

## **CHAPTER 4: RESEARCH FINDINGS**

### **4.1 Introduction**

This chapter presents the results and findings that have been conducted based on the data set based on the banks from the selected countries using the DEA methodology followed by productivity by applying the Malmquist Productivity Index.

### **4.2 Relative Efficiency of Banks Analysis by Country**

Based on the 3 input and 3 output variables, the relative efficiency scores for the pooled sample of 74 commercial banks in 4 different selected ASEAN countries are derived using the DEA input orientation model applying both constant return to scale (CRS) and variable return to scale (VRS).

The results are presented by categorising the banks according to the different countries. The analysis are for the full period of study which is from 2005 to 2009 where the maximum efficiency score of 1.00 represent banks that are efficient.

Table 4.1 summarizes the list of banks and the scores that have been obtained segregated by country. Based on the analysis, there is no notable trend that can be concluded based on the scores and number of banks categorised as efficient bank. The year on year basis comparison between countries where the number of banks categorised as efficient bank varies.

**Table 4.1**  
**CRS and VRS Efficiency Score Segregated by Country**

Country	Bank	2005		2006		2007		2008		2009	
		CRS	VRS	CRS	VRS	CRS	VRS	CRS	VRS	CRS	VRS
Malaysia	AFFIN	0.85	0.98	0.77	0.89	0.80	0.90	0.80	0.90	0.83	0.93
	ALBM	0.86	0.98	0.78	0.87	0.86	0.96	0.85	0.96	0.82	0.91
	AMBank	0.85	1.00	0.93	1.00	0.93	0.99	1.00	1.00	0.92	0.99
	BBM	0.96	1.00	1.00	1.00	0.93	0.97	1.00	1.00	0.87	0.95
	BOAM	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	BOTMM	0.85	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	CIMB	0.85	1.00	0.80	0.96	0.85	1.00	0.81	0.98	0.93	1.00
	CITIBM	0.84	0.93	0.89	0.99	0.85	0.99	0.90	0.99	1.00	1.00
	DBM	0.87	0.88	0.76	0.80	0.88	0.94	0.92	0.96	0.88	1.00
	EON	0.82	0.96	0.83	0.94	0.82	0.94	0.82	0.93	0.83	0.96
	HLBB	0.76	0.92	0.81	0.93	0.79	0.88	0.78	0.89	0.75	0.89
	HSBCM	0.95	0.98	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00
	MBB	0.91	1.00	0.85	1.00	0.83	1.00	0.84	1.00	0.83	1.00
	OCBCM	0.77	1.00	0.77	0.94	0.77	0.92	0.79	0.95	0.84	1.00
	PBB	0.86	1.00	0.85	0.98	0.87	1.00	0.90	1.00	0.92	1.00
	RBSM	0.74	0.74	0.76	0.76	0.56	0.62	1.00	1.00	0.69	0.69
	RHB	0.73	0.87	0.76	0.90	0.80	0.95	0.83	0.99	1.00	1.00
SCBM	0.79	0.90	0.78	0.91	0.81	0.93	0.94	1.00	0.90	0.95	
UOBM	0.84	1.00	0.86	1.00	0.87	1.00	0.80	0.98	0.94	1.00	
Average		0.84	0.95	0.85	0.94	0.85	0.95	0.89	0.98	0.89	0.96
Standard Deviation		0.06	0.07	0.09	0.07	0.10	0.09	0.09	0.03	0.09	0.07
Minimum		0.73	0.74	0.76	0.76	0.56	0.62	0.78	0.89	0.69	0.69
No. of Efficient Bank		0	7	4	6	2	6	6	9	4	10

Philippines	ABP	0.76	0.86	0.71	0.87	0.76	0.96	0.83	0.85	0.94	0.99
	AUBP	1.00	1.00	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00
	BCP	0.76	0.93	0.72	0.84	0.80	0.88	0.87	0.95	0.79	0.86
	BOUB	0.78	0.96	0.82	1.00	0.88	1.00	0.85	0.93	1.00	1.00
	BPI	0.91	1.00	0.84	1.00	0.90	1.00	0.98	1.00	1.00	1.00
	CBP	0.90	1.00	0.91	1.00	0.87	0.99	0.89	1.00	0.89	0.97
	LBOP	0.80	1.00	0.79	1.00	0.88	1.00	0.98	1.00	0.99	1.00
	MBBP	0.89	0.98	0.97	0.97	0.74	0.78	1.00	1.00	0.94	0.96
	MBTCP	0.78	1.00	0.75	1.00	0.81	0.98	0.81	1.00	0.89	1.00
	PBCP	0.78	0.83	0.97	0.97	0.86	0.95	0.75	0.80	0.79	0.82
	PDB	0.99	1.00	1.00	1.00	0.96	1.00	0.96	1.00	0.89	1.00
	PNBP	0.77	0.85	0.93	0.97	1.00	1.00	0.77	0.89	0.91	1.00
	PTBP	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
	PVBP	0.96	1.00	0.83	0.86	0.96	0.97	1.00	1.00	0.91	0.91
	RCBCP	0.73	1.00	0.71	0.94	0.81	0.96	0.83	0.95	0.92	1.00
	SBP	0.85	0.98	0.78	0.86	0.90	1.00	0.96	1.00	0.98	1.00
	UBP	1.00	1.00	0.79	0.87	0.72	0.83	0.80	0.90	0.93	1.00
UCPB	0.56	0.74	0.54	0.68	0.49	0.57	0.58	0.62	0.53	0.59	
UOBP	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Average		0.85	0.95	0.84	0.94	0.86	0.94	0.89	0.94	0.91	0.95
Standard Deviation		0.12	0.08	0.13	0.09	0.13	0.11	0.11	0.10	0.11	0.10
Minimum		0.56	0.74	0.54	0.68	0.49	0.57	0.58	0.62	0.53	0.59
No. of Efficient Bank		4	11	3	8	4	9	3	8	5	11

Thailand	BB	0.88	0.93	0.85	1.00	0.83	1.00	0.87	1.00	0.96	1.00
	BOA	0.92	0.93	0.80	0.90	0.73	0.91	0.87	1.00	0.93	1.00
	CIMBT	0.79	0.83	0.56	0.72	0.76	0.84	0.64	0.68	0.69	0.75
	GHB	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	ICBCT	0.86	0.87	0.80	0.81	0.69	0.70	0.77	0.77	1.00	1.00
	KB	1.00	1.00	0.86	0.98	0.90	1.00	0.89	0.94	0.96	1.00
	KNB	1.00	1.00	1.00	1.00	0.97	0.99	0.86	0.91	0.87	0.90
	KTB	1.00	1.00	0.93	1.00	0.91	1.00	0.93	1.00	0.91	1.00
	SCB	0.80	0.80	0.70	0.91	0.68	0.80	0.78	0.84	0.83	0.85
	SCBT	1.00	1.00	0.94	1.00	0.93	1.00	0.99	1.00	0.93	0.94
	SCOMB	1.00	1.00	0.87	1.00	0.88	1.00	0.94	1.00	0.99	1.00
	SMEDB	0.88	0.89	0.85	0.86	0.78	0.79	0.62	0.62	0.80	0.81
	TISCOB	1.00	1.00	0.99	0.99	1.00	1.00	0.88	0.89	0.93	0.94
	TMBB	0.87	0.88	0.66	0.81	0.57	0.88	0.71	0.82	0.74	0.86
	TRB	0.74	1.00	1.00	1.00	0.69	0.71	0.67	0.68	0.68	0.68
UOBT	1.00	1.00	0.82	0.86	0.74	0.80	0.83	0.87	0.82	0.83	
Average		0.92	0.95	0.85	0.93	0.82	0.90	0.83	0.88	0.88	0.91
Standard Deviation		0.09	0.07	0.13	0.09	0.13	0.11	0.12	0.13	0.11	0.10
Minimum		0.74	0.80	0.56	0.72	0.57	0.70	0.62	0.62	0.68	0.68
No. of Efficient Bank		8	9	3	7	2	7	1	6	2	7

