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**THE DETERMINANTS OF BANK EFFICIENCY  
IN MALAYSIAN BANKING INDUSTRY**



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**MASTER OF SCIENCE (FINANCE)  
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THE DETERMINANTS OF BANK EFFICIENCY  
IN MALAYSIAN BANKING INDUSTRY



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Universiti Utara Malaysia

Thesis Submitted to  
School of Economics, Finance and Banking,  
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## ABSTRACT

It is noted that the study of bank efficiency and its determinants has become a focal point in the banking literature. Unexpected situation in the economy system such as the financial crisis is found to give a negative impact to the bank efficiency performance. In addition, the presence of foreign banks in the local banking system also affects the bank efficiency. For Islamic banks, the prohibited elements such as riba, gharar and maisir are the key for the increments of Islamic banks efficiency performance as compared to conventional banks. Hence, this study is aims to examine the impact of determinants of bank efficiency components; namely financial crisis, origins of bank ownership (foreign banks versus domestic banks) and types of bank (Islamic banks versus conventional banks); on three components of bank efficiency which are technical efficiency, pure technical efficiency and scale efficiency. This study covers 404 observations of commercial banks from the year 2004 to 2015. Thus, this study only analyzes one crisis which is the 2007-2008 U.S. financial crisis. This study employ the Data Envelopment Analysis (DEA) approach to find the bank efficiency followed by Tobit regression model to test the relationship between the financial crisis, origins of bank ownership (foreign banks versus domestic banks), types of bank (Islamic banks versus conventional banks) and bank efficiency. This study discovers that financial crisis has a significant and positive impact on bank efficiency (technical efficiency and pure technical efficiency). As for the origins of bank ownership, foreign banks with better skills, expertise and technology, outperformed the domestic banks in scale efficiency. In contrast, domestic banks perform better in technical and pure technical efficiencies as compared to their foreign counterparts. Finally, the findings highlight that Islamic banks are technically and scale efficient than conventional banks. Meanwhile conventional banks performed better in pure technical efficiency than their Islamic counterparts. Therefore, these findings provide some policy implications to the policy makers and the bank management in continuously assess the performance of Malaysian banks.

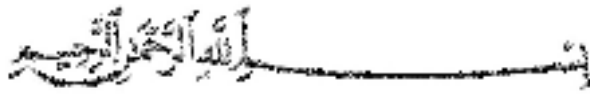
**Keywords:** Bank efficiency, data envelopment analysis, financial crisis, origins of bank ownership, types of bank.

## ABSTRAK

Didapati bahawa kajian tentang tahap kecekapan bank dan faktor-faktor penentunya menjadi tumpuan kepada kesusasteraan perbankan. Walau bagaimanapun, kejadian yang tidak diduga dalam ekonomi seperti krisis sistem kewangan akan menjejaskan prestasi kecekapan bank. Seterusnya, kehadiran bank asing dalam sistem perbankan tempatan juga akan memberi kesan terhadap tahap kecekapan prestasi bank. Bagi bank-bank Islam, unsur-unsur larangan seperti riba, gharar dan maisir adalah kunci kepada peningkatan tahap kecekapan prestasi sesebuah bank Islam berbanding dengan bank konvensional. Justeru, kajian ini bertujuan untuk mengkaji kesan faktor-faktor penentu komponen tahap kecekapan bank; iaitu krisis kewangan, asal-usul pemilikan bank (bank asing berbanding dengan bank tempatan) dan jenis bank (bank Islam berbanding dengan bank konvensional); kepada tiga komponen kecekapan bank iaitu kecekapan teknikal, kecekapan teknikal tulen dan kecekapan skala. Kajian ini merangkumi 404 pemerhatian bank komersial dari tahun 2004 hingga 2015. Oleh itu, kajian ini hanya menganalisis satu krisis iaitu krisis kewangan AS 2007-2008. Kajian ini menggunakan DEA untuk mengukur tahap kecekapan bank dan menggunakan model regresi Tobit untuk menguji hubungan di antara krisis kewangan, asal-usul pemilikan bank (bank asing berbanding dengan bank tempatan), jenis bank (bank Islam berbanding dengan bank konvensional) dan tahap kecekapan bank. Kajian ini mendapati bahawa krisis kewangan memberi kesan yang signifikan dan positif kepada tahap kecekapan bank (kecekapan teknikal dan kecekapan teknikal tulen). Bagi asal-usul pemilikan bank, bank-bank asing dengan kemahiran yang lebih baik, kepakaran dan teknologi, mengatasi bank-bank tempatan dalam kecekapan skala. Sebaliknya, bank-bank tempatan prestasi yang lebih baik dalam kecekapan teknikal dan tulen berbanding dengan negara-negara luar. Akhir sekali, hasil kajian juga mendapati bahawa bank-bank Islam secara teknikal dan skala lebih cekap berbanding dengan bank-bank konvensional. Sementara itu bank-bank konvensional yang lebih cekap dalam teknikal tulen berbanding dengan bank-bank Islam. Oleh itu, penemuan ini menyediakan beberapa implikasi dasar kepada pembuat dasar dan pengurusan bank untuk meneruskan penilaian prestasi terhadap bank-bank Malaysia.

