constant price at time t
r_t^d	=	Interest rate differential at time t
y_t^p	=	Yield from market investment at time t
ER_t	=	Deviation of exchange rate at time t
D1	=	Political situation ;D1 = 1 if political shock,and D1 = 0,otherwise

The Portfolio Foreign Investment Results

The relationship between portfolio foreign investment with the variables which are gross domestic product, interest rate differential, exchange rate, yields from portfolio investment and political situation(D1) (Table 4.2). The estimated equation from ordinary least squares can be written as follows(t statistics in parenthesis)

$$PFI = -180,968.6 + 0.13\ GDP_t + 89.49\ r_t^d - 11,857.40\ ER_t +$$
$$(5.58) \qquad (0.01) \qquad (-2.26)$$
$$2,513.79\ y_t^p - 4,835.72\ D1 \qquad\qquad (4.3)$$
$$(0.46) \qquad (-0.22)$$

$$R^2 = 0.87 \qquad F\text{-stat} = 18.59 \qquad D.W. = 1.98$$

From equation 4.3, we found that the variables which help to explain the inflows of portfolio foreign investment are gross domestic product with the significant at 5 percent level($t_c = 2.09$) and it goes in the same direction with

Table 4.2 Portfolio Foreign Investment Variables

Year	GDP$_t$	r_t^d	y_t^p	ER$_t$	D1
	(Million Baht)	(Percent)	(Million Baht)	(Baht)	
1976	765,200	5.47	8.77	-3.74	1
1977	814,000	4.81	5.43	-3.74	1
1978	928,800	2.25	4.53	-3.40	0
1979	978,100	1.40	7.50	-3.32	0
1980	1,024,900	2.32	8.93	-3.26	0
1981	1,085,500	0.52	9.43	-1.92	1
1982	1,143,600	4.16	9.14	-0.74	0
1983	1,207,400	5.81	7.76	-0.74	0
1984	1,276,900	6.33	7.96	-0.10	0
1985	1,336,200	7.85	8.35	3.42	1
1986	1,410,200	6.87	6.35	2.56	0
1987	1,544,400	4.55	3.50	2.00	0
1988	1,749,600	3.80	3.48	1.56	0
1989	1,962,900	3.00	2.93	1.96	0
1990	2,191,100	6.26	2.73	1.85	0
1991	2,367,900	9.47	3.47	1.78	1
1992	2,546,800	8.43	3.34	1.66	0
1993	2,773,800	7.99	2.85	1.58	0
1994	3,047,000	6.46	1.71	1.41	0
1995	3,274,744	7.36	2.18	1.18	0

Sources: r_t^d and ER$_t$ are collected from the Bank of Thailand

y_t^p is collected from Stock Exchange of Thailand

D1 is collected from Siam Almanac 1995

Notes: r_t^d is calculated from the differences between MLR

and Euro rate 1 month

y_t^p is calculated from the market dividend yield formula

portfolio foreign investment inflows as we have expected. Other variable is exchange rate which has the t statistics significant at 5 percent level and it also has the sign as we have expected. Interest rate differential, yields from portfolio investment and political situation (D1) have the right sign as expected but have a low t statistics or it can be conclude that it is not significant at 5 percent level.

Even though we try other ways to solve this problem including lagged variables, it still gave the same result. Back to consider equation 4.3, the R^2 of 0.87 provide a goodness of fit of the above model. The F-statistics is significant at 1 percent level ($F_{5,15} = 4.56$),allowing us to reject the null hypothesis that the regression coefficients are equal to zero or we can conclude that all of the independent variables have effect on portfolio investment.

In conclusion, the factors which determined the inflows of portfolio foreign investment are gross domestic product and exchange rate at time t. If gross domestic product changes 1 million baht, the portfolio foreign investment inflows will change equal to 0.13 million baht in the same direction, and if the exchange rate changes only one baht, the portfolio foreign investment will change equal to 11,857.40 million baht in the opposite direction. Both are significance at 5 percent level. Interest rate differential that does not relate to portfolio foreign investment inflows resulted from foreign factors or push factor of other countries that extracted the investment and indifference with interest rate differential. Though yields from portfolio investment have the expected sign but have the level of t statistics. This can be explained by the same reason with the interest rate differential

The dummy variable of domestic political situation(D1) has no relationship with the portfolio foreign investment inflows because the of other investors countries situation have the partial power in determining inflows. In1990, the gulf war happened and it scared the investors especially in the stock exchange market which is quite sensitive to shock. The world economic receded during that time and it also affected Thai market. From those reason, the yield from Thai market investment does not have enough power to attract investment.