Vietnam	ABBKV	1.00	1.00	0.97	1.00	0.79	0.80	1.00	1.00	0.88	0.91
	ACB	0.80	0.86	0.78	0.85	1.00	1.00	0.97	1.00	0.79	0.93
	AGRIBV	1.00	1.00	0.97	1.00	0.94	1.00	0.92	1.00	0.87	1.00
	DONGA	0.96	0.96	0.90	0.90	1.00	1.00	1.00	1.00	1.00	1.00
	HABU	0.91	0.92	0.93	0.94	0.94	0.96	1.00	1.00	0.86	0.90
	MHB	0.82	0.83	0.81	0.83	0.85	0.89	0.89	0.89	0.83	0.86
	MPV	0.86	1.00	0.90	1.00	0.87	1.00	0.96	1.00	0.90	1.00
	NAMAV	0.97	1.00	0.86	0.86	0.89	0.90	1.00	1.00	0.82	0.82
	NAVIB	0.92	0.93	1.00	1.00	0.91	0.92	0.82	0.82	0.73	0.73
	OCB	0.94	0.94	0.96	0.96	0.94	0.95	1.00	1.00	1.00	1.00
	OCV	0.92	1.00	1.00	1.00	0.91	1.00	1.00	1.00	0.71	0.77
	SACOM	0.90	0.93	0.92	1.00	1.00	1.00	0.92	0.98	0.89	0.96
	SAIGON	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00
	THCOMV	1.00	1.00	1.00	1.00	0.86	0.90	1.00	1.00	0.88	0.97
	VEXIMB	0.84	0.86	0.96	0.96	0.96	0.98	0.96	0.99	0.97	1.00
	VIBB	0.84	0.89	0.83	0.87	0.81	0.86	0.88	0.91	0.76	0.80
	VIDPB	0.92	0.92	0.90	0.91	0.88	0.92	1.00	1.00	1.00	1.00
	VIETCB	1.00	1.00	0.88	1.00	0.85	1.00	0.94	1.00	0.86	1.00
	VIETIN	0.93	1.00	0.91	0.97	0.94	1.00	0.93	1.00	0.96	0.99
VPB	0.89	0.89	0.81	0.82	0.94	0.96	1.00	1.00	0.86	0.88	
Average		0.92	0.95	0.91	0.94	0.91	0.95	0.96	0.98	0.88	0.93
Standard Deviation		0.06	0.06	0.07	0.07	0.06	0.06	0.05	0.05	0.09	0.09
Minimum		0.80	0.83	0.78	0.82	0.79	0.80	0.82	0.82	0.71	0.73
No. of Efficient Bank		3	8	4	7	4	9	10	15	3	8

**All Banks**

Average	0.92	0.91	0.90	0.90	0.90	0.92	0.92	0.92	0.91	0.94
Standard Deviation	0.09	0.07	0.11	0.08	0.11	0.09	0.10	0.09	0.10	0.09
Minimum	0.56	0.74	0.54	0.68	0.49	0.57	0.58	0.62	0.53	0.59
No. of Efficient Bank	15	35	14	28	12	31	20	38	14	36

In terms of the comparison between CRS and VRS approach, the graph in Figure 4.1 and 4.2 will provide a clearer illustration.

Figure 4.1  
Average Efficiency Score by Country - CRS Approach

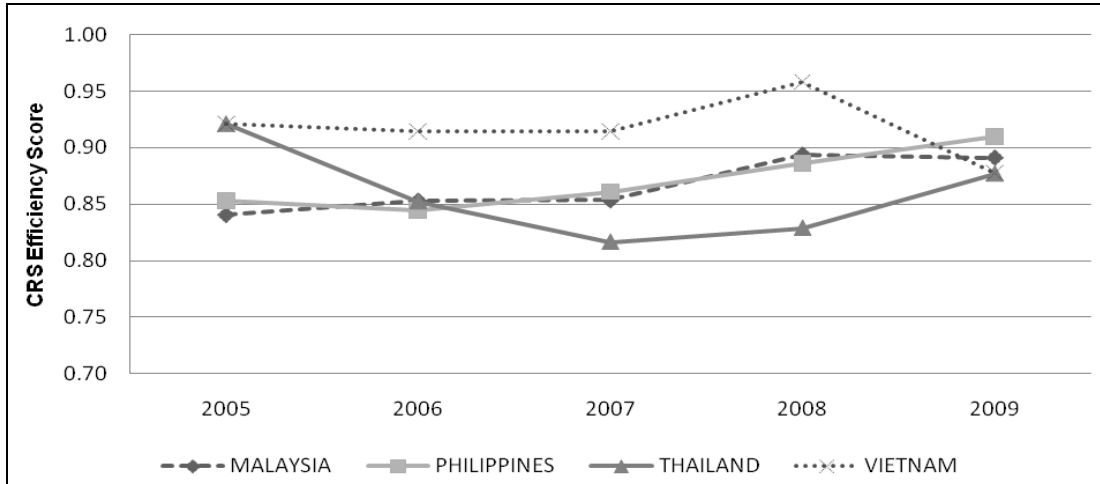
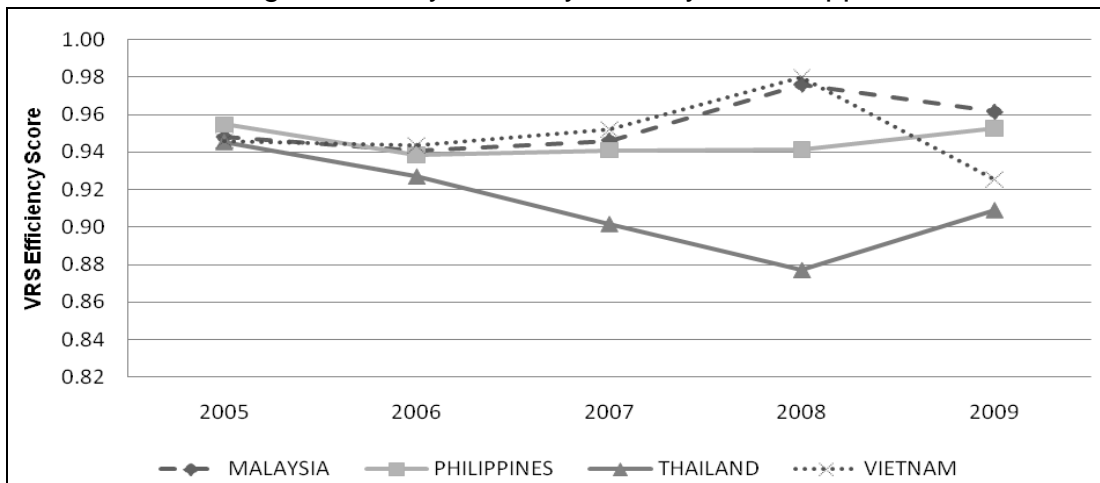


Figure 4.2  
Average Efficiency Score by Country - VRS Approach



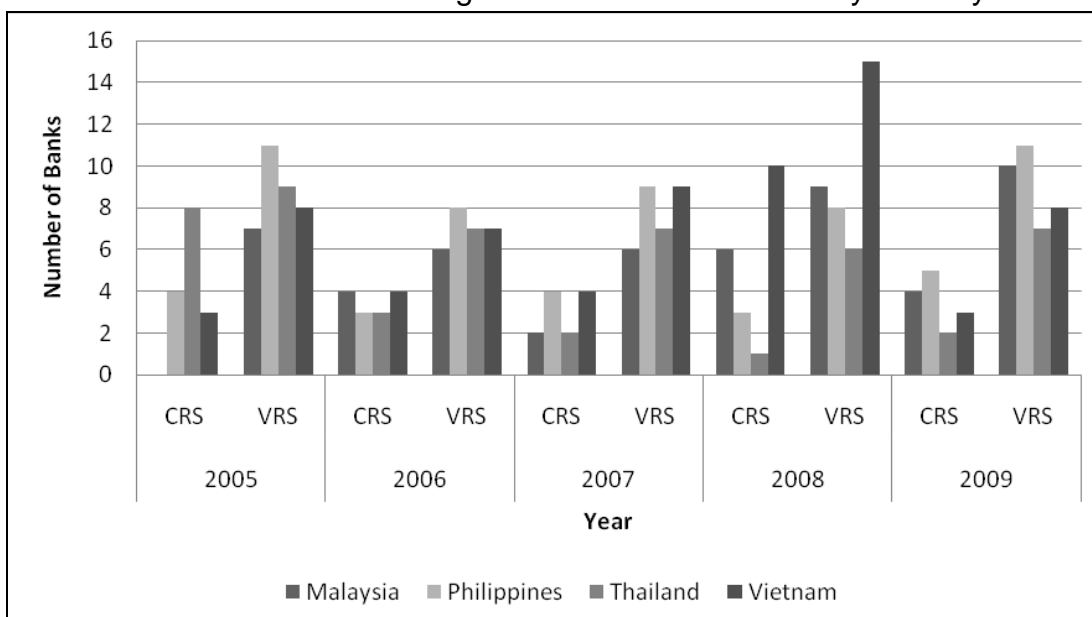
Based on above graphs, banks located in Malaysia has a consistent increase in the CRS score however based on the VRS approach, there is a slight decrease in the efficiency score in 2009. Banks located in Philippines display a consistent increase in both CRS and VRS scores.