**Kata kunci:** Tahap kecekapan bank, DEA, krisis kewangan, asal-usul pemilikan bank, jenis bank

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## LIST OF ABBREVIATIONS

BCC Model	Banker, Charnes and Cooper (1984)'s model
BIMB	Bank Islam Malaysia Berhad
BNM	Bank Negara Malaysia
BOA	Bank of America
BOC	Bank of China
BOTM	Bank of Tokyo-Mitsubishi UFJ
CCR Model	Charnes, Cooper and Rhodes (1978)'s model
CPI	Consumer Price Index
CRS	Constant Return to Scale
DEA	Data Envelopment Analysis
DMUs	Decision Making Units
FSMP	Financial Sector MasterPlan
GCC	Gulf Cooperation Council
GDP	Growth Domestic Products
HLEONG	Hong Leong Bank
HLEONG-I	Hong Leong Islamic
INCEIF	International Centre for Education in Islamic Finance
INDIAINTER	India International Bank
ICBC	Industrial and Commercial Bank of China
MYR	Malaysian Ringgit
NBAD	National Bank of Abu Dhabi
OCBC-I	OCBC Al-Amin Bank
OECD	Organization for Economic Cooperation and Development
OIC	Organisations of Islamic Conference
PWSBH	Perbadanan Wang Simpanan Bakal-Bakal Haji
ROA	Return on Assets
ROE	Return on Equity

STDCHARTERED	Standard Chartered Bank
SFA	Stochastic Frontier Analysis
VRS	Variable Return to Scale



# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Banking institution is highly regulated because of their significant roles in the economic development (Freixas & Rochet, 2006; Kawai & Prasad, 2011). The important goal of the banking regulations is to safeguard the soundness of the banking system to ensure that the public interest is protected throughout the entire period. In addition, in the stable condition, the banks are able to operate efficiently by providing the products and services at the lower cost of productions (Berger, 2007; Berger, DeYoung, Genay, & Udell, 2000). Bank efficiency is the capacity of the banks to minimize the inputs and maximize the outputs is one of the important performance measurements of a bank (Sherman & Zhu, 2006). Due to that, the bank efficiency has become an important issue for the regulators since this measurement also indicates the bank success in providing their products and services at the competitive prices. Similarly, from the academic standpoint, the study of bank efficiency and its determinants has become a focal point in the banking literature (Alzubaidi & Bougheas, 2012; Anayiotos, Toroyan & Vamvakidis, 2010; Siddiquee, 2012). Hence, the information provided by the previous studies aid the understanding of the policy makers, banks' management and depositors on the bank efficiency's determinants.

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## APPENDICES

### APPENDIX A

#### NUMBER OF COMMERCIAL BANKS IN MALAYSIA (2004-2015)

Origins of bank ownership	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Domestic banks	11	12	13	15	15	17	17	17	17	17	17	17
Foreign banks	14	14	14	15	17	18	18	18	22	23	23	23
<b>Total</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>30</b>	<b>32</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>39</b>	<b>40</b>	<b>40</b>	<b>40</b>

Types of bank	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Conventional banks	23	23	22	22	22	22	22	21	25	26	26	26
Islamic banks	2	3	5	8	10	13	13	14	14	14	14	14
<b>Total</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>30</b>	<b>32</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>39</b>	<b>40</b>	<b>40</b>	<b>40</b>

Sources: BNM Statistical Bulletin (2004-2015)

## APPENDIX B

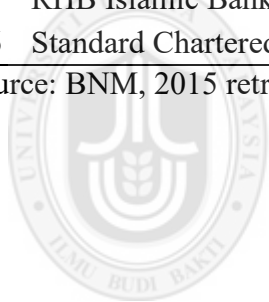
### LIST OF COMMERCIAL BANKS IN MALAYSIA (2004-2015)

No	Conventional Banks	Origins of Bank Ownership
1	Affin Bank Bhd.	Domestic bank
2	Alliance Bank Bhd.	Domestic bank
3	AmBank Bhd.	Domestic bank
4	BNP Paribas Malaysia Bhd.	Foreign bank
5	Bangkok Bank (M) Bhd.	Foreign bank
6	Bank of America (M) Bhd.	Foreign bank
7	Bank of China (M) Bhd.	Foreign bank
8	Bank of Tokyo-Mitsubishi UFJ (M) Bhd.	Foreign bank
9	CIMB Bank Bhd.	Domestic bank
10	Citibank (M) Bhd.	Foreign bank
11	Deutsche Bank (M) Bhd.	Foreign bank
12	Hong Leong Bank Bhd.	Domestic bank
13	HSBC Bank (M) Bhd.	Foreign bank
14	India International Bank (M) Bhd.	Foreign bank
15	Industrial and Commercial Bank of China (M) Bhd.	Foreign bank
16	J.P. Morgan Chase Bank (M) Bhd.	Foreign bank
17	Malayan Banking Bhd.	Domestic bank
18	Mizuho Corporate Bank (M) Bhd.	Foreign bank
19	National Bank of Abu Dhabi (M) Bhd.	Foreign bank
20	OCBC Bank (M) Bhd.	Foreign bank
21	Public Bank Bhd.	Domestic bank
22	RHB Bank Bhd.	Domestic bank
23	Standard Chartered Bank (M) Bhd.	Foreign bank
24	Sumitomo Mitsui Banking Corporation (M) Bhd.	Foreign bank
25	The Bank of Nova Scotia (M) Bhd.	Foreign bank
26	The Royal Bank of Scotland (M) Bhd.	Foreign bank
27	United Overseas Bank (M) Bhd.	Foreign bank

