

Chapter Five: Empirical Analysis

< 1 > Overview of Empirical Results

The result of analysis for each scenario are shown from table 5-1 to table 5-8. Broadly speaking, we can find out that PCC can save more cost of risks than commercial reinsurance.

Table 5-1 Difference in cost of risks in Scenario 1

Company Name	CR_{RIN}	CR_{PCC}	DCR
Taiwan	12,802,834	12,702,166	100,668
ChungKuo	13,937,568	13,745,470	192,098
TaiPing	9,569,675	10,030,542	(460,867)
Fubon	49,746,154	50,936,261	(1,190,106)
Zurich	12,731,938	12,613,565	118,373
Taian	14,910,310	14,895,478	14,832
Mingtai	23,641,248	23,578,935	62,313
Central	18,573,000	17,759,073	813,927
First	10,987,588	10,866,974	120,614
KuoHua	12,168,964	12,047,312	121,653
Union	12,167,418	11,956,858	210,560
ShinKong	18,429,909	18,028,430	401,480
SouthChina	10,690,871	10,529,150	161,721

Table 5-2 Difference in cost of risks in Scenario 2

Company Name	CR_{RIN}	CR_{PCC}	DCR
Taiwan	12,802,834	12,690,306	112,528
ChungKuo	13,937,568	13,756,307	181,261
TaiPing	9,569,675	9,727,951	(158,276)
Fubon	49,746,154	50,495,878	(749,723)
Zurich	12,731,938	12,591,609	140,328
Taian	14,910,310	14,898,576	11,734
Mingtai	23,641,248	23,552,228	89,020
Central	18,573,000	17,797,787	775,213
First	10,987,588	10,868,700	118,888
KuoHua	12,168,964	12,054,938	114,026
Union	12,167,418	11,961,723	205,695
ShinKong	18,429,909	18,047,921	381,988
SouthChina	10,690,871	10,535,587	155,284

Table 5-3 Difference in cost of risks in Scenario 3

Company Name	CR_{RIN}	CR_{PCC}	DCR
Taiwan	12,898,398	12,849,779	48,619
ChungKuo	13,573,806	13,469,843	103,963
TaiPing	9,336,792	9,972,615	(635,824)
Fubon	50,169,904	50,973,363	(803,459)
Zurich	12,669,545	12,611,579	57,966
Taian	14,872,025	14,882,499	(10,475)
Mingtai	23,636,534	23,658,396	(21,862)
Central	18,413,484	17,749,733	663,751
First	10,743,583	10,816,195	(72,613)
KuoHua	11,873,488	11,856,518	16,970
Union	11,589,637	11,772,287	(182,649)
ShinKong	17,713,488	17,542,669	170,819
SouthChina	10,551,744	10,442,194	109,550

Table 5-4 Difference in cost of risks in Scenario 4

Company Name	CR_{RIN}	CR_{PCC}	DCR
Taiwan	12,677,952	12,733,211	(55,260)
ChungKuo	13,978,212	13,697,479	280,733
TaiPing	9,555,605	10,062,791	(507,186)
Fubon	50,895,605	51,216,672	(321,067)
Zurich	12,709,858	12,489,030	220,828
Taian	14,918,209	14,730,628	187,580
Mingtai	25,019,052	24,490,462	528,591
Central	19,636,976	18,504,204	1,132,772
First	11,348,682	11,087,066	261,616
KuoHua	12,095,569	11,837,741	257,828
Union	13,055,193	12,623,099	432,093
ShinKong	19,239,310	18,519,250	720,060
SouthChina	11,014,020	10,709,390	304,630

Table 5-5 Difference in cost of risks in Scenario 5

Company Name	CR_{RIN}	CR_{PCC}	DCR
Taiwan	12,677,952	12,459,312	218,639
ChungKuo	13,978,212	13,723,550	254,662
TaiPing	9,555,605	9,709,820	(154,216)
Fubon	50,895,605	49,997,461	898,144
Zurich	12,709,858	12,467,665	242,193
Taian	14,918,209	14,820,937	97,271
Mingtai	25,019,052	24,460,878	558,174
Central	19,636,976	18,530,613	1,106,363
First	11,348,682	11,104,622	244,060
KuoHua	12,095,569	11,838,783	256,787
Union	13,055,193	12,681,764	373,428
ShinKong	19,239,310	18,559,001	680,309
SouthChina	11,014,020	10,747,748	266,272