Banks located in Thailand shows a downtrend in the average efficiency score for both CRS and VRS from year 2005 to 2008 however in 2009, both the

scores increased as compared to 2008. The efficiency scores for banks located in Vietnam is the reverse of Thailand whereby the scores for both CRS and VRS is on an uptrend from 2005 to 2008 however the scores drop significantly in 2009 as compared to 2008. Furthermore, out of the four countries that are being studied, Thailand banks scored the lowest score based on the average score efficiency for both CRS and VRS.

As opposed to the CRS and VRS approach to determine the efficiency scores, the VRS approach average scores are higher as compared to CRS approach average scores.

Figure 4.3  
Number of Banks Categorized as Efficient Banks by Country



Based on Figure 4.3 graph, the number of banks which have scored 1.00 for the efficiency score for both CRS and VRS are being compared across the 4 different countries.

In 2005, Malaysia has the least number of efficient banks. Based on the CRS approach, the number of banks performing efficiently in Thailand is notably high however based on the VRS approach, Philippines has the highest number of banks performing efficiently.

The number of banks performing efficiently in 2005 has shrunk in 2006. Based on the CRS approach, Malaysia has an increase in banks classified as efficient. Based on the VRS approach, Philippines has the highest number of banks classified as efficient. There is a slight increase in the number of banks in 2007 as compared to 2006 based on the VRS approach.

In 2008, based on the CRS approach, the number of banks classified as efficient has decrease substantially for Philippines and Thailand. However the VRS approach indicates that there is a significant increase in the number of efficient banks in Vietnam for year 2008 however this number then decreased in 2009.

Further observation, Vietnam has consistently scored high on the number of banks classified as efficient. This could be due to the reason that the number of banks that are being categorised as small is the highest for Vietnam with 9 banks in this study.

### 4.3 Relative Efficiency of Banks Analysis by Bank Size

Further analysis has been done by categorizing the different bank size for the period of 2005 to 2009.

Table 4.2  
CRS and VRS Efficiency Score Segregated by Bank Size

Country	Bank	2005		2006		2007		2008		2009	
		CRS	VRS	CRS	VRS	CRS	VRS	CRS	VRS	CRS	VRS
<b>Bank Size – Large</b>											
Malaysia	AMBANK	0.85	1.00	0.93	1.00	0.93	0.99	1.00	1.00	0.92	0.99
	CIMB	0.85	1.00	0.80	0.96	0.85	1.00	0.81	0.98	0.93	1.00
	EON	0.82	0.96	0.83	0.94	0.82	0.94	0.82	0.93	0.83	0.96
	HLBB	0.76	0.92	0.81	0.93	0.79	0.88	0.78	0.89	0.75	0.89
	HSBCM	0.95	0.98	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00
	MBB	0.91	1.00	0.85	1.00	0.83	1.00	0.84	1.00	0.83	1.00
	OCBCM	0.77	1.00	0.77	0.94	0.77	0.92	0.79	0.95	0.84	1.00
	PBB	0.86	1.00	0.85	0.98	0.87	1.00	0.90	1.00	0.92	1.00
	RHB	0.73	0.87	0.76	0.90	0.80	0.95	0.83	0.99	1.00	1.00
	SCBM	0.79	0.90	0.78	0.91	0.81	0.93	0.94	1.00	0.90	0.95
UOBM	0.84	1.00	0.86	1.00	0.87	1.00	0.80	0.98	0.94	1.00	
Philippines	BOUB	0.78	0.96	0.82	1.00	0.88	1.00	0.85	0.93	1.00	1.00
	BPI	0.91	1.00	0.84	1.00	0.90	1.00	0.98	1.00	1.00	1.00
	MBTCP	0.78	1.00	0.75	1.00	0.81	0.98	0.81	1.00	0.89	1.00
Thailand	BB	0.88	0.93	0.85	1.00	0.83	1.00	0.87	1.00	0.96	1.00
	BOA	0.92	0.93	0.80	0.90	0.73	0.91	0.87	1.00	0.93	1.00
	GHB	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	KB	1.00	1.00	0.86	0.98	0.90	1.00	0.89	0.94	0.96	1.00
	KTB	1.00	1.00	0.93	1.00	0.91	1.00	0.93	1.00	0.91	1.00
	SCB	0.80	0.80	0.70	0.91	0.68	0.80	0.78	0.84	0.83	0.85
	SCOMB	1.00	1.00	0.87	1.00	0.88	1.00	0.94	1.00	0.99	1.00
	TMBB	0.87	0.88	0.66	0.81	0.57	0.88	0.71	0.82	0.74	0.86
Vietnam	AGRIBV	1.00	1.00	0.97	1.00	0.94	1.00	0.92	1.00	0.87	1.00
	VIETCB	1.00	1.00	0.88	1.00	0.85	1.00	0.94	1.00	0.86	1.00
	VIETIN	0.93	1.00	0.91	0.97	0.94	1.00	0.93	1.00	0.96	0.99
Average		0.88	0.97	0.84	0.97	0.85	0.97	0.88	0.97	0.91	0.98
Standard Deviation		0.09	0.05	0.08	0.05	0.09	0.05	0.08	0.05	0.08	0.05
Minimum		0.73	0.80	0.66	0.81	0.57	0.80	0.71	0.82	0.74	0.85
No. of Efficient Bank		5	14	2	12	1	14	3	14	4	17
<b>Bank Size - Medium</b>											
Malaysia	AFFIN	0.85	0.98	0.77	0.89	0.80	0.90	0.80	0.90	0.83	0.93
	ALBM	0.86	0.98	0.78	0.87	0.86	0.96	0.85	0.96	0.82	0.91
	CITIBM	0.84	0.93	0.89	0.99	0.85	0.99	0.90	0.99	1.00	1.00
	DBM	0.87	0.88	0.76	0.80	0.88	0.94	0.92	0.96	0.88	1.00
Philippines	ABP	0.76	0.86	0.71	0.87	0.76	0.96	0.83	0.85	0.94	0.99
	CBP	0.90	1.00	0.91	1.00	0.87	0.99	0.89	1.00	0.89	0.97
	LBOP	0.80	1.00	0.79	1.00	0.88	1.00	0.98	1.00	0.99	1.00
	PNBP	0.77	0.85	0.93	0.97	1.00	1.00	0.77	0.89	0.91	1.00
	RCBCP	0.73	1.00	0.71	0.94	0.81	0.96	0.83	0.95	0.92	1.00
	SBP	0.85	0.98	0.78	0.86	0.90	1.00	0.96	1.00	0.98	1.00
	UBP	1.00	1.00	0.79	0.87	0.72	0.83	0.80	0.90	0.93	1.00
UCPB	0.56	0.74	0.54	0.68	0.49	0.57	0.58	0.62	0.53	0.59	

