Capital Structure, Shareholder Independence, and Performance of ASEAN Banks

Arnat Leemakdej *

Thammasat Business School, Thammasat University, Thailand

Abstract

This paper investigates the efficiencies of leading commercial banks in five ASEAN countries, namely, Indonesia, Malaysia, Philippines, Singapore, and Thailand. The efficiency is measured in terms of technical efficiency by the DEA framework. The regression results show that Singaporean commercial banks lead the peers. Surprisingly, size of the banks impedes efficiency despite the fact that most banks run at constant return to scale. To get more insight, this study adds the shareholder independence indicator and concludes that shareholder independence and equity are key factors to enhance efficiency regardless of the host countries.

Keywords

Introduction

ASEAN consists of 10 countries, namely, Brunei, Cambodia, Indonesia, Laos, Myanmar, Malaysia, Philippines, Vietnam, Singapore, and Thailand. These countries plan to enhance economic integration towards the ASEAN Economic Community (AEC) by the end of 2015. One of the key industries that shall be greatly affected from the AEC is banking. The sector has long been protected by strict regulations that favor local financial institutions. The comparative study of ASEAN banks' efficiency thus benefits both the industry and the policymakers to examine the efficiencies across banks in ASEAN.

One of the impacts from liberalization is change in ownership structure. As banks play a vital role in economic development, it is necessary to ensure that this shall lead to improved performance. The issue of ownership and performance are still contentious. There are supports of the role played by major shareholders which are families in the corporate stewardship literature. On the contrary, there are many examples of conflict of interests between major shareholders and stakeholders that lead to misappropriate use of resources in the extant literature of management entrenchment. This is the first study that addresses the issue between the ownership and the performance under the circumstance of ASEAN.

By using the ownership concentration indicator developed by Bureau Van Dijk (BvD) to measure independence and the efficiency score from the DEA method, this study supports the positive link between shareholder independence and performance.

The paper consists of 5 sections. The next section will review the literature related to the study. Section 3 will discuss the methodology and the results will be presented in section 4. The last section will conclude the paper.

Literature Review

ASEAN is now a group of ten countries with diverse development among member countries. Some members have just recently changed their economic system towards a market approach and are still in the earlier stage of trade liberalization. Five incumbent members are selected in this study to investigate the level of efficiency in the banking sector. This selection is due to data availability. As the group aims to extend connectivity towards the ASEAN Economic Community (AEC) by the end of 2015, the banking sector will play an important role in allocating funds to the most efficient business at the lowest cost.

ASEAN stands for Association of Southeast Asian Nations. The alliance was founded in 1967. There was not much development in co-operation until the first summit in 1977. The leaders of all member countries agreed on the Declaration ASEAN Concord and Treaty of Amity and Cooperation in Southeast Asia. This led to trade promotion within the group by offering privileges to member countries. In 1990, ASEAN members began a common tariff for some goods such as cement, fertilizer, and paper pulp. ASEAN strengthened trade within the group by the initiative of

the ASEAN Free Trade Area or AFTA in 1992. ASEAN trade proliferated since then and more ambitious goal for zero tariff was set to be achieved in 2010 and 2015 for founding members and new members, respectively.

The ASEAN Economic Community or AEC was first proposed in 2002 and one year later all leaders declared the Bali Concord II to pave the way for the ASEAN Community. This will not only integrate the ASEAN economies but also cover security and social aspects.

The banking industry in ASEAN is inevitably affected from this integration. With these initiatives, ASEAN designed four strategies to liberalize the financial sector: (i) common payment system (ii) no capital control (iii) free trade in banking service, and (iv) capital market liberalization. Although ASEAN members agree that the liberalization in the banking sector shall be based on a voluntary basis, all members realize that liberalization will improve efficiency and benefit economic development. Thailand, for an example, set the plan to license more new foreign commercial banks in 2014. ASEAN members are preparing the common standard for ASEAN banks. This standard, once established, will facilitate banks complying with the standard to apply for licenses in any member country.