The Model for Determinants of Foreign Loans

The model below shows the relationship between Foreign loans and other variables which affects in determining foreign loans. These are interest rate differential , current trade balance ,yield from loans,exchange rate which measure from deviation and let them in squares form, the political situation and withholding tax.It can be seen as:

$$FL = \gamma_0 + \gamma_1 r_t^d + \gamma_2 CTB_t + \gamma_3 ER_t + \gamma_4 D1 + \gamma_5 D2$$

where:

FL	=	Inflows of Foreign Loans
r_t^d	=	Interest rate differential at time t
CTB_t	=	Current trade balance at time t
ER_t	=	deviation of exchange rate at time t
$D1$	=	Political situation ;D1 = 1 if political shock,and D1 = 0,otherwise
$D2$	=	Withholding tax;D2 = 1 if exemption from tax,and D2 = 0,otherwise

The Foreign Other Loans Results

The relationship of inflows of foreign other loans with the various which are interest rate differential, exchange rate, current trade balance, political situation and exemption from withholding tax(Table 4.3). The equation using ordinary least squares was estimated and get the results as follows (t statistics in parentheses)

$$FL = -104,013.6 + 18,097.44\, r_t^d - 8,749.71\, ER_t - 1.41\, CTB_t$$
$$ (1.53) (-0.89) (-6.69)$$
$$-30,231.71 D1 - 13,470.58 D2 (4.4)$$
$$(-0.72) (-0.28)$$

$$R^2 = 0.87 \qquad F\text{-stat} = 19.03 \qquad D.W. = 1.29$$

Table 4.3 Foreign Loans Variables

year	r_t^d (Percent)	ER_t (Baht)	CTB_t (Million Baht)	D1	D2
1976	5.47	-3.74	-11,085	1	0
1977	4.81	-3.74	-25,599	1	0
1978	2.25	-3.40	-28,540	0	0
1979	1.40	-3.32	-47,053	0	1
1980	2.32	-3.26	-57,985	0	1
1981	0.52	-1.92	-65,782	1	1
1982	4.16	-0.74	-36,137	0	1
1983	5.81	-0.74	-89,239	0	1
1984	6.33	-0.10	-69,439	0	0
1985	7.85	3.42	-62,468	1	0
1986	6.87	2.56	-15,099	0	0
1987	4.55	2.00	-44,128	0	0
1988	3.80	1.56	-101,251	0	0
1989	3.00	1.96	-140,176	0	1
1990	6.26	1.85	-255,136	0	0
1991	9.47	1.78	-247,263	1	0
1992	8.43	1.66	-205,380	0	0
1993	7.99	1.58	-221,675	0	0
1994	6.46	1.41	-226,782	0	0
1995	7.36	1.18	-373,796	0	0

Sources: r_t^d, ER_t, CTB_t and D2 are collected from the Bank of Thailand

        D1 is collected from <u>Siam Almanac</u> 1995

Notes: r_t^d is calculated from the differences between MLR

        and Euro rate 1 month

        ER_t is calculated from the variance from the 1976-1995 average

The R^2 of 0.87 from above equation explain a good fit of variance in the model and the F-stat of 19.03 together with the F statistics is significant at 1 percent level ($F_{5,15}$= 4.56),allowing us to reject the mull hypothesis that the regression coeffecients are equal to zero or we can conclude that all of the independent variables have effect on foreign loans. However, when we consider each factors, we found that interest rate differential, exchange rate and the first dummy variable have the fight sign of coefficient as we have expected but neither has the t-statistics significance at 5 percent level. Even though current trade balance has the t-statistics significant at 5 percent level. . Both current trade balance has an expected sign and also significant. The second dummy variable has the wrong direction from expected.

We tried to adjust many ways to find out the most appropriate equation but it was not much better, and the result was not quite satisfied. Finally, the best equation that we have chosen is:

$$FL = -115,498.3 + 17,434.25\ r_t^d - 6,796.10\ ER_t - 1.43CTB_t \qquad (4.5)$$
$$\qquad\qquad\qquad (1.95) \qquad (-0.76) \qquad (-7.37)$$

$$R^2 = 0.87 \qquad F\text{-stat} = 34.62 \qquad D.W. = 1.20$$

From equation 4.5, the R^2 was equal to equation 4.4 which meaned a good deal of the model. The F-statistics is significant at 1 percent level ($F_{3,17}$=5.19) allowing us to reject the null hypothesis that the regression coefficient are equal to zero or we can conclude that all the independent variables have effect on forreign loans . The D.W. value of 1.20 is not fall in the region of having serial correlation.In equation 4.5 , the factor which determines the foreign loans is interest rate differential and the coefficient has the same sign as we have expected.

Interest rate differential is significant at 10 percent level. The exchange rate and current trade balance is significance at 5 percent level(t_c = 2.09), exchange rate and current trade balance go in the same direction with foreign loans inflows as we expected. The change in one percent of interest rate differential cause the change in 17,434.25 million baht of foreign loans in the same direction as we have expected. The change in 1 million baht of current trade balance will result in

the change in foreign loans of 1.43 million baht in the opposite direction and it is not as we have expected.