Country	Bank	2005		2006		2007		2008		2009	
		CRS	VRS	CRS	VRS	CRS	VRS	CRS	VRS	CRS	VRS
Thailand	CIMBT	0.79	0.83	0.56	0.72	0.76	0.84	0.64	0.68	0.69	0.75
	KNB	1.00	1.00	1.00	1.00	0.97	0.99	0.86	0.91	0.87	0.90
	SCBT	1.00	1.00	0.94	1.00	0.93	1.00	0.99	1.00	0.93	0.94
	TISCOB	1.00	1.00	0.99	0.99	1.00	1.00	0.88	0.89	0.93	0.94
	UOBT	1.00	1.00	0.82	0.86	0.74	0.80	0.83	0.87	0.82	0.83
Vietnam	ACB	0.80	0.86	0.78	0.85	1.00	1.00	0.97	1.00	0.79	0.93
	DONGA	0.96	0.96	0.90	0.90	1.00	1.00	1.00	1.00	1.00	1.00
	MPV	0.86	1.00	0.90	1.00	0.87	1.00	0.96	1.00	0.90	1.00
	SACOM	0.90	0.93	0.92	1.00	1.00	1.00	0.92	0.98	0.89	0.96
	SAIGON	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00
	THCOMV	1.00	1.00	1.00	1.00	0.86	0.90	1.00	1.00	0.88	0.97
	VEXIMB	0.84	0.86	0.96	0.96	0.96	0.98	0.96	0.99	0.97	1.00
	VIBB	0.84	0.89	0.83	0.87	0.81	0.86	0.88	0.91	0.76	0.80
Average		0.87	0.94	0.84	0.92	0.87	0.94	0.88	0.93	0.88	0.94
Standard Deviation		0.11	0.07	0.13	0.09	0.12	0.10	0.11	0.10	0.11	0.10
Minimum		0.56	0.74	0.54	0.68	0.49	0.57	0.58	0.62	0.53	0.59
No. of Efficient Bank		6	10	3	6	6	10	3	9	2	10
<b>Bank Size - Small</b>											
Malaysia	BBM	0.96	1.00	1.00	1.00	0.93	0.97	1.00	1.00	0.87	0.95
	BOAM	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	BOTMM	0.85	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	RBSM	0.74	0.74	0.76	0.76	0.56	0.62	1.00	1.00	0.69	0.69
Philippines	AUBP	1.00	1.00	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00
	BCP	0.76	0.93	0.72	0.84	0.80	0.88	0.87	0.95	0.79	0.86
	MBBP	0.89	0.98	0.97	0.97	0.74	0.78	1.00	1.00	0.94	0.96
	PBCP	0.78	0.83	0.97	0.97	0.86	0.95	0.75	0.80	0.79	0.82
	PDB	0.99	1.00	1.00	1.00	0.96	1.00	0.96	1.00	0.89	1.00
	PTBP	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
	PVBP	0.96	1.00	0.83	0.86	0.96	0.97	1.00	1.00	0.91	0.91
UOBP	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Thailand	ICBCT	0.86	0.87	0.80	0.81	0.69	0.70	0.77	0.77	1.00	1.00
	SMEDB	0.88	0.89	0.85	0.86	0.78	0.79	0.62	0.62	0.80	0.81
	TRB	0.74	1.00	1.00	1.00	0.69	0.71	0.67	0.68	0.68	0.68
Vietnam	ABBKV	1.00	1.00	0.97	1.00	0.79	0.80	1.00	1.00	0.88	0.91
	HABU	0.91	0.92	0.93	0.94	0.94	0.96	1.00	1.00	0.86	0.90
	MHB	0.82	0.83	0.81	0.83	0.85	0.89	0.89	0.89	0.83	0.86
	NAMAV	0.97	1.00	0.86	0.86	0.89	0.90	1.00	1.00	0.82	0.82
	NAVIB	0.92	0.93	1.00	1.00	0.91	0.92	0.82	0.82	0.73	0.73
	OCB	0.94	0.94	0.96	0.96	0.94	0.95	1.00	1.00	1.00	1.00
	OCV	0.92	1.00	1.00	1.00	0.91	1.00	1.00	1.00	0.71	0.77
	VIDPB	0.92	0.92	0.90	0.91	0.88	0.92	1.00	1.00	1.00	1.00
VPB	0.89	0.89	0.81	0.82	0.94	0.96	1.00	1.00	0.86	0.88	
Average		0.90	0.94	0.92	0.93	0.88	0.90	0.93	0.94	0.88	0.90
Standard Deviation		0.08	0.07	0.09	0.08	0.12	0.11	0.12	0.11	0.11	0.11
Minimum		0.74	0.74	0.72	0.76	0.56	0.62	0.62	0.62	0.68	0.68
No. of Efficient Bank		4	11	9	10	5	7	14	15	8	9



Based on Table 4.3, it is notable that the minimum CRS and VRS efficiency scores for large banks is significantly higher than medium and small banks which indicates that bigger banks generally performs more efficiently as compared to the other bank sizes.

Banks with at least 3 times scoring the VRS efficiency score of 1.00 are listed based on the bank size category. Banks that are categorized as large bank are AMBANK, CIMB, HSBCM, MBB, UOBM, BOUB, BPI, MBTCP, GHB, KB, KTB, SCOMB, AGRIBV, VIETCB and VIETIN. Banks that are categorized as medium are as LBOP, SBP, SCBT, DONGA, MPV, SAIGON and THCOMV. Banks that are categorized as small are BOAM, BOTMM, AUBP, PDB, PTBP, UOBP, ABBKV and OCV.

Further analysis can be done based on the CRS and VRS trend based on average efficiency score categorized by the bank size based on the graphs in Figure 4.4 below.

Figure 4.4  
Average Efficiency Score by Bank Size - CRS Approach

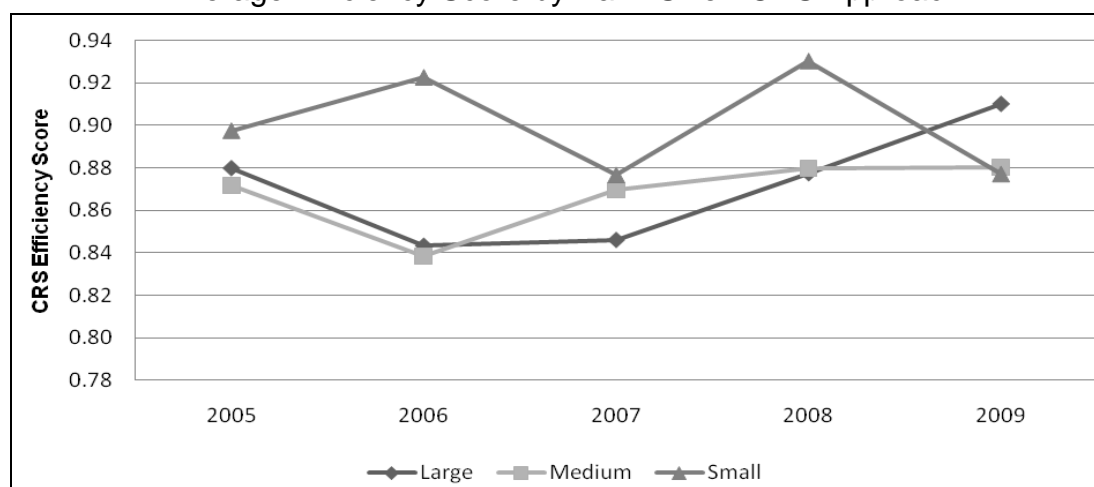
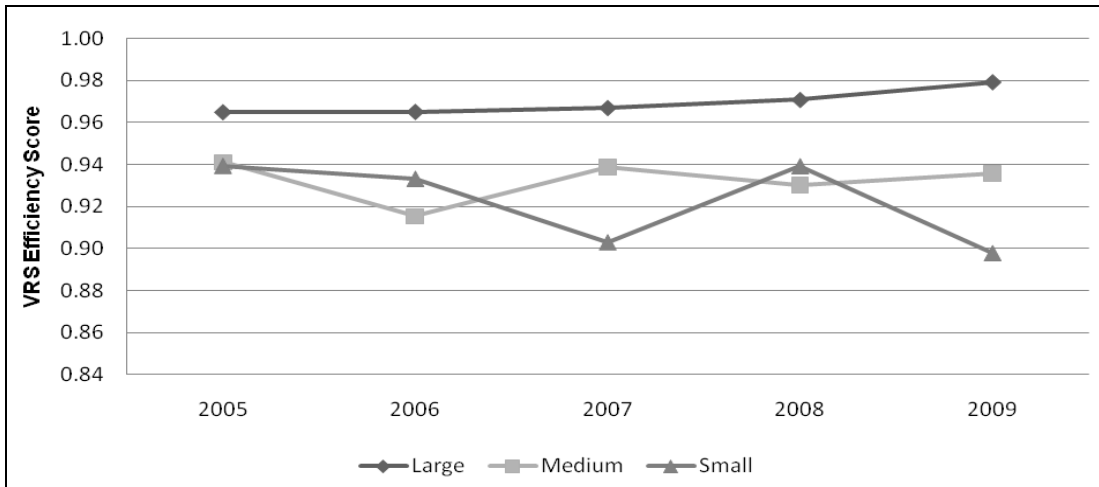


Figure 4.5  
Average Efficiency Score by Bank Size - VRS Approach



Based on CRS approach, the average efficiency score for large and medium banks are have a drop from year 2005 to 2006 however from 2006 to 2009, the average efficiency scores is on an uptrend. As for small size banks, the average efficiency scores has a mix trend from 2005 to 2009.

Based on VRS approach, the average efficiency score for large bank is steadily increasing and the graph shows the gap between the average efficiency scores between medium and small size banks. As for the medium and small size banks, the average efficiency score is not consistent however it is notable that the small size banks average efficiency score has dropped significantly in 2009.

Based on both CRS and VRS average efficiency score, in 2009, large size banks display higher efficiency as to compare to small and medium size banks.

#### 4.4 Productivity Change

The productivity change of the banks in the selected country of study is being measured using the Malmquist Productivity Index over the analysis period of 2005 to 2009. Using the input orientation of 3 input variables (deposit, interest expense and non-interest expense) and 3 output variables (net loan, interest income and non-interest income), the distance functions are computed using the Data Envelopment Analysis (DEA) method.

Upon obtaining the productivity change of the banks through Malmquist Productivity Index, it is then decomposed to measure the change in efficiency and the second component is to measure the technological change or change in the frontier technology. Based on the value obtained, the value that is greater than unity will indicate negative total factor productivity growth between the two periods while a value less than unity will indicate otherwise.