Most ASEAN members have recently adopted financial liberalization since the financial crisis in 1997. The regulations on risk management for banks in five countries are at par with international standards. The Basel II has been adopted since 2006 in Singapore and the rest adopted it during 2007-2008. All five countries but Indonesia have their local accounting system in compliance with the IFRS. The local accounting system in Malaysia and Singapore are the most identical to IFRS.

Table 1 shows the number of local and foreign banks currently established in five ASEAN countries studied in this paper. If we consider the ratio of local banks to foreign banks, Singapore obviously liberalizes the banking sector as the ratios of local to foreign bank are mostly less than one. The local banks in the Philippines do not dominate the foreign banks as found in Thailand and Malaysia. However, the ratios in Thailand and Malaysia have been declining since 2005 showing the sign towards more liberalization. Unlike Indonesia, starting with an equal number of local and foreign banks in 1999, the number of local banks is now double while the number of foreign banks is capped. As a result, the market is now dominated by the local banks.
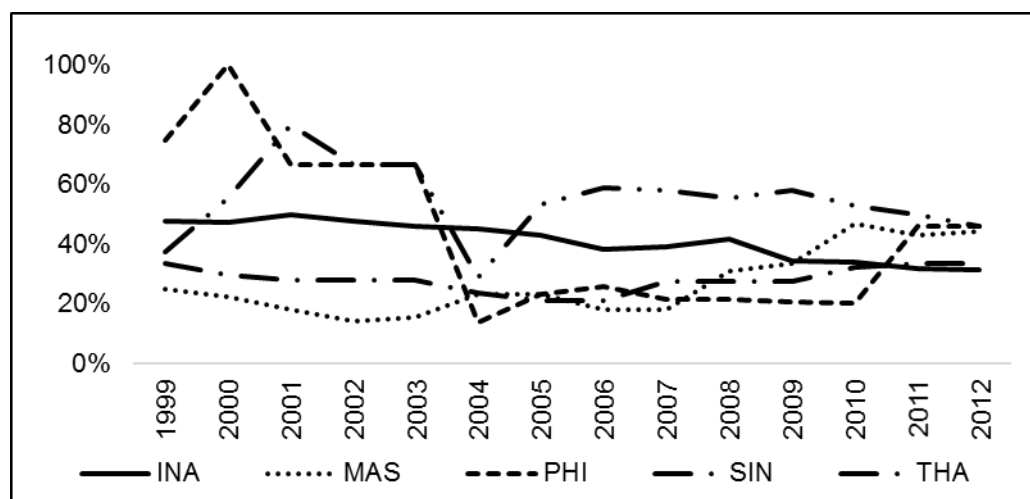
Figure 1 The Ratio of Foreign Banks to Total in ASEAN Countries (Source: Bankscope)

Figure 1 shows that share of foreign banks has been increasing obviously in Thailand, Malaysia, and Philippines.

Table 1 Return on Asset (%) of Local and Foreign Banks in ASEAN Countries

Year	Indonesia		Malaysia		Philippines		Singapore		Thailand	
	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign
1999	-1.83	-2.86	1.15	0.98	-3.74	-0.32	0.21	1.05	-3.32	-7.94
2000	-1.31	2.83	4.15	1.04	NA	-0.90	1.03	2.24	0.47	-3.74
2001	0.65	1.19	35.16	0.84	1.08	0.23	0.82	0.35	3.70	-0.35
2002	0.43	1.78	0.39	1.00	0.54	-0.78	0.81	5.25	0.83	-1.65
2003	0.95	2.11	10.56	1.10	1.50	0.84	0.94	5.13	0.86	0.33
2004	1.51	2.15	-3.06	0.90	1.00	1.53	1.84	1.06	1.29	1.58
2005	1.47	2.32	-16.60	1.23	0.65	13.35	2.70	4.99	0.69	1.14
2006	1.20	2.32	-0.44	1.05	1.02	-0.85	3.60	3.19	0.01	0.33
2007	1.47	1.86	14.92	1.09	1.05	0.40	3.53	3.00	-0.31	0.05
2008	-3.03	1.71	0.22	0.28	0.78	0.04	2.57	-1.36	0.73	0.76
2009	0.72	1.91	1.13	0.45	1.21	0.81	1.96	0.24	0.98	0.51
2010	1.26	1.46	0.56	0.94	1.56	0.90	1.80	0.93	1.14	0.60
2011	1.37	1.39	0.99	0.07	1.92	0.65	1.55	2.61	1.04	0.60
2012	1.51	1.47	1.97	0.57	1.99	0.61	1.85	1.09	0.28	0.77

Source: Bankscope and author's calculation

The comparison of return on asset might roughly indicate the efficiency of local and foreign banks. As shown in Table 1, foreign banks in Thailand mostly outperform their local counterparts.