(Source: BNM, 2015 retrieved on 1 Mac 2016)

<b>No</b>	<b>Islamic Banks</b>	<b>Origins of Bank Ownership</b>
1	Affin Islamic Bank Bhd.	Domestic bank
2	Al-Rajhi Banking & Investment Corporation (M) Bhd.	Foreign bank
3	Alliance Islamic Bank Bhd.	Domestic bank
4	AmIslamic Bank Bhd.	Domestic bank
5	Asian Finance Bank Bhd.	Foreign bank
6	Bank Islam Malaysia Bhd.	Domestic bank
7	Bank Muamamat Malaysia Bhd.	Domestic bank
8	CIMB Islamic Bank Bhd.	Domestic bank
9	Hong Leong Islamic Bank Bhd.	Domestic bank
10	HSBC Amanah (M) Bhd.	Foreign bank
11	Kuwait Finance House (M) Bhd.	Foreign bank
12	Maybank Islamic Bhd.	Domestic bank
13	OCBC Al-Amin Bank Bhd.	Foreign bank
14	Public Islamic Bank Bhd.	Domestic bank
15	RHB Islamic Bank Bhd.	Domestic bank
16	Standard Chartered Saadiq Bhd.	Foreign bank

(Source: BNM, 2015 retrieved on 1 Mac 2016)



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## APPENDIX C

### EFFICIENCY SCORES FROM YEAR 2004 TO 2015

Year	Banks	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Origins of Bank Ownership
<b><i>Conventional Banks:</i></b>					
2004	ABNAMRO	0.4158	0.4524	0.9190	F
2005	ABNAMRO	0.3962	0.4119	0.9619	F
2006	ABNAMRO	0.2343	0.2967	0.7895	F
2007	ABNAMRO	0.1198	0.1245	0.9623	F
2004	AFFIN	0.4197	0.6820	0.6153	D
2005	AFFIN	0.4676	0.7956	0.5877	D
2006	AFFIN	0.3784	0.6125	0.6178	D
2007	AFFIN	0.3539	0.5836	0.6064	D
2008	AFFIN	0.3958	0.6253	0.6329	D
2009	AFFIN	0.4571	0.6786	0.6736	D
2010	AFFIN	0.4413	0.6478	0.6812	D
2011	AFFIN	0.4821	0.6913	0.6974	D
2012	AFFIN	0.5127	0.7819	0.6558	D
2013	AFFIN	0.5134	0.7575	0.6778	D
2014	AFFIN	0.5642	0.8254	0.6836	D
2015	AFFIN	0.5832	0.8952	0.6515	D
2004	ALLIANCE	0.4755	0.7820	0.6080	D
2005	ALLIANCE	0.4852	0.8099	0.5991	D
2006	ALLIANCE	0.4209	0.7080	0.5946	D
2007	ALLIANCE	0.3683	0.6224	0.5917	D
2008	ALLIANCE	0.3677	0.6019	0.6109	D
2009	ALLIANCE	0.3645	0.6009	0.6067	D
2010	ALLIANCE	0.4150	0.6993	0.5934	D
2011	ALLIANCE	0.4921	0.8340	0.5901	D
2012	ALLIANCE	0.4797	0.8200	0.5849	D
2013	ALLIANCE	0.4922	0.8712	0.5649	D
2014	ALLIANCE	0.5023	0.8283	0.6064	D
2015	ALLIANCE	0.5291	0.8477	0.6242	D
2004	AMBANK	0.4444	0.5935	0.7488	D
2005	AMBANK	0.5982	0.8940	0.6690	D
2006	AMBANK	0.5399	0.8295	0.6509	D
2007	AMBANK	0.4675	0.7303	0.6402	D
2008	AMBANK	0.4648	0.7972	0.5830	D
2009	AMBANK	0.4353	0.7180	0.6063	D
2010	AMBANK	0.4642	0.8627	0.5381	D

continued...