The results are presented in Table 4.3 below which the results are segregated by the different countries and bank size.

Table 4.3

## Data Envelopment Analysis based on Malmquist Productivity Index Segregated by Country and Categorized by Bank Size

## Malaysia

Bank Size	Bank	2005 - 2006			2006 - 2007			2007 - 2008			2008 - 2009		
		Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change
Large	AMBANK	1.1130	0.9624	1.1564	1.0107	1.0491	0.9634	1.0400	1.0000	1.0400	1.0036	1.0000	1.0036
	CIMB	0.9210	0.8438	1.0914	1.0514	1.1812	0.8901	0.9950	1.0004	0.9946	1.1380	1.0144	1.1218
	EON	1.0641	0.9487	1.1216	0.9920	1.1130	0.8912	1.0194	1.0370	0.9831	1.0849	1.0066	1.0778
	HLBB	1.1779	1.0061	1.1708	0.9545	0.9752	0.9788	1.0407	1.0150	1.0253	0.9888	1.0049	0.9840
	HSBCM	1.0685	1.0000	1.0685	1.0195	1.0000	1.0195	1.0424	1.0000	1.0424	1.1501	1.0000	1.1501
	MBB	0.9018	0.8658	1.0416	0.9812	1.1097	0.8842	1.0240	1.0408	0.9839	1.0178	1.0000	1.0178
	OCBCM	0.9846	0.7943	1.2396	0.9948	1.2545	0.7930	1.0279	1.0178	1.0099	1.0759	0.9432	1.1407
	PBB	1.0610	0.9322	1.1382	1.0446	1.1037	0.9465	1.0406	1.0093	1.0310	1.1578	1.0000	1.1578
	RHB	1.0858	0.9450	1.1489	1.0524	1.2442	0.8458	1.0738	1.0457	1.0269	1.1884	1.0000	1.1884
	SCBM	1.0111	0.9285	1.0889	1.0325	1.1486	0.8989	1.1174	1.0626	1.0516	1.1079	0.9681	1.1444
UOBM	1.0347	0.9042	1.1443	1.0172	1.1060	0.9198	1.0250	1.0000	1.0250	1.1682	1.0000	1.1682	
<b>Average Large</b>		<b>1.0385</b>	<b>0.9210</b>	<b>1.1282</b>	<b>1.0137</b>	<b>1.1168</b>	<b>0.9119</b>	<b>1.0406</b>	<b>1.0208</b>	<b>1.0194</b>	<b>1.0983</b>	<b>0.9943</b>	<b>1.1050</b>
Medium	AFFIN	0.9436	0.8654	1.0904	1.0198	1.1175	0.9125	1.0350	1.0398	0.9954	1.0689	1.0245	1.0433
	ALBM	0.9054	0.8333	1.0866	1.0654	1.2444	0.8562	1.0008	1.0000	1.0008	0.9911	0.9597	1.0328
	CITIBM	1.0659	0.9952	1.0711	0.9734	1.0588	0.9194	1.0427	1.0142	1.0281	1.2393	1.0079	1.2296
	DBM	0.9043	0.8502	1.0637	1.1976	1.1762	1.0182	1.0049	0.9666	1.0397	1.2094	0.9060	1.3349
<b>Average Medium</b>		<b>0.9548</b>	<b>0.8860</b>	<b>1.0779</b>	<b>1.0640</b>	<b>1.1492</b>	<b>0.9266</b>	<b>1.0209</b>	<b>1.0052</b>	<b>1.0160</b>	<b>1.1272</b>	<b>0.9745</b>	<b>1.1602</b>
Small	BBM	1.1861	1.0000	1.1861	1.0615	1.0000	1.0615	1.1225	1.0000	1.1225	1.1326	1.0000	1.1326
	BOAM	1.1635	1.0000	1.1635	1.0729	1.0000	1.0729	1.1934	1.0000	1.1934	1.6194	1.0000	1.6194
	BOTMM	1.3035	1.0000	1.3035	1.2159	1.0000	1.2159	1.0616	1.0000	1.0616	1.2741	1.0000	1.2741
	RBSM	1.2934	1.1517	1.1230	0.5982	0.5970	1.0021	2.9097	1.6750	1.7371	0.7732	0.7972	0.9699
<b>Average Small</b>		<b>1.2366</b>	<b>1.0379</b>	<b>1.1940</b>	<b>0.9871</b>	<b>0.8993</b>	<b>1.0881</b>	<b>1.5718</b>	<b>1.1688</b>	<b>1.2786</b>	<b>1.1999</b>	<b>0.9493</b>	<b>1.2490</b>
<b>Industry Average</b>		<b>1.0626</b>	<b>0.9383</b>	<b>1.1315</b>	<b>1.0187</b>	<b>1.0778</b>	<b>0.9521</b>	<b>1.1483</b>	<b>1.0486</b>	<b>1.0733</b>	<b>1.1258</b>	<b>0.9807</b>	<b>1.1469</b>

Philippines

Bank Size	Bank	2005 - 2006			2006 - 2007			2007 - 2008			2008 - 2009		
		Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change
Large	BOUB	1.1520	1.1746	0.9807	1.1187	1.0899	1.0264	0.9257	0.8995	1.0291	1.1718	1.1125	1.0533
	BPI	0.9532	1.0000	0.9532	1.1675	1.0000	1.1675	1.0938	1.0000	1.0938	1.0748	1.0000	1.0748
	MBTCP	0.9586	1.0592	0.9050	1.1532	1.0839	1.0639	0.9777	0.9637	1.0146	1.0720	1.0737	0.9984
<b>Average Large</b>		<b>1.0212</b>	<b>1.0779</b>	<b>0.9463</b>	<b>1.1464</b>	<b>1.0579</b>	<b>1.0859</b>	<b>0.9991</b>	<b>0.9544</b>	<b>1.0458</b>	<b>1.1062</b>	<b>1.0621</b>	<b>1.0422</b>
Medium	ABP	0.9716	1.0671	0.9105	1.1164	1.1085	1.0072	0.9889	0.9398	1.0523	1.1505	1.1325	1.0159
	CBP	1.0103	1.0354	0.9758	0.9954	0.9626	1.0340	0.9818	1.0522	0.9331	0.9955	1.0038	0.9918
	LBOP	1.0171	1.1538	0.8815	1.1046	1.0032	1.1011	1.0677	1.0000	1.0677	1.0146	1.0000	1.0146
	PNBP	1.1125	1.0000	1.1125	1.1754	1.0000	1.1754	0.8516	0.7820	1.0890	1.1684	1.2788	0.9137
	RCBCP	0.9319	1.0274	0.9071	1.1155	1.1819	0.9439	0.9925	1.0268	0.9666	1.0821	1.1045	0.9797
	SBP	0.9102	0.9546	0.9535	1.1628	1.2358	0.9410	0.9936	1.0000	0.9936	1.0383	1.0000	1.0383
	UBP	0.8039	0.8133	0.9884	0.9430	1.0262	0.9189	1.0586	1.1034	0.9594	1.0939	1.0859	1.0074
UCPB	0.9701	1.0700	0.9066	0.9327	0.9708	0.9608	1.0236	1.0792	0.9485	0.9463	0.9622	0.9835	
<b>Average Medium</b>		<b>0.9660</b>	<b>1.0152</b>	<b>0.9545</b>	<b>1.0682</b>	<b>1.0611</b>	<b>1.0103</b>	<b>0.9948</b>	<b>0.9979</b>	<b>1.0013</b>	<b>1.0612</b>	<b>1.0709</b>	<b>0.9931</b>
Small	AUBP	1.0034	1.0000	1.0034	1.1471	1.0000	1.1471	1.0050	1.0000	1.0050	1.0837	1.0000	1.0837
	BCP	0.9164	1.0184	0.8998	1.0685	1.1551	0.9250	0.9784	1.0218	0.9575	1.0049	1.0403	0.9659
	MBBP	1.0352	1.0000	1.0352	0.9435	0.9811	0.9617	1.1998	1.0193	1.1771	0.9788	1.0000	0.9788
	PBCP	1.2266	1.2786	0.9593	0.9367	1.0000	0.9367	0.9377	0.9739	0.9629	1.0530	1.0268	1.0255
	PDB	1.0698	1.0086	1.0607	1.0227	1.0000	1.0227	1.0014	1.0000	1.0014	0.9974	1.0000	0.9974
	PTBP	1.0869	1.0000	1.0869	1.1231	1.0000	1.1231	1.0804	1.0000	1.0804	1.0540	1.0000	1.0540
	PVBP	0.9298	0.9858	0.9432	1.1317	1.0144	1.1156	1.1270	1.0000	1.1270	0.9710	0.9535	1.0184
UOBP	2.5028	1.0000	2.5028	1.2125	1.0000	1.2125	1.5748	1.0000	1.5748	1.0209	1.0000	1.0209	
<b>Average Small</b>		<b>1.2214</b>	<b>1.0364</b>	<b>1.1864</b>	<b>1.0732</b>	<b>1.0188</b>	<b>1.0555</b>	<b>1.1131</b>	<b>1.0019</b>	<b>1.1108</b>	<b>1.0205</b>	<b>1.0026</b>	<b>1.0181</b>
<b>Industry Average</b>		<b>1.0822</b>	<b>1.0340</b>	<b>1.0509</b>	<b>1.0827</b>	<b>1.0428</b>	<b>1.0413</b>	<b>1.0453</b>	<b>0.9927</b>	<b>1.0544</b>	<b>1.0512</b>	<b>1.0408</b>	<b>1.0114</b>