The current trade balance had significance but goes in the expected direction . The exchange rate is insignificant in foreign other loans inflows because the inevitable borrowing of borrower to cover any crisis and its necessity make investors ignore the gain or lose from the exchange rate.

The Comparative Results with Other Studies

From Table 4.4, it was found that population, minimum wages and yields from investment in the previous years are the factors affecting foreign direct investment at 5 percent level significance of t statistics. Srisuda found that yields from investment and industrial export merchandise at time t are the factors affecting foreign direct investment at 10 percent level with the sign as she expected but population at time t was not have significant at 10 percent level. She explained that the foreign markets were important for these direct investment in Thailand.

Jeerasak described factors affecting foreign direct investment in Thailand. He classified such factors into four groups which were resource utilization, maintaining or regaining cost advantage through dynamic comparative advantages or product life cycle, gaining or maintaining demand advantage and capital stock adjustment.

For the factors determining portfolio foreign investment, it was found that gross domestic product,exchage rate are the important factors affecting portfolio investmtne inflows with t statistics at 5 percent level significance. Sriduda found that gross national product has the expect sign and significance at 3 percent level. Interest rate differential and yields from portfolio investment are significance at 10 percent level at least 10 percent but both has negaive sign which opposite to her hypothesis. She referred to the world crisis in some years which obstructed the foreign funds. Such as the oil crisis in 1981, the depreciation of Thai baht in 1984 and the Gulf war in 1990. Jeerasak found that the inflows of foreign investment funds was correlated with gross domestic product and investment returns 14 months later. In other words, variations in the net inflows of 14 monthes ago can be seen in

Table 4.4 Comparative Results of Determinants of Foreign Direct Investment
Inflows

	Sangnapa[1]	Sriduda[2]
POP_{t-1}	0.01 (-4.3)	
MW_{t-1}	-2,202.36 (-3.23)	
y_{t-1}	3.31 (-3.4)	
DYI_t		3.72 (-3.93)
POP_t		-0.67 (-1.45)
EM_t		0.06 (-1.83)

POP_{t-1} = Population at time t-1

MW_{t-1} = Minimum wages at time t-1

DYI_t = Domestic yields from investment at time t

y_{t-1} = yields from investment at time t-1

EM_t = Industrial export merchandise at time t

Notes: [1] The annual data from 1976-1995 were used

[2] The annual data from 1977-1990 were used

[3] In this case Jeerasak used descriptive method to explain

Table 4.5 Comparative Results of Determinants of Portfolio Investment

	Sangnapa [1]	Jeerasak [2]	Srisuda [3]
GDP_t	0.13 (5.58)		
GNP_t			0.01 (2.58)
GDP_{t+14}		0.015 (3.48)	
r_t^d	89.49 (0.01)		
ER_t	-11,857.40 (-2.26)		
y_t^p	2,513.79 (0.46)		-1,627.89 (-1.79)
I_t^d			-1,448.08 (-1.84)
R_{t+13}		1,535.11 (3.81)	

GNP_t = Gross National Product at time t

GDP_{t+14} = Gross Domestic Product 14 months later

I_t^d = Interest rate differential

r_{t+13} = Investment return 13 months later

Notes: [1] The annual data from 1976-1995 were used

[2] The monthly data from 1984-1988 were used

[3] The annual data from 1977-1990 were used

Table 4.6 Comparative Results of Determinants of Foreign Loans

	Sangnapa [1]	Jeerasak [2]	Sriduda [3]
CTB_t	-1.43 (-7.37)		
r_t^d	17,434.25 (1.95)		
ER_t	-6,796.10 (-0.76)		
CAD		-0.09 (-3.06)	
FORW		132.9 (4.82)	
I_t^d			2,115.32 (1.95)
BG_t			-1.38 (-11.23)
GNP_t			-0.02 (-4.7)

CAD   =   Current account deficit

FORW =   The one month premium or discount in the sales of

the sales of US$ in the forward market

BG_t =   Balance of government budget

Notes: [1] The annual data from 1976-1995 were used

[2] The monthly data from 1984-1988 were used

[3] The annual data from 1977-1990 were used

either gross domestic product or invetment return figures of the current month, with explanatory power of 31 percent and 39 percent respectively.(Table 4.5)

It can be seen from Table 4.6, it was found that interest rate differential and current trade balance are significance at the impose level and have the sign as it have been expected in the hypothesis.Srisuda found that government budget balance and interest rate differential are the factors which affect the inflows of foreign loans. Both have the sign as she has expected with significant at least 10 percent level but gross national product does not have significance and also has the opposite sign as she has expected. The result shows that the interest rate differential in srisuda and my study has quite close results. Thus, interest rate differential seems to be an important factor in considering the factors affecting the inflows of foreign loans. Jeerasak found that current account deficits and the forward rate significantly influence net foreign loans.