Table 5-6 Difference in cost of risks in Scenario 6

Company Name	CR_{RIN}	CR_{PCC}	DCR
Taiwan	8,053,938	8,624,479	(570,541)
ChungKuo	8,147,093	7,984,759	162,334
TaiPing	6,474,136	6,992,156	(518,019)
Fubon	31,023,056	33,763,680	(2,740,624)
Zurich	7,928,176	8,052,373	(124,197)
Taian	8,839,712	8,872,564	(32,852)
Mingtai	15,672,623	15,378,507	294,116
Central	13,243,175	12,656,338	586,837
First	6,664,307	6,519,031	145,276
KuoHua	7,792,819	7,645,219	147,600
Union	7,558,203	7,307,553	250,650
ShinKong	10,703,019	10,303,608	399,411
SouthChina	6,715,317	6,599,032	116,285

Table 5-7 Difference in cost of risks in Scenario 7

Company Name	CR_{RIN}	CR_{PCC}	DCR
Taiwan	8,053,938	8,255,993	(202,055)
ChungKuo	8,147,093	7,974,479	172,614
TaiPing	6,474,136	6,727,762	(253,626)
Fubon	31,023,056	31,849,984	(826,928)
Zurich	7,928,176	7,765,917	162,259
Taian	8,839,712	8,931,948	(92,236)
Mingtai	15,672,623	15,375,577	297,046
Central	13,243,175	12,683,248	559,927
First	6,664,307	6,524,912	139,394
KuoHua	7,792,819	7,650,345	142,473
Union	7,558,203	7,293,385	264,818
ShinKong	10,703,019	10,332,777	370,242
SouthChina	6,715,317	6,603,428	111,889

Table 5-8 Difference in cost of risks in Scenario 8

Company Name	CR_{RIN}	CR_{PCC}	DCR
Taiwan	12,677,952	12,436,694	241,257
ChungKuo	13,978,212	13,678,721	299,491
TaiPing	9,555,605	9,687,294	(131,689)
Fubon	50,895,605	49,906,141	989,464
Zurich	12,709,858	12,460,613	249,245
Taian	14,918,209	14,864,821	53,388
Mingtai	25,019,052	24,497,329	521,723
Central	19,636,976	18,604,778	1,032,198
First	11,348,682	11,079,124	269,558
KuoHua	12,095,569	11,867,631	227,939
Union	13,055,193	12,571,076	484,117
ShinKong	19,239,310	18,589,294	650,016
SouthChina	11,014,020	10,742,068	271,952

< 2 > Analysis of Empirical Results

2.1 Factor analysis for empirical results of Scenario 1 :

In scenario 1, each company's cost of risks saved by PCC is shown as Table5-1. First we should analyze which factor would affect each company's cost of risks saved by PCC under our basic assumption (scenario 1). After comparing each company's cost of risks saved by PCC with its amount of ceding premium, the relationship is shown as Figure5-1~5-3 :

Figure 5-1 : Factor analysis of difference in cost of risks(scenario 1)