Thailand

Bank Size	Bank	2005 - 2006			2006 - 2007			2007 - 2008			2008 - 2009		
		Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change
Large	BB	1.0132	1.1198	0.9048	0.9975	0.9706	1.0277	1.0621	1.0379	1.0234	1.1999	1.0103	1.1877
	BOA	0.9057	0.9971	0.9084	0.9238	0.9110	1.0141	1.1804	1.1913	0.9908	1.0385	1.0000	1.0385
	GHB	1.2195	1.0000	1.2195	1.0419	1.0000	1.0419	1.0520	1.0000	1.0520	1.0955	1.0000	1.0955
	KB	0.9298	1.0000	0.9298	1.0601	1.0000	1.0601	1.1083	1.0000	1.1083	1.2581	1.0000	1.2581
	KTB	0.9678	1.0000	0.9678	1.0116	1.0000	1.0116	1.1119	1.0000	1.1119	1.1436	1.0000	1.1436
	SCB	0.8544	1.0015	0.8531	0.9667	0.9882	0.9783	1.1394	1.1661	0.9771	1.0658	1.0154	1.0496
	SCOMB	0.9651	1.0000	0.9651	1.0536	1.0000	1.0536	1.0795	1.0000	1.0795	1.2799	1.0000	1.2799
TMBB	0.7756	0.9099	0.8524	0.9610	1.0103	0.9513	1.0030	1.0388	0.9655	1.1653	1.0691	1.0900	
<b>Average Large</b>		<b>0.9539</b>	<b>1.0035</b>	<b>0.9501</b>	<b>1.0020</b>	<b>0.9850</b>	<b>1.0173</b>	<b>1.0921</b>	<b>1.0543</b>	<b>1.0386</b>	<b>1.1558</b>	<b>1.0119</b>	<b>1.1429</b>
Medium	CIMBT	0.6466	0.6853	0.9436	1.2777	1.4216	0.8988	0.8680	0.9369	0.9264	1.1830	1.1565	1.0229
	KNB	1.0215	1.0000	1.0215	1.0496	1.0000	1.0496	0.9872	1.0000	0.9872	1.0222	1.0000	1.0222
	SCBT	0.9848	1.0000	0.9848	1.0070	1.0000	1.0070	1.0750	1.0000	1.0750	1.0897	1.0000	1.0897
	TISCOB	1.0259	1.0000	1.0259	1.0690	1.0000	1.0690	0.9870	1.0000	0.9870	1.0927	1.0000	1.0927
	UOBT	0.9050	1.0000	0.9050	0.8525	0.8570	0.9948	1.1276	1.1284	0.9994	1.0530	0.9465	1.1125
<b>Average Medium</b>		<b>0.9168</b>	<b>0.9371</b>	<b>0.9761</b>	<b>1.0512</b>	<b>1.0557</b>	<b>1.0038</b>	<b>1.0090</b>	<b>1.0131</b>	<b>0.9950</b>	<b>1.0881</b>	<b>1.0206</b>	<b>1.0680</b>
Small	ICBCT	0.8897	0.9643	0.9226	0.9274	0.9265	1.0009	1.0827	1.1375	0.9518	1.2720	1.1509	1.1053
	SMEDB	0.9500	1.0036	0.9466	0.9479	0.9684	0.9788	0.8146	0.8726	0.9336	1.3522	1.3346	1.0132
	TRB	2.1287	1.0000	2.1287	0.9185	1.0000	0.9185	0.8907	0.8702	1.0235	1.0562	0.9993	1.0569
<b>Average Small</b>		<b>1.3228</b>	<b>0.9893</b>	<b>1.3326</b>	<b>0.9312</b>	<b>0.9650</b>	<b>0.9661</b>	<b>0.9293</b>	<b>0.9601</b>	<b>0.9696</b>	<b>1.2268</b>	<b>1.1616</b>	<b>1.0585</b>
<b>Industry Average</b>		<b>1.0115</b>	<b>0.9801</b>	<b>1.0300</b>	<b>1.0041</b>	<b>1.0033</b>	<b>1.0035</b>	<b>1.0356</b>	<b>1.0237</b>	<b>1.0120</b>	<b>1.1480</b>	<b>1.0427</b>	<b>1.1036</b>

Vietnam

Bank Size	Bank	2005 - 2006			2006 - 2007			2007 - 2008			2008 - 2009		
		Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change	Malmquist Index	Technical Efficiency Change	Technology Change
Large	AGRIBV	1.0094	1.0000	1.0094	0.9890	1.0000	0.9890	1.0706	1.0000	1.0706	1.0444	0.9405	1.1105
	VIETCB	0.9414	0.9558	0.9850	0.9598	1.0462	0.9174	1.0342	1.0000	1.0342	1.2137	0.9526	1.2741
	VIETIN	1.0073	1.0401	0.9684	1.0313	1.0021	1.0292	1.0305	0.9294	1.1088	1.2871	1.0760	1.1962
<b>Average Large</b>		<b>0.9860</b>	<b>0.9986</b>	<b>0.9876</b>	<b>0.9934</b>	<b>1.0161</b>	<b>0.9785</b>	<b>1.0451</b>	<b>0.9765</b>	<b>1.0712</b>	<b>1.1817</b>	<b>0.9897</b>	<b>1.1936</b>
Medium	ACB	0.9765	0.9795	0.9970	1.4081	1.2109	1.1628	1.1040	0.9656	1.1433	1.0162	1.0222	0.9941
	DONGA	1.0206	1.0000	1.0206	1.0721	1.0000	1.0721	1.1973	1.0000	1.1973	1.2420	1.0000	1.2420
	MPV	1.0345	0.9605	1.0771	0.9905	1.0411	0.9514	1.0385	1.0000	1.0385	1.1545	1.0000	1.1545
	SACOM	1.0762	1.0126	1.0629	1.0863	1.0372	1.0473	1.1009	0.9181	1.1991	1.1653	1.0892	1.0699
	SAIGON	1.0576	1.0000	1.0576	1.0697	1.0000	1.0697	1.1354	1.0000	1.1354	1.1434	1.0000	1.1434
	THCOMV	1.1044	1.0000	1.1044	0.9489	0.9878	0.9606	1.2154	1.0124	1.2005	1.0296	1.0000	1.0296
	VEXIMB	1.1798	1.1387	1.0361	1.0102	1.0000	1.0102	1.0812	0.9811	1.1021	1.2686	1.0193	1.2447
	VIBB	0.9925	1.0397	0.9546	0.9792	1.0547	0.9284	1.0267	0.9343	1.0988	0.9872	0.9342	1.0568
<b>Average Medium</b>		<b>1.0553</b>	<b>1.0164</b>	<b>1.0388</b>	<b>1.0706</b>	<b>1.0415</b>	<b>1.0253</b>	<b>1.1124</b>	<b>0.9764</b>	<b>1.1394</b>	<b>1.1259</b>	<b>1.0081</b>	<b>1.1169</b>
Small	ABBKV	1.1710	1.0000	1.1710	0.8688	0.8942	0.9716	1.3980	1.1183	1.2501	1.1070	0.9428	1.1742
	HABU	1.0200	1.0613	0.9611	1.0682	1.0000	1.0682	1.0923	1.0000	1.0923	0.9610	1.0000	0.9610
	MHB	1.0126	1.0210	0.9918	1.1336	1.1438	0.9911	1.0264	0.8875	1.1565	0.9681	1.1114	0.8711
	NAMAV	0.8963	0.9090	0.9860	1.1561	1.1001	1.0509	1.2965	1.0000	1.2965	0.9545	0.9047	1.0550
	NAVIB	1.8897	1.0000	1.8897	0.9706	0.9330	1.0403	0.9174	0.8837	1.0381	0.9632	1.0041	0.9593
	OCB	1.0068	1.0066	1.0002	0.9967	1.0000	0.9967	1.2247	1.0000	1.2247	1.1958	1.0000	1.1958
	OCV	1.2087	1.0000	1.2087	0.9650	1.0000	0.9650	1.1879	1.0000	1.1879	1.0269	1.0000	1.0269
	VIDPB	0.9617	0.9486	1.0138	0.9943	1.0542	0.9432	1.1797	1.0000	1.1797	1.3180	1.0000	1.3180
	VPB	0.9373	0.9565	0.9799	1.1244	1.1570	0.9718	1.2200	1.0000	1.2200	0.9979	0.8965	1.1131
<b>Average Small</b>		<b>1.1227</b>	<b>0.9892</b>	<b>1.1336</b>	<b>1.0309</b>	<b>1.0314</b>	<b>0.9999</b>	<b>1.1714</b>	<b>0.9877</b>	<b>1.1829</b>	<b>1.0547</b>	<b>0.9844</b>	<b>1.0749</b>
<b>Industry Average</b>		<b>1.0752</b>	<b>1.0015</b>	<b>1.0738</b>	<b>1.0411</b>	<b>1.0331</b>	<b>1.0068</b>	<b>1.1289</b>	<b>0.9815</b>	<b>1.1487</b>	<b>1.1022</b>	<b>0.9947</b>	<b>1.1095</b>