This signals potential improvement in the country if liberalization is fully implemented. Local banks in Malaysia, however, mostly offer a better return rate in comparison with foreign banks. The performances of foreign banks in the other three countries are not much different from the local ones.

Although return on asset might give us some idea on the efficiency, there are many other aspects that shall be taken into account. This study measures technical efficiency by the Data Envelopment (DEA) method. The measurement allows us to take multiple inputs and outputs into consideration simultaneously. Charnes, Cooper, and Rhodes (1978) or CCR suggested how to compute the efficiency score by DEA. Assuming constant return to scale, CCR defines efficiency score as weight given to inputs of the firm of interest. Using linear programming to minimize these weights by fixing the output of the company not lower than its peers, the result will give the efficiency score. The technique was later extended to measure the case when return to scale is not constant.

DEA has been adopted in many researches to compare efficiencies in many industries such as securities brokerages (Fang & Hu, 2009), educational institutions (Toth, 2009; Tzeremes & Halkos, 2010) hotels (Yen & Othman, (2011), and restaurants (Hadad et al., 2007). The comparison of soccer premier leagues was even conducted by Haas (2003). There is extant literature that uses DEA to investigate commercial banks' efficiency. Miller and Noulas (1996) first measured US large commercial banks and found that most banks operated at decreasing return to scale. Bank size and profitability positively contributed to the efficiency. Seiford and Zhu (1999) later found that large banks contribute to profitability while smaller banks enjoyed superior marketability. Drake and Howcraft (2002) investigated UK clearing banks and found a positive relationship between efficiency and size. The DEA studies in various countries have been added. The examples include Turkey (Yildirim, 2002), Malaysia (Krishnasamy, 2003), Canada (Wu et al., 2006), Hong Kong (Kwan, 2006), China (Ariff & Can, 2008), Middle East (Mostafa, 2009), Brazil (Staub et al., 2009) and Czeck (Repkova, 2014).

Not all studies support that size contributes to efficiency. Staub et al. (2009) did not find any relationship between bank performance and size. Kwan (2006) and Repkova (2014) even found a negative relationship. Ariff and Can (2008) found that private and medium size are the most efficient.

Mostafa (2009) surveyed key inputs and outputs used in previous studies. Most studies define inputs as number of employees, expense, interest cost, capital, ATMs, and terminals. Key outputs are number of transactions, net profit, non-interest income, number of accounts, financial ratio, and deposits.

Besides the efficiency comparison of commercial banks in ASEAN, this study tries to investigate the factors behind the performance. Khan (2012) compared the performances of listed companies in India. He found that debt positively contributes to the performance. The relationship, however, is non-linear as debt increases, the performance will increase at a declining rate. The result is consistent with Margaritis and Psillaki (2010) who investigated French companies and Lauterbach and Vaninsky (1999) for Israeli companies.

The positive relationship between debt and performance can be explained by the agency problem (Jensen & Meckling, 1976). This theory proposes that the manager has a conflict of interest with shareholders. Increasing in debt will limit the discretion made by the managers due to declining cashflow from interest payments. This will contribute to lower agency cost and enhance firm's performance.

Not all empirical studies support the positive relationship between debt and performance, Kim (2006) found a negative relationship of debt in capital structure and performance of South Korean firms. Kim explained that strict covenant from debt will limit the opportunity of firms to take risky projects with reasonable returns.

This finding conforms to Myer's (1977) underinvestment problem of firms. The burden on interest payment will force the manager to select only low risk projects in order to avoid bankruptcy. They are prone to reject a positive NPV but risky project. Therefore, the company loses growth opportunity and aggravates the performance.