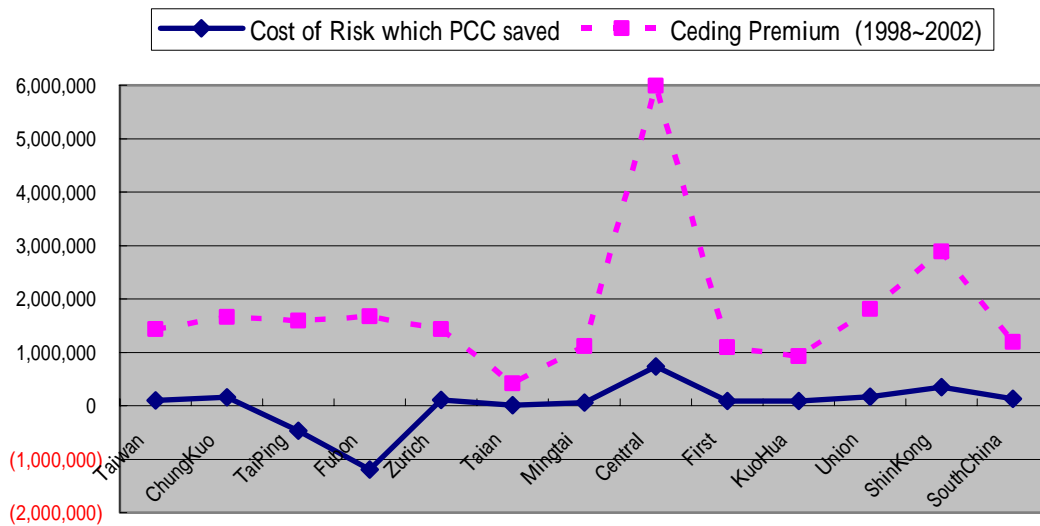


Figure 5-2 : The correlations between DCR with ceding premium (1998~2002) (all the sample firms)

		DCR	Ceding Premium
DCR	Pearson Correlation	1.000	0.138
	Sig. (2-tailed)	.	0.652
	N	13	13

** Correlation is significant at the 0.01 level (2-tailed).

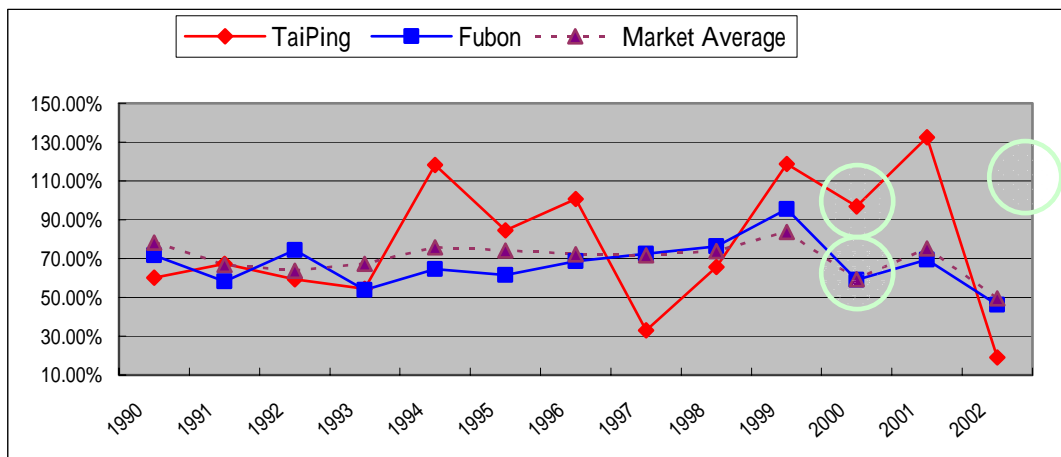
Figure 5-3 : The correlations between DCR with ceding premium (1998~2002) (excluding Fubon and Tai Ping)

		DCR	Ceding Premium
DCR	Pearson Correlation	1.000	0.992*
	Sig. (2-tailed)	.	0.000
	N	11	11

** Correlation is significant at the 0.01 level (2-tailed).

From figure5-3, we can find out that, except Fubon and Tai Ping, each company's DCR has significant positive correlation with its amount of ceding premium. But one might wonder: Why can they (Fubon and Tai Ping not save the cost of risk? Compared with the market average, the trend analysis of loss ratio of Fubon and Tai Ping is shown as the following figure 5-4, The same characteristic is that both Fubon and Tai Ping suffer a 12 years-high loss ratio between 1998~2002. Besides, Tai Ping's Loss Ratio increase continuously from 1997~2001. It shows that, PCC as rent-a-captive are not suitable for high loss variance and deteriorating business.