Year	Banks	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Origins of Bank Ownership
2011	AMBANK	0.4679	0.8644	0.5413	D
2012	AMBANK	0.5069	0.9586	0.5289	D
2013	AMBANK	0.4918	0.9826	0.5005	D
2014	AMBANK	0.4915	0.9951	0.4940	D
2015	AMBANK	0.4858	0.9805	0.4955	D
2004	BANGKOK	0.5432	0.6667	0.8148	F
2005	BANGKOK	0.5004	0.6453	0.7754	F
2006	BANGKOK	0.6535	0.8072	0.8095	F
2007	BANGKOK	0.3604	0.4471	0.8061	F
2008	BANGKOK	0.5421	0.6178	0.8774	F
2009	BANGKOK	0.5020	0.5664	0.8862	F
2010	BANGKOK	0.4504	0.4972	0.9057	F
2011	BANGKOK	0.4540	0.4998	0.9084	F
2012	BANGKOK	0.5321	0.5461	0.9743	F
2013	BANGKOK	0.5400	0.5478	0.9859	F
2014	BANGKOK	0.5369	0.5460	0.9833	F
2015	BANGKOK	0.6148	0.6223	0.9879	F
2004	BOA*	0.1338	0.6899	0.1940	F
2005	BOA	0.1409	0.8525	0.1652	F
2006	BOA	0.1170	1.0000	0.1170	F
2007	BOA	0.1201	0.5619	0.2137	F
2008	BOA	0.1031	0.6394	0.1612	F
2009	BOA	0.1226	0.8170	0.1501	F
2010	BOA	0.1373	0.4076	0.3369	F
2011	BOA	0.0681	0.2929	0.2326	F
2012	BOA	0.2701	0.3893	0.6938	F
2013	BOA	0.1406	0.2315	0.6073	F
2014	BOA	0.1425	0.2544	0.5603	F
2015	BOA	0.0916	0.3153	0.2906	F
2004	BOC*	0.2123	0.7698	0.2758	F
2005	BOC	0.2065	0.9742	0.2120	F
2006	BOC	0.2185	1.0000	0.2185	F
2007	BOC	0.2049	0.7260	0.2823	F
2008	BOC	0.3766	0.6762	0.5569	F
2009	BOC	0.2624	0.4188	0.6267	F
2010	BOC	0.2591	0.3727	0.6953	F
2011	BOC	0.3128	0.3923	0.7973	F
2012	BOC	0.2833	0.3316	0.8543	F

continued...

Year	Banks	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Origins of Bank Ownership
2013	BOC	0.2135	0.2307	0.9253	F
2014	BOC	0.3661	0.3716	0.9853	F
2015	BOC	0.3798	0.3988	0.9523	F
2004	BOTM*	0.3575	0.3725	0.9597	F
2005	BOTM	0.3628	0.3793	0.9564	F
2006	BOTM	0.3371	0.3519	0.9582	F
2007	BOTM	0.3396	0.3530	0.9622	F
2008	BOTM	0.3561	0.3667	0.9710	F
2009	BOTM	0.3087	0.3159	0.9772	F
2010	BOTM	0.3649	0.3663	0.9962	F
2011	BOTM	0.3376	0.3449	0.9789	F
2012	BOTM	0.2982	0.3057	0.9754	F
2013	BOTM	0.3278	0.3516	0.9324	F
2014	BOTM	0.4827	0.6040	0.7991	F
2015	BOTM	0.8588	1.0000	0.8588	F
2004	CIMB	0.4380	0.7158	0.6120	D
2005	CIMB	0.4638	0.8125	0.5708	D
2006	CIMB	0.4213	0.8068	0.5222	D
2007	CIMB	0.3416	0.6618	0.5162	D
2008	CIMB	0.4196	0.7818	0.5367	D
2009	CIMB	0.3714	0.7434	0.4995	D
2010	CIMB	0.3860	0.7918	0.4875	D
2011	CIMB	0.3772	0.7495	0.5033	D
2012	CIMB	0.4001	0.9304	0.4300	D
2013	CIMB	0.4264	0.9040	0.4717	D
2014	CIMB	0.4475	1.0000	0.4475	D
2015	CIMB	0.4768	1.0000	0.4768	D
2004	CITI	0.4341	0.6847	0.6340	F
2005	CITI	0.3667	0.5802	0.6321	F
2006	CITI	0.3886	0.6867	0.5659	F
2007	CITI	0.2739	0.4141	0.6614	F
2008	CITI	0.3161	0.5166	0.6119	F
2009	CITI	0.3441	0.5377	0.6401	F
2010	CITI	0.3007	0.5040	0.5967	F
2011	CITI	0.2958	0.4729	0.6255	F
2012	CITI	0.3005	0.5134	0.5852	F
2013	CITI	0.2959	0.5077	0.5829	F
2014	CITI	0.3543	0.6473	0.5474	F

continued...