Data and Methodology

This study investigates the performance of commercial banks in five ASEAN countries, namely, Indonesia, Malaysia, Philippines, Singapore, and Thailand. Only the top ten listed banks in each country judged from total assets in 2012 will be selected due to data availability. In case that the number of listed banks in some countries is less than ten, we select all banks in those countries. The panel data of these banks extends from 2005 to 2012. All financial data are from Thomson Reuters Datastream while the independence indicator in 2012 is obtained from the Bureau Van Dijk database. The selection results in 40 banks in 5 countries. Combining all data gives us 320 bank-year samples.

The study follows CCR approach to compute an efficiency score, E_n, from the linear programming below.

Minimize E_n with respect to $w_1, w_2, ..., w_N, E_n$

Subject to:

$$\sum_{j=1}^{N} w_j y_{ij} - y_{in} \geq 0 \qquad \text{for } i = 1,...,I$$

$$\sum_{j=1}^{N} w_j x_{kj} - E_n x_{kn} \geq 0 \qquad \text{for } k = 1,...,K$$

$$w_j \geq 0 \qquad \text{for } j = 1,...,N$$

where y_{ij} is output i of company j,

y_{in} is output i of the company of our interest,

x_{kj} is input k of company j,

w_j is weight of each input of company j,

E_n is an efficiency score of the company of our interest.

Note that the linear programming system consists of *N* companies, *I* outputs, and *K* inputs. In order to get the efficiency score for each company, the linear programming will be repeatedly solved one by one by changing bank *n* in the system.

The efficiency score represents technical efficiency of the particular firm with its peers. The value ranges from zero to one. The most efficient bank will get the value of one while the least one will get the value of zero. For example, if a bank gets the efficiency score of 0.8, the bank is less efficient in comparison with its peer. The bank can reduce the input by 20 per cent while still maintaining the output if it can adapt the production process by imitating its peer. The bank weights, w_i, are also choice variables in the system.

The CCR system assumes that all samples yield constant return to scale. For robustness check, this study will also consider the case when firms' returns to scale are not constant. Further developments in the techniques enable us to identify the production states of each firm.

Following earlier studies, this study defines two outputs and three inputs in accessing ASEAN banks. The outputs are measured by interest revenue and non-interest revenue. The inputs are interest expense, non-interest expense, and salary. All currencies are converted into US dollar. The average values of all samples are shown in Table 2

Table 2 Average Inputs and Outputs in DEA Framework

Unit: USD

	Indonesia	Malaysia	Philippines	Singapore	Thailand
Interest Revenue	1,577,479,650	1,499,394,709	464,295,373	4,242,975,592	1,294,715,687
Non-interest Revenue	308,491,193	547,742,440	177,496,286	1,497,038,374	508,153,108
Interest Expense	623,463,076	726,232,685	184,293,228	1,767,670,917	448,875,314
Non-interest Expense	634,770,734	624,547,107	278,355,022	1,730,411,872	772,146,582
Salary	304,798,787	321,066,535	107,165,737	867,602,140	270,051,547
Interest Revenue/Interest Expense	2.5302	2.0646	2.5193	2.4003	2.8844
Interest Revenue/Non-interest Expense	2.4851	2.4008	1.6680	2.4520	1.6768
Interest Revenue/Salary	5.1755	4.6700	4.3325	4.8905	4.7943
Non-interest Revenue/Interest Expense	0.4948	0.7542	0.9631	0.8469	1.1321
Non-interest Revenue/Non-interest Expense	0.4860	0.8770	0.6377	0.8651	0.6581
Non-interest Revenue/Salary	1.0121	1.7060	1.6563	1.7255	1.8817

While the selection of revenue and expense is obvious to represent the efficiency of the banks. The salary is used as another input to approximate the number of employees used in the process.