Figure 5-4: Trend Analysis of Loss Ratio (From 1990 to 2002)



Data Source : "Yearbook of Insurance", 1990-2002, Insurance Institute of ROC.

2.2 Additional results for empirical analysis of variance scenarios

2.2.1 Ceding term and condition

The results for the ceding term and condition are shown in Table 5-9 and Table 5-10 as follows :

Table 5-9 Variables analysis result of ceding term and condition (1)

Company Name	DCR		
	Scenario 1	Scenario 3	Scenario 4
	excess of 70% loss ratio up to 120% paid loss ratio.	excess of 80% loss ratio up to 130% paid loss ratio	excess of 60% loss ratio up to 120% paid loss ratio.
Taiwan	100,668	48,619	(55,260)
ChungKuo	192,098	103,963	280,733
TaiPing	(460,867)	(635,824)	(507,186)
Fubon	(1,190,106)	(803,459)	(321,067)
Zurich	118,373	57,966	220,828
Taian	14,832	(10,475)	187,580
Mingtai	62,313	(21,862)	528,591
Central	813,927	663,751	1,132,772
First	120,614	(72,613)	261,616
KuoHua	121,653	16,970	257,828
Union	210,560	(182,649)	432,093
ShinKong	401,480	170,819	720,060
SouthChina	161,721	109,550	304,630

Table 5-10 Variables analysis result of ceding term and condition (2)

Company Name	DCR	
	Scenario 2	Scenario 5
	excess of 70% loss ratio up to 120% paid loss ratio.	excess of 60% loss ratio up to 120% paid loss ratio.
Taiwan	112,528	218,639
ChungKuo	181,261	254,662
TaiPing	(158,276)	(154,216)
Fubon	(749,723)	898,144
Zurich	140,328	242,193
Taian	11,734	97,271
Mingtai	89,020	558,174
Central	775,213	1,106,363
First	118,888	244,060
KuoHua	114,026	256,787
Union	205,695	373,428
ShinKong	381,988	680,309
SouthChina	155,284	266,272

As shown in Table 5-9 and Table 5-10, the analysis results of the ceding term and condition are as follows : For PCC as rent-a-captive, excess of a **60%** loss ratio up to a **120%** loss ratio is better than excess of a **70%** loss ratio up to a **120%** paid loss ratio, and excess of a **70%** loss ratio up to a **120%** loss ratio is better than excess of a **80%** loss ratio up to a **130%** paid loss ratio.

The possible reason for this result could be contributed to :

(1) PCC and other retention methods are not suitable for taking peak risk business.

Parkinson (2002) thinks that Captive are suitable for “medium severity, high frequency” business, not “high severity, low frequency” business. So does PCC when it is used as rent-a-captive. So in table5-9 , we can get that : When the risk which PCC taking is peak risk, such as scenario 3(excess of a 80% loss ratio up to a 130% paid loss ratio), using PCC as rent-a-captive would not better than commercial reinsurance.

(2) Except high loss variance and deteriorating business, the more the ceding premium, the more cost of risks saved by PCC

Comparing scenario1 (excess of a 70% loss ratio up to a 120% paid loss ratio)and scenario4(excess of a 60% loss ratio up to a 120% paid loss ratio) , the later (scenario4) has more ceding premium (lower underlying retention) . So each sample insurance company, in general speaking, its cost of risks saved by PCC will increase.