Year	Banks	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Origins of Bank Ownership
2015	CITI	0.3407	0.6063	0.5619	F
2004	DEUTSCHE	0.2856	0.3079	0.9277	F
2005	DEUTSCHE	0.1469	0.2318	0.6339	F
2006	DEUTSCHE	0.1362	0.1727	0.7889	F
2007	DEUTSCHE	0.2968	0.2990	0.9926	F
2008	DEUTSCHE	0.1429	0.2129	0.6712	F
2009	DEUTSCHE	0.1535	0.2295	0.6688	F
2010	DEUTSCHE	0.1139	0.2166	0.5261	F
2011	DEUTSCHE	0.0975	0.2223	0.4386	F
2012	DEUTSCHE	0.2442	0.2952	0.8273	F
2013	DEUTSCHE	0.3121	0.3600	0.8667	F
2014	DEUTSCHE	0.1298	0.2744	0.4732	F
2015	DEUTSCHE	0.1120	0.2071	0.5406	F
2004	EON	0.5488	0.8127	0.6752	D
2005	EON	0.5006	0.8513	0.5881	D
2006	EON	0.4977	0.8205	0.6066	D
2007	EON	0.4266	0.7304	0.5840	D
2008	EON	0.3871	0.6797	0.5696	D
2009	EON	0.3976	0.7217	0.5509	D
2010	EON	0.3854	0.6737	0.5721	D
2004	HLEONG*	0.3589	0.5112	0.7021	D
2005	HLEONG	0.3833	0.5535	0.6925	D
2006	HLEONG	0.4353	0.6373	0.6831	D
2007	HLEONG	0.3474	0.4777	0.7274	D
2008	HLEONG	0.3475	0.5124	0.6782	D
2009	HLEONG	0.3891	0.7334	0.5305	D
2010	HLEONG	0.4191	0.8698	0.4818	D
2011	HLEONG	0.3965	0.6164	0.6431	D
2012	HLEONG	0.4476	0.8386	0.5337	D
2013	HLEONG	0.4977	0.8349	0.5961	D
2014	HLEONG	0.5512	0.9900	0.5568	D
2015	HLEONG	0.5779	1.0000	0.5779	D
2004	HSBC	0.3716	0.6373	0.5830	F
2005	HSBC	0.3446	0.6020	0.5724	F
2006	HSBC	0.3616	0.6572	0.5502	F
2007	HSBC	0.3077	0.5464	0.5631	F
2008	HSBC	0.3410	0.6111	0.5579	F
2009	HSBC	0.2796	0.4941	0.5659	F

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Year	Banks	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Origins of Bank Ownership
2010	HSBC	0.3140	0.5428	0.5785	F
2011	HSBC	0.2926	0.4541	0.6443	F
2012	HSBC	0.3441	0.5919	0.5813	F
2013	HSBC	0.3299	0.5623	0.5867	F
2014	HSBC	0.3881	0.7314	0.5307	F
2015	HSBC	0.3167	0.5688	0.5569	F
2013	INDIAINTER*	0.0715	1.0000	0.0715	F
2014	INDIAINTER	0.1090	1.0000	0.1090	F
2015	INDIAINTER	0.1093	1.0000	0.1093	F
2012	ICBC*	0.0682	0.2962	0.2303	F
2013	ICBC	0.2129	0.2571	0.8279	F
2014	ICBC	0.2750	0.3115	0.8829	F
2015	ICBC	0.3181	0.3375	0.9423	F
2004	JPMORGAN	0.0835	0.3982	0.2097	F
2005	JPMORGAN	0.1672	0.4396	0.3803	F
2006	JPMORGAN	0.4496	0.6127	0.7339	F
2007	JPMORGAN	0.4602	0.5219	0.8818	F
2008	JPMORGAN	0.0729	0.3764	0.1936	F
2009	JPMORGAN	0.0591	0.3748	0.1576	F
2010	JPMORGAN	0.1999	0.3804	0.5255	F
2011	JPMORGAN	0.2606	0.3591	0.7257	F
2012	JPMORGAN	0.1754	0.3162	0.5548	F
2013	JPMORGAN	0.0854	0.1389	0.6150	F
2014	JPMORGAN	0.0948	0.1499	0.6321	F
2015	JPMORGAN	0.0335	0.1090	0.3070	F
2004	MAYBANK	0.4676	0.8270	0.5654	D
2005	MAYBANK	0.4814	0.8541	0.5636	D
2006	MAYBANK	0.4663	0.8352	0.5583	D
2007	MAYBANK	0.4310	0.7432	0.5800	D
2008	MAYBANK	0.4701	0.7971	0.5898	D
2009	MAYBANK	0.4494	0.9350	0.4807	D
2010	MAYBANK	0.4499	0.9261	0.4858	D
2011	MAYBANK	0.4472	0.9069	0.4931	D
2012	MAYBANK	0.4555	0.9155	0.4975	D
2013	MAYBANK	0.4602	0.9536	0.4826	D
2014	MAYBANK	0.4872	1.0000	0.4872	D
2015	MAYBANK	0.4639	1.0000	0.4639	D
2012	MIZUHO	0.1188	0.4546	0.2614	F