The productivity change based on Malmquist Index for large banks in Malaysia, Thailand and Vietnam has been consistently increasing except for Philippines where for based on the observation period has had a significant decrease from 1.1464 to 0.9991 however for the period of 2008 - 2009, there is a significant increase. As for the medium size bank, the index shows a mix trend whereby the banks in this size. The small size banks on average have a higher Malmquist Index as compared to banks categorized as large and medium size. The period of 2006 to 2007 shows a decrease in the index for banks categorized in this size. Further observation by comparing the large and medium size banks versus the small banks for the period of 2005 to 2009, banks in the small size category in the 4 countries have deteriorated.

In terms of Technical Efficiency Change, there is mix trend in the result for all bank size in all the countries. However, it is notable that from the period of 2005 to 2009, banks in medium size on an average have the highest distance as compared to the large and small size banks.

The observation done on Technology Change, the large and medium size banks on an average have improved based on the observation period where the large banks have the highest improvement. The small size bank in term of technology change has decrease by 9.20 percent based on the observation period.



Table 4.4  
Data Envelopment Analysis based on Malmquist Productivity Index  
- Country Comparison

Country	Malmquist Index	Technical Efficiency Change	Technology Change
Malaysia	1.0888	1.0114	1.0759
Philippines	1.0653	1.0276	1.0395
Thailand	1.0498	1.0125	1.0373
Vietnam	1.0869	1.0027	1.0847

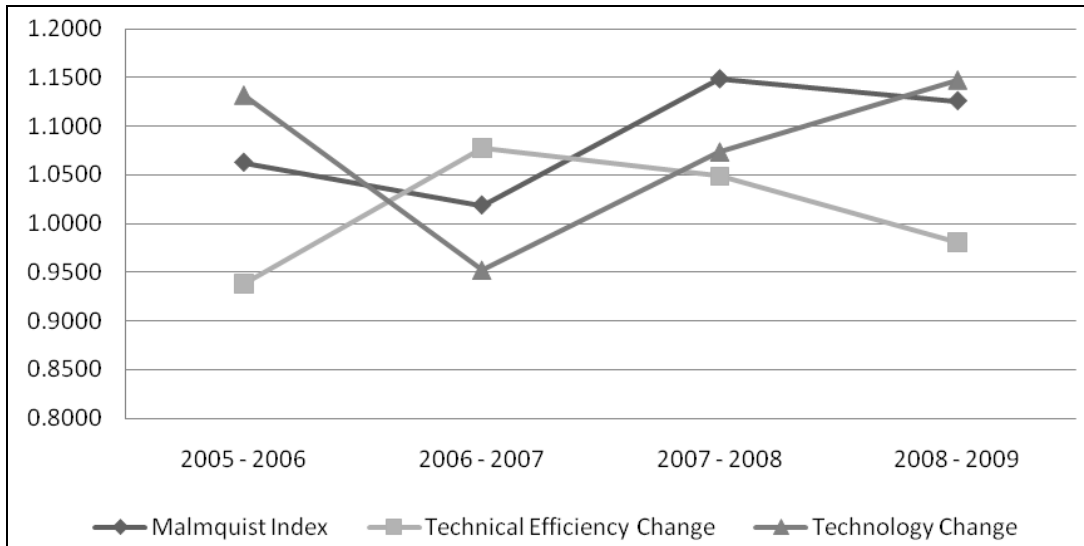
Table 4.4 above is a summary of the average Malmquist Index, Technical Efficiency Change and Technology Change which is segregated by country. The summary takes into account the whole 5 years period from 2005 to 2009 whereby within this period, the Malmquist Index shows that Malaysia banks scored the highest and followed by Vietnam, Philippines and Thailand. The Technical Efficiency Change on an average is scored highest by Philippines followed by Thailand, Malaysia and Vietnam. The Technology Change however is scored highest by Vietnam and followed by Malaysia, Philippines and Thailand.

Based on this table, it is notable that countries such as Vietnam and Malaysia have a high Technology Change score where this could suggest that the two countries are investing heavily in technology related expenditure to ensure that the banks are in pace with the technology advancement in the banking industry.

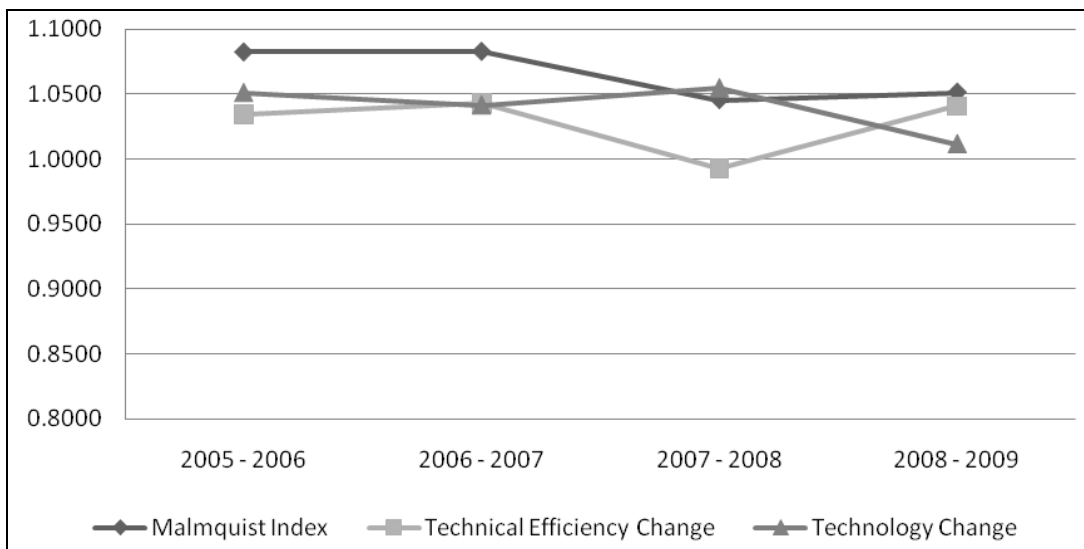
Next, further discussion on the productivity change over the analysis period is presented in Figure 4.6 which is segregated by the different countries to allow further comparison in terms of the observation of the changes in each of the measurement alongside with the other productivity change.