2.2.2 Retrocession

Variables analysis result for the effect of retrocession is as follow as Table 5-11, Table 5-12, & Table 5-13 :

Table 5-11 Variables analysis result of retrocession (1)

Company Name	DCR	
	Scenario 1	Scenario 2
	No retrocession	With retrocession
Taiwan	100,668	112,528
ChungKuo	192,098	181,261
TaiPing	(460,867)	(158,276)
Fubon	(1,190,106)	(749,723)
Zurich	118,373	140,328
Taian	14,832	11,734
Mingtai	62,313	89,020
Central	813,927	775,213
First	120,614	118,888
KuoHua	121,653	114,026
Union	210,560	205,695
ShinKong	401,480	381,988
SouthChina	161,721	155,284

Table 5-12 Variables analysis result of retrocession (2)

Company Name	DCR	
	Scenario 4	Scenario 5
	No retrocession	With retrocession
Taiwan	(55,260)	218,639
ChungKuo	280,733	254,662
TaiPing	(507,186)	(154,216)
Fubon	(321,067)	898,144
Zurich	220,828	242,193
Taian	187,580	97,271
Mingtai	528,591	558,174
Central	1,132,772	1,106,363
First	261,616	244,060
KuoHua	257,828	256,787
Union	432,093	373,428
ShinKong	720,060	680,309
SouthChina	304,630	266,272

Table 5-13 : Variables analysis result of retrocession (3)

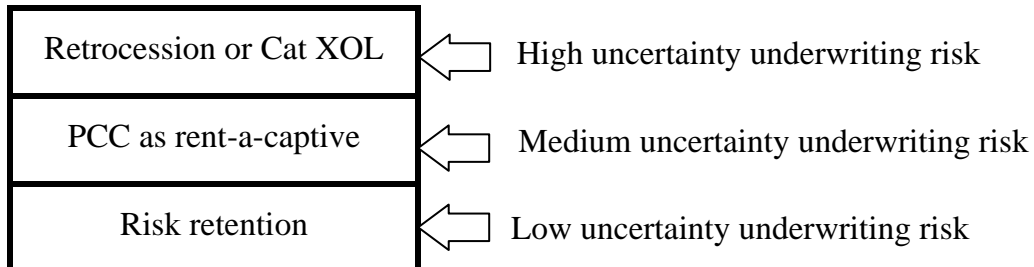
Company Name	DCR	
	Scenario 6	Scenario 7
	No retrocession	With retrocession
Taiwan	(570,541)	(202,055)
ChungKuo	162,334	172,614
TaiPing	(518,019)	(253,626)
Fubon	(2,740,624)	(826,928)
Zurich	(124,197)	162,259
Taian	(32,852)	(92,236)
Mingtai	294,116	297,046
Central	586,837	559,927
First	145,276	139,394
Kuo Hua	147,600	142,473
Union	250,650	264,818
Shin Kong	399,411	370,242
South China	116,285	111,889

The captive is initially designed to take the burning cost and eliminating the peak risks helps to preserve stability and protect the captive's balance. PCC, like other captives, may be considered not suitable for taking peak risk business. If business of its parent company belongs to high loss severity, using

PCC as rent-a-captive instead of commercial reinsurance will increase its cost of risks. Retrocession can help to resolve this problem. If PCC has arranged retrocession, it can reduce the increase of cost of risks; On the contrary, if business of its parent company belongs to medium loss severity, retrocession will reduce the benefit in decreasing its cost of risks. Besides, in the initial stage of PCC operating, retrocession can decrease the business uncertainty of its parent company (as table 5-13) .

So, we can get that if PCC has arranged retrocession, it can avoid PCC to take peak risk and just take medium uncertainty underwriting risk as figure 5-3 as follows,

Figure 5-3



2.2.3 Operation Period

Variables analysis result of operation period is as Table 5-14 & Table 5-15 as follows :

Table 5-14 Variables analysis result of operation period (1)

Company Name	DCR	
	Scenario 4	Scenario 6
	5 Years	3 Years
Taiwan	(55,260)	(570,541)
ChungKuo	280,733	162,334
TaiPing	(507,186)	(518,019)
Fubon	(321,067)	(2,740,624)
Zurich	220,828	(124,197)
Taian	187,580	(32,852)
Mingtai	528,591	294,116
Central	1,132,772	586,837
First	261,616	145,276
KuoHua	257,828	147,600
Union	432,093	250,650
ShinKong	720,060	399,411
SouthChina	304,630	116,285

Table 5-15 Variables analysis result of operation period (2)