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Year	Banks	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Origins of Bank Ownership
2013	MIZUHO	0.1277	0.2889	0.4422	F
2014	MIZUHO	0.1326	0.2807	0.4724	F
2015	MIZUHO	0.1956	0.2918	0.6705	F
2012	NBAD*	1.0000	1.0000	1.0000	F
2013	NBAD	0.2387	0.6208	0.3844	F
2014	NBAD	0.2062	0.4821	0.4276	F
2015	NBAD	0.3921	0.6869	0.5708	F
2004	OCBC	0.6228	0.9879	0.6304	F
2005	OCBC	0.6426	0.9587	0.6703	F
2006	OCBC	0.5750	0.8419	0.6830	F
2007	OCBC	0.5091	0.7544	0.6749	F
2008	OCBC	0.5001	0.7832	0.6386	F
2009	OCBC	0.4525	0.6398	0.7072	F
2010	OCBC	0.4565	0.6485	0.7040	F
2011	OCBC	0.4997	0.7443	0.6714	F
2012	OCBC	0.4620	0.6818	0.6776	F
2013	OCBC	0.5119	0.7594	0.6741	F
2014	OCBC	0.5330	0.7906	0.6742	F
2015	OCBC	0.5786	0.8949	0.6466	F
2004	PUBLICBANK	0.4509	0.6783	0.6647	D
2005	PUBLICBANK	0.4538	0.6993	0.6490	D
2006	PUBLICBANK	0.4582	0.6932	0.6610	D
2007	PUBLICBANK	0.4340	0.7034	0.6170	D
2008	PUBLICBANK	0.4642	0.7021	0.6611	D
2009	PUBLICBANK	0.4629	0.7119	0.6502	D
2010	PUBLICBANK	0.5014	0.7829	0.6405	D
2011	PUBLICBANK	0.5642	0.9110	0.6194	D
2012	PUBLICBANK	0.5789	0.9256	0.6254	D
2013	PUBLICBANK	0.5793	0.9248	0.6264	D
2014	PUBLICBANK	0.6264	1.0000	0.6264	D
2015	PUBLICBANK	0.6202	1.0000	0.6202	D
2004	RHB	0.3784	0.7600	0.4978	D
2005	RHB	0.4454	0.8279	0.5379	D
2006	RHB	0.4983	1.0000	0.4983	D
2007	RHB	0.3920	0.6868	0.5707	D
2008	RHB	0.4242	0.7839	0.5411	D
2009	RHB	0.4564	0.7828	0.5831	D
2010	RHB	0.4973	0.8676	0.5732	D

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Year	Banks	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Origins of Bank Ownership
2011	RHB	0.4586	0.8448	0.5428	D
2012	RHB	0.4545	0.7985	0.5692	D
2013	RHB	0.5068	0.9923	0.5107	D
2014	RHB	0.4773	0.9089	0.5251	D
2015	RHB	0.4787	0.9852	0.4858	D
2004	SOUTHERN	0.5251	0.9053	0.5800	F
2005	SOUTHERN	0.4778	0.8259	0.5784	F
2004	STDCHARTERED*	0.4594	0.6605	0.6955	F
2005	STDCHARTERED	0.4748	0.6888	0.6893	F
2006	STDCHARTERED	0.4054	0.6123	0.6621	F
2007	STDCHARTERED	0.3015	0.4374	0.6893	F
2008	STDCHARTERED	0.4230	0.8163	0.5181	F
2009	STDCHARTERED	0.3992	0.6179	0.6460	F
2010	STDCHARTERED	0.4896	0.8303	0.5897	F
2011	STDCHARTERED	0.4652	0.8040	0.5786	F
2012	STDCHARTERED	0.4591	0.8055	0.5699	F
2013	STDCHARTERED	0.4175	0.7346	0.5684	F
2014	STDCHARTERED	0.3838	0.7144	0.5372	F
2015	STDCHARTERED	0.3540	0.6160	0.5747	F
2012	SUMITUMOMITSUI	0.1419	0.3278	0.4327	F
2013	SUMITUMOMITSUI	0.2852	0.3815	0.7477	F
2014	SUMITUMOMITSUI	0.2788	0.3614	0.7714	F
2015	SUMITUMOMITSUI	0.2639	0.2830	0.9324	F
2004	NOVASCOTIA	0.6114	0.7018	0.8711	F
2005	NOVASCOTIA	0.5878	0.6825	0.8613	F
2006	NOVASCOTIA	0.6275	0.7913	0.7930	F
2007	NOVASCOTIA	0.5037	0.5431	0.9275	F
2008	NOVASCOTIA	0.7756	0.7843	0.9889	F
2009	NOVASCOTIA	0.8145	0.8199	0.9934	F
2010	NOVASCOTIA	0.8995	0.9164	0.9815	F
2011	NOVASCOTIA	0.9512	0.9650	0.9858	F
2012	NOVASCOTIA	1.0000	1.0000	1.0000	F
2013	NOVASCOTIA	0.8989	1.0000	0.8989	F
2014	NOVASCOTIA	0.6663	0.6966	0.9566	F
2015	NOVASCOTIA	1.0000	1.0000	1.0000	F
2008	ROYALBANK	0.2614	0.2779	0.9404	F
2009	ROYALBANK	0.1388	0.1497	0.9273	F
2010	ROYALBANK	0.1809	0.2018	0.8966	F