Figure 4.6  
Average Malmquist Index, Technical Efficiency and Technology Productivity  
Change Segregated by Country

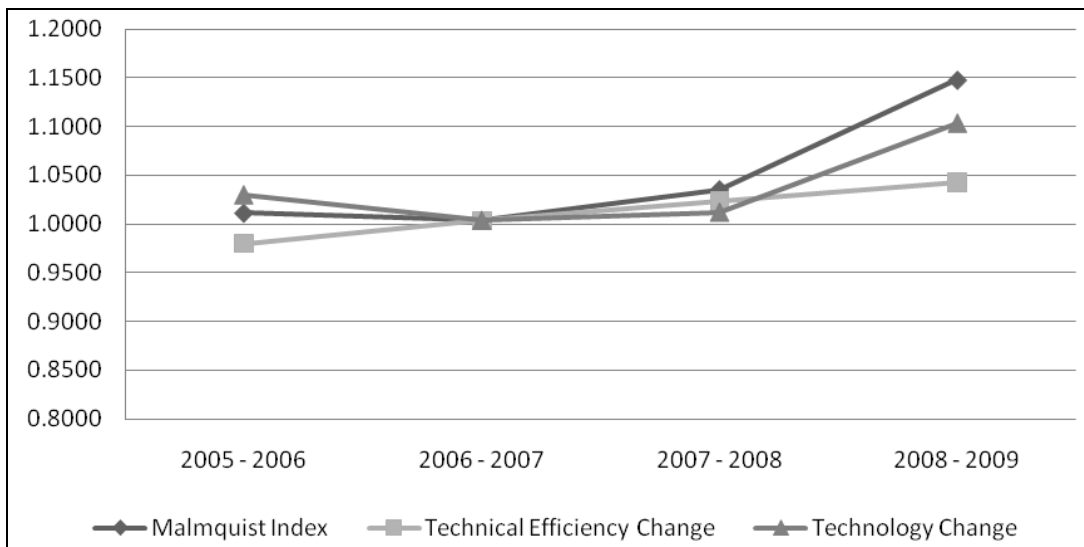
**Malaysia**



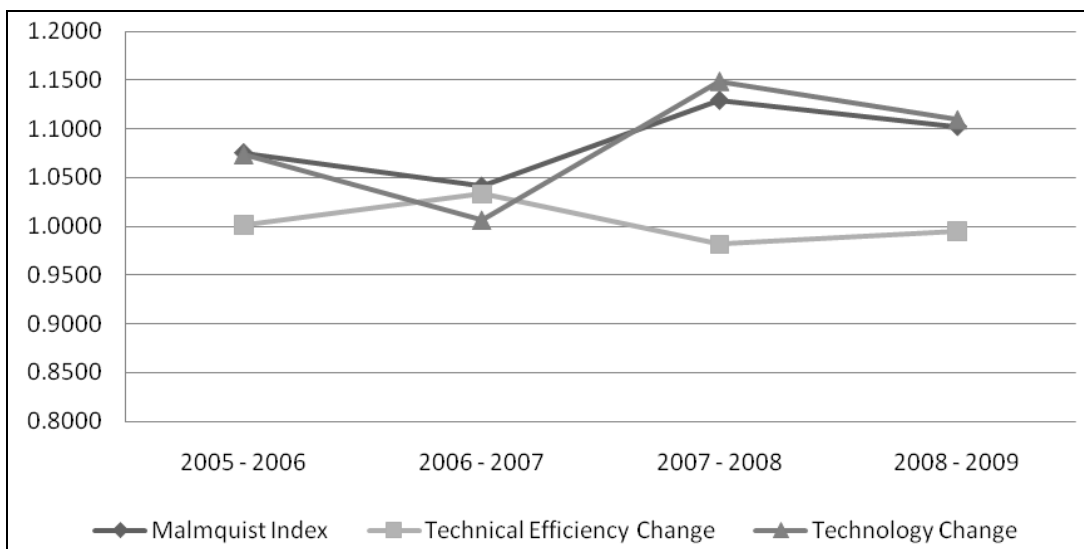
**Philippines**



## Thailand



## Vietnam



Based on the above graphs, Malaysia shows a hike in terms of Technology Change since 2006 to 2009 whereby during this period, which suggest that huge investment in technology which have contributed to the hike in the Malmquist Index however it is noted that there is a decrease in technical efficiency by roughly 4.5 percent during the period of 2006 to 2009. The Malmquist Index shows that there is a slight decrease between 2005 - 2006

and 2008 to 2009 however the decrease for both year of comparison is minimal.

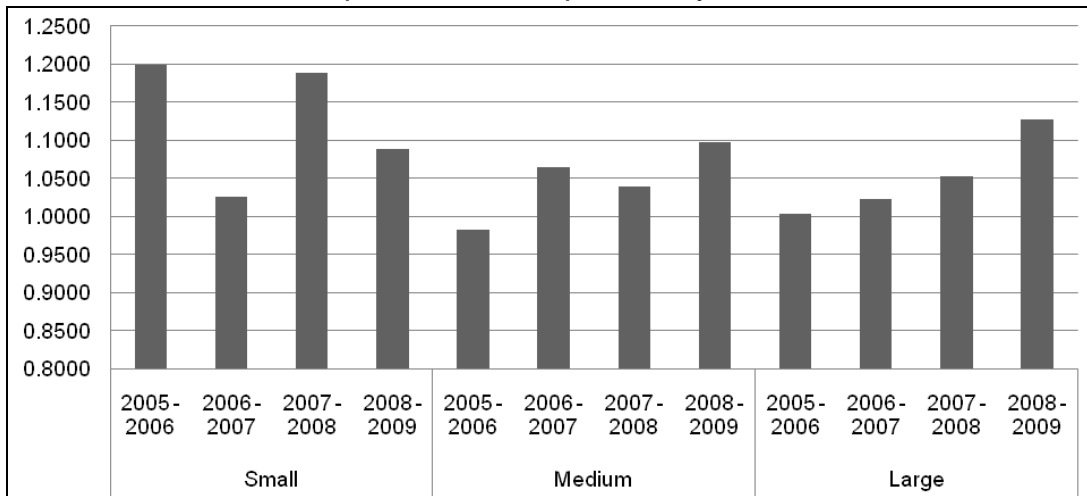
As for Philippines banks, the Malmquist Index shows a slight decrease in 2007 to 2008 compared to the previous year whereby this is due to the decrease in Technical Efficiency as compared to the hike in Technology Change. However based on 2008 - 2009 analysis, the emphasis in improving the Technical Efficiency have slightly improved the Malmquist Index score.

The graph for Thailand banks shows that there is an overall improvement in the Technical Efficiency and Technology whereby from 2006 - 2009, there is a hike in all the three scores which shows that Thailand banks have been consistently improving its banking sector holistically as compared to the different countries in this study.

Vietnam banks have shown a hike in the Technology Change based the comparison for 2006 to 2007 and 2007 to 2008 whereby the hike as opposed to Technical Efficiency change is higher which also improved on the Malmquist Index. However based on the Malmquist Index, there is a slight decrease in the following year, 2008 to 2009.

Next, the comparison of Malmquist Index as to the different bank size is being further discussed.

Figure 4.7  
Malmquist Index Comparison by Bank Size



Based on the graph in Figure 4.7, the average Malmquist Index for all banks in the scope of study is being categorized into the different bank size.

Based on the graph, on an average, the bank in the large category index have been on an increasing basis whereby in 2009, the index shows that it has exceeded the small size bank index. This could be whereby the consolidation of banks during the earlier period in the region has started to show sign of increase in the efficiency level.

The medium and small size bank however have mix readings whereby both the pattern is quite similar where in 2006 - 2007 and 2008 - 2009 indexes have decrease as compared to the previous years.

#### 4.5 Multiple Regression Analysis

The bank specific variable that is being regressed against the CRS score results will be further discussed based on Table 4.5 below

Table 4.5  
Test Statistics of Multiple Regression for Size

	Coef.	Std. Err.	t	P >  t	95% Conf. Interval	
Malaysia	-0.0485	0.0140	-3.47	0.0010	-0.0763	-0.0206
Philippines	-0.0898	0.0394	-2.27	0.0250	-0.1683	-0.0113
Thailand	0.0831	0.0332	2.50	0.0150	0.0168	0.1494
Vietnam	-0.0244	0.0253	-0.97	0.3370	-0.0749	0.0258

The regression coefficient is interpreted based on OLS regression. The 'size' score changes by coefficient for each unit increase or decrease based on the corresponding predictor. Malaysia, Philippines and Vietnam have negative coefficient which means that the size have negative relationship towards the CRS score however Thailand has positive relationship towards the CRS score.

The standard error derived based on the regression where the smaller the standard error means that the less the spread. Based on the statistic in the table above, all the four countries standard error is between 0.0140 to 0.0394.

The null hypothesis test on bank size does not matter in impacting the efficiency of the bank, whereby based on the result derived from the regression, Malaysia, ( $t = 3,47$ ;  $p < 0.05$ ); Philippines ( $t = 2.27$ ;  $p < 0.05$ ) and Thailand ( $t = 2.50$ ;  $p < 0.05$ ) rejects the null hypothesis test which also means that the bank size in the above countries does impact on the bank's efficiency.

However Vietnam ( $t = 0.97$ ;  $p > 0.05$ ) accepts the null hypothesis whereby bank size does not matter and it has no impact towards the bank's efficiency.

#### 4.6 Summary

The discussion the findings presented in this chapter have been analysed by using the two stage DEA analysis. Further analysis has been conducted to determine the enhanced efficiency scores in terms of the different banks in the group and benchmarking the banks against bank within the same group.

Finally, the Malmquist Productivity Index for the banks of different sizes is being computed to determine the efficiency change and technological change.