Company Name	DCR	
	Scenario 5	Scenario 7
	5 Years	3 Years
Taiwan	218,639	(202,055)
ChungKuo	254,662	172,614
TaiPing	(154,216)	(253,626)
Fubon	898,144	(826,928)
Zurich	242,193	162,259
Taian	97,271	(92,236)
Mingtai	558,174	297,046
Central	1,106,363	559,927
First	244,060	139,394
KuoHua	256,787	142,473
Union	373,428	264,818
ShinKong	680,309	370,242
SouthChina	266,272	111,889

We separately analyze and compare scenario 4 (5 years) vs. scenario 6 (3 years), scenario 5 (5 years) vs. scenario 7(3 years), we can get that no matter

what the ceding terms and conditions, the longer we use PCC as rent-a-captive the more we can save its cost of risk.

2.2.4 Paid-up Capital

We compare two scenarios, one is the minimum capital required by the regulatory within PCC domiciles, the other is that, premium to surplus ratio is 2 to1. The empirical result are shown in table 5-16

We find out that if PCC is a pure captive, adding up the paid-up capital of PCC can will increase not only its opportunity cost of capital but also cost of risks. Thus we suggest that if PCC is a pure captive, paid-up capital of PCC which just meet the minimum capital required by the regulatory within PCC domiciles will be optimal. But if PCC is not a pure captive, to avoid insolvency and indirect financial distress cost, considering of solvency margin will be necessary.

Table 5-16 Variables analysis result of paid-up capital

Company Name	DCR	
	Scenario 5	Scenario 8
	the premium to surplus ratio is two to one.	minimum capital required by the regulatory
Taiwan	218,639	241,257
ChungKuo	254,662	299,491
TaiPing	(154,216)	(131,689)
Fubon	898,144	989,464
Zurich	242,193	249,245
Taian	97,271	53,388
Mingtai	558,174	521,723
Central	1,106,363	1,032,198
First	244,060	269,558
KuoHua	256,787	227,939
Union	373,428	484,117
ShinKong	680,309	650,016
SouthChina	266,272	271,952

2.2.5 Conclusion

Based on the result of scenario 1 ~ scenario 8, it is apparently that scenario 8 is the optimal situation for PCC risk management strategy. Because it has the following characteristics :

1. In scenario 8, most business that PCC takes belongs to medium severity

business.

2. In scenario 8, the operation period of PCC is 5 years instead of 3 years
3. In scenario 8, the paid-up capital of PCC just meet the minimum capital required by the regulatory within PCC domiciles will be optimal.
4. PCC did arrange retrocession to protect its risk uncertainty.

Table 5-17 The result of scenario 1 ~ scenario 8

Company Name	DCR							
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Taiwan	100,668	112,528	48,619	(55,260)	218,639	(570,541)	(202,055)	241,257
Chung Kuo	192,098	181,261	103,963	280,733	254,662	162,334	172,614	299,491
TaiPing	(460,867)	(158,276)	(635,824)	(507,186)	(154,216)	(518,019)	(253,626)	(131,689)
Fubon	(1,190,106)	(749,723)	(803,459)	(321,067)	898,144	(2,740,624)	(826,928)	989,464
Zurich	118,373	140,328	57,966	220,828	242,193	(124,197)	162,259	249,245
Taian	14,832	11,734	(10,475)	187,580	97,271	(32,852)	(92,236)	53,388
Mingtai	62,313	89,020	(21,862)	528,591	558,174	294,116	297,046	521,723
Central	813,927	775,213	663,751	1,132,772	1,106,363	586,837	559,927	1,032,198
First	120,614	118,888	(72,613)	261,616	244,060	145,276	139,394	269,558
Kuo Hua	121,653	114,026	16,970	257,828	256,787	147,600	142,473	227,939
Union	210,560	205,695	(182,649)	432,093	373,428	250,650	264,818	484,117
Shin Kong	401,480	381,988	170,819	720,060	680,309	399,411	370,242	650,016
South China	161,721	155,284	109,550	304,630	266,272	116,285	111,889	271,952