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Year	Banks	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Origins of Bank Ownership
2011	ROYALBANK	0.2717	0.3044	0.8924	F
2012	ROYALBANK	0.2043	0.2788	0.7328	F
2013	ROYALBANK	0.2067	0.3070	0.6734	F
2014	ROYALBANK	0.1973	0.2962	0.6662	F
2015	ROYALBANK	0.1151	0.2994	0.3845	F
2004	UNITEDOVERSEA	0.5648	0.8015	0.7046	F
2005	UNITEDOVERSEA	0.5602	0.8177	0.6851	F
2006	UNITEDOVERSEA	0.5476	0.8912	0.6144	F
2007	UNITEDOVERSEA	0.5358	0.8919	0.6008	F
2008	UNITEDOVERSEA	0.4639	0.6765	0.6858	F
2009	UNITEDOVERSEA	0.4879	0.7486	0.6518	F
2010	UNITEDOVERSEA	0.4757	0.7289	0.6526	F
2011	UNITEDOVERSEA	0.4874	0.7407	0.6581	F
2012	UNITEDOVERSEA	0.5675	0.8870	0.6398	F
2013	UNITEDOVERSEA	0.4923	0.7616	0.6465	F
2014	UNITEDOVERSEA	0.5066	0.8432	0.6007	F
2015	UNITEDOVERSEA	0.5187	0.8811	0.5887	F
<b><i>Islamic Banks:</i></b>					
2007	AFFIN-I	0.3536	1.0000	0.3536	D
2008	AFFIN-I	0.3137	0.3543	0.8853	D
2009	AFFIN-I	0.3422	0.3492	0.9802	D
2010	AFFIN-I	0.3611	0.3701	0.9758	D
2011	AFFIN-I	0.3017	0.3117	0.9681	D
2012	AFFIN-I	0.3421	0.3455	0.9902	D
2013	AFFIN-I	0.3691	0.3773	0.9782	D
2014	AFFIN-I	0.4450	0.4887	0.9105	D
2015	AFFIN-I	0.6291	0.7079	0.8887	D
2008	ALRAJHI-I	0.2948	0.2949	0.9999	F
2009	ALRAJHI-I	0.3470	0.4031	0.8608	F
2010	ALRAJHI-I	0.3746	0.4362	0.8588	F
2011	ALRAJHI-I	0.3504	0.3995	0.8773	F
2012	ALRAJHI-I	0.3381	0.3992	0.8469	F
2013	ALRAJHI-I	0.4518	0.5705	0.7920	F
2014	ALRAJHI-I	0.4646	0.5735	0.8101	F
2015	ALRAJHI-I	0.4994	0.6322	0.7899	F
2009	ALLIANCE-I	1.0000	1.0000	1.0000	D
2010	ALLIANCE-I	0.7048	0.7730	0.9117	D

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<b>Year</b>	<b>Banks</b>	<b>Technical Efficiency Score</b>	<b>Pure Technical Efficiency Score</b>	<b>Scale Efficiency Score</b>	<b>Origins of Bank Ownership</b>
2011	ALLIANCE-I	0.8536	0.8858	0.9637	D
2012	ALLIANCE-I	0.9192	0.9533	0.9643	D
2013	ALLIANCE-I	0.9821	1.0000	0.9821	D
2014	ALLIANCE-I	1.0000	1.0000	1.0000	D
2015	ALLIANCE-I	0.9265	0.9451	0.9803	D
2007	AMBANK-I	0.8594	0.8853	0.9707	D
2008	AMBANK-I	1.0000	1.0000	1.0000	D
2009	AMBANK-I	0.8288	0.9145	0.9063	D
2010	AMBANK-I	0.8101	1.0000	0.8101	D
2011	AMBANK-I	0.7770	0.7770	1.0000	D
2012	AMBANK-I	0.9570	0.9652	0.9915	D
2013	AMBANK-I	0.9624	0.9666	0.9956	D
2014	AMBANK-I	1.0000	1.0000	1.0000	D
2015	AMBANK-I	1.0000	1.0000	1.0000	D
2007	ASIANFINANCE-I	0.0421	0.3303	0.1274	F
2008	ASIANFINANCE-I	0.0666	0.2672	0.2492	F
2009	ASIANFINANCE-I	0.1621	0.2740	0.5914	F
2010	ASIANFINANCE-I	0.1736	0.3042	0.5706	F
2011	ASIANFINANCE-I	0.2472	0.3421	0.7225	F
2012	ASIANFINANCE-I	0.3418	0.4116	0.8305	F
2013	ASIANFINANCE-I	0.4762	0.5806	0.8202	F
2014	ASIANFINANCE-I	0.6028	0.8079	0.7461	F
2015	ASIANFINANCE-I	0.4931	0.8789	0.5610	F
2004	BANKISLAM-I	0.4664	0.6159	0.7572	D
2005	BANKISLAM-I	0.3941	0.5472	0.7201	D
2006	BANKISLAM-I	0.3188	0.4711	0.6766	D
2007	BANKISLAM-I	0.2843	0.3819	0.7445	D
2008	BANKISLAM-I	0.2374	0.3001	0.7910	D
2009	BANKISLAM-I	0.3176	0.6554	0.4846	D
2010	BANKISLAM-I	0.3887	1.0000	0.3887	D
2011	BANKISLAM-I	0.3834	0.8593	0.4461	D
2012	BANKISLAM-I	0.4479	0.9844	0.4550	D
2013	BANKISLAM-I	0.4181	0.8467	0.4937	D
2014	BANKISLAM-I	0.4443	0.8212	0.5410	D
2015	BANKISLAM-I	0.4685	0.8485	0.5521	D
2004	BANKMUAMALAT-I	0.3041	0.3225	0.9431	D
2005	BANKMUAMALAT-I	0.2857	0.3030	0.9429	D
2006	BANKMUAMALAT-I	0.3159	0.3312	0.9540	D

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Year	Banks	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Origins of Bank Ownership
2007	BANKMUAMALAT-I	0.3378	0.3647	0.9263	D
2008	BANKMUAMALAT-I	0.3168	0.3483	0.9094	D
2009	BANKMUAMALAT-I	0.3616	0.4093	0.8834	D
2010	BANKMUAMALAT-I	0.2858	0.3371	0.8478	D
2011	BANKMUAMALAT-I	0.2926	0.3411	0.8579	D
2012	BANKMUAMALAT-I	0.3688	0.4800	0.7684	D
2013	BANKMUAMALAT-I	0.3835	0.5590	0.6861	D
2014	BANKMUAMALAT-I	0.4556	0.7248	0.6285	D
2015	BANKMUAMALAT-I	0.4537	0.7357	0.6167	D
2009	CIMB-I	0.6144	0.6904	0.8900	D
2010	CIMB-I	0.6542	0.6937	0.9431	D
2011	CIMB-I	0.6777	0.7824	0.8661	D
2012	CIMB-I	0.7005	1.0000	0.7005	D
2013	CIMB-I	0.7409	1.0000	0.7409	D
2014	CIMB-I	0.8082	0.9518	0.8491	D
2015	CIMB-I	0.8522	1.0000	0.8522	D
2006	HLEONG-I*	0.6903	0.7428	0.9293	D
2007	HLEONG-I	0.6766	0.7473	0.9053	D
2008	HLEONG-I	0.6778	0.7720	0.8779	D
2009	HLEONG-I	0.8555	0.8722	0.9808	D
2010	HLEONG-I	1.0000	1.0000	1.0000	D
2011	HLEONG-I	0.7106	0.7114	0.9988	D
2012	HLEONG-I	0.9172	0.9224	0.9944	D
2013	HLEONG-I	0.9335	0.9340	0.9995	D
2014	HLEONG-I	0.9639	0.9640	0.9999	D
2015	HLEONG-I	0.8926	0.9133	0.9773	D
2009	HSBC-I	0.6164	0.6279	0.9818	F
2010	HSBC-I	0.5761	0.5804	0.9925	F
2011	HSBC-I	0.6876	0.7175	0.9583	F
2012	HSBC-I	0.6684	0.7135	0.9367	F
2013	HSBC-I	0.5898	0.6167	0.9563	F
2014	HSBC-I	0.8151	0.8679	0.9392	F
2015	HSBC-I	0.6401	0.6906	0.9269	F
2006	KUWAITFINANCE-I	0.2170	0.2333	0.9301	F
2007	KUWAITFINANCE-I	0.3021	0.3429	0.8809	F
2008	KUWAITFINANCE-I	0.3772	0.5285	0.7136	F
2009	KUWAITFINANCE-I	0.4138	0.5229	0.7913	F
2010	KUWAITFINANCE-I	0.3570	0.4628	0.7714	F

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Year	Banks	Technical Efficiency Score	Pure Technical Efficiency Score	Scale Efficiency Score	Origins of Bank Ownership
2011	KUWAITFINANCE-I	0.3264	0.4147	0.7871	F
2012	KUWAITFINANCE-I	0.3891	0.5201	0.7482	F
2013	KUWAITFINANCE-I	0.4123	0.5738	0.7186	F
2014	KUWAITFINANCE-I	0.4226	0.5753	0.7346	F
2015	KUWAITFINANCE-I	0.4524	0.5744	0.7876	F
2008	OCBC-I*	1.0000	1.0000	1.0000	F
2009	OCBC-I	0.4798	0.5139	0.9336	F
2010	OCBC-I	0.5310	0.5401	0.9830	F
2011	OCBC-I	0.5369	0.5396	0.9950	F
2012	OCBC-I	0.6700	0.6751	0.9923	F
2013	OCBC-I	0.6836	0.7002	0.9763	F
2014	OCBC-I	0.7274	0.7550	0.9634	F
2015	OCBC-I	0.7702	0.7962	0.9674	F
2011	PUBLICBANK-I	0.7092	0.7282	0.9738	D
2012	PUBLICBANK-I	0.8069	0.8237	0.9795	D
2013	PUBLICBANK-I	0.7667	0.7766	0.9872	D
2014	PUBLICBANK-I	1.0000	1.0000	1.0000	D
2015	PUBLICBANK-I	1.0000	1.0000	1.0000	D
2005	RHB-I	0.5268	0.5393	0.9768	D
2006	RHB-I	0.4806	0.4812	0.9988	D
2007	RHB-I	0.4767	0.4813	0.9906	D
2008	RHB-I	0.5364	0.5653	0.9489	D
2009	RHB-I	0.4537	0.4843	0.9368	D
2010	RHB-I	0.6226	0.7031	0.8856	D
2011	RHB-I	0.5183	0.5572	0.9301	D
2012	RHB-I	0.6460	0.7501	0.8611	D
2013	RHB-I	0.6819	0.8093	0.8426	D
2014	RHB-I	0.7834	0.8701	0.9004	D
2015	RHB-I	0.9052	1.0000	0.9052	D

\*Note: BOA = Bank of America, BOC = Bank of China, BOTM = Bank of Tokyo-Mitsubishi UFJ, HLEONG = Hong Leong Banks, INDIAINTER = India International Bank, ICBC = Industrial and Commercial Bank of China, NBAD = National Bank of Abu Dhabi, STDCHARTERED = Standard Chartered Bank, HLEONG-I = Hong Leong Islamic Bank, OCBC-I = OCBC Al-Amin Bank.