Table 3 shows that on average the commercial banks in Singapore are the leaders in terms of revenue making followed by Malaysia, Indonesia, and Thailand. The commercial banks in the Philippines are the least earners. We can plot the ratio of average interest revenue to average asset along the timeline to see how the banking industry has changed over time by Figure 2.
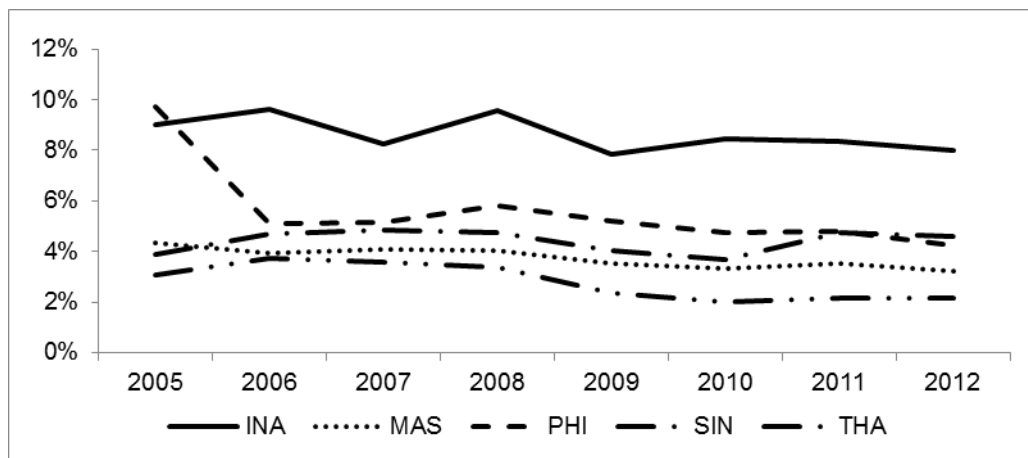
Figure 2 Ratio of Average Interest Revenues to Average Asset

The global crisis in 2008-2009 seems to affect Singaporean banks (SIN) the most. Despite a sharp drop in 2006 the Philippines banks Indonesian banks' ratio (INA) is the highest for all periods while the Philippines banks (PHI) suffered a sharp drop in 2006. Singaporean banks (SIN) are the highest revenue earners but when we scale the revenue by size, they become the lowest performers.
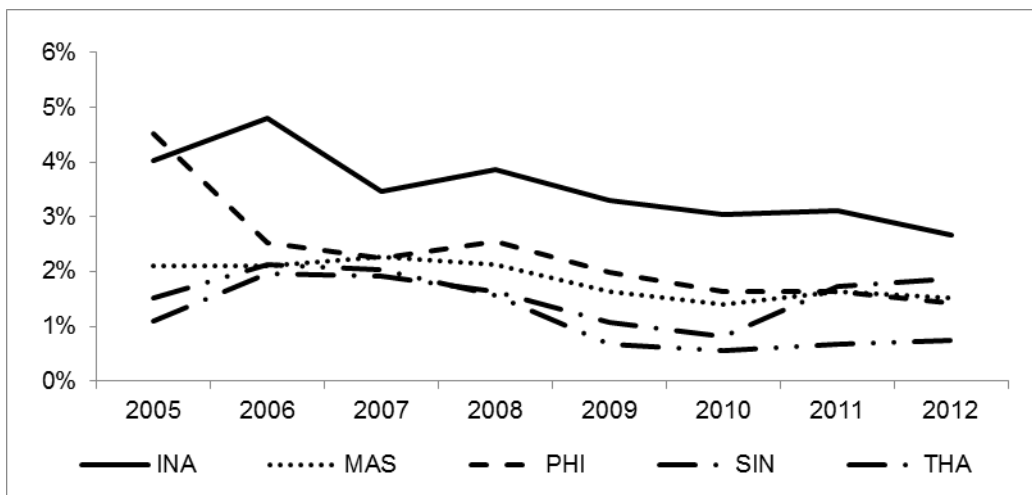
Figure 3 shows the ratio of average non-interest revenue to average total asset. Despite a sharp drop on 2006, the ratio of the Philippines banks (PHI) is still the highest. Thai (THA), Indonesian (INA), and Malaysian banks exhibit continuous improvement and are now at par with the leader. Singaporean banks (SIN) are at the bottom for all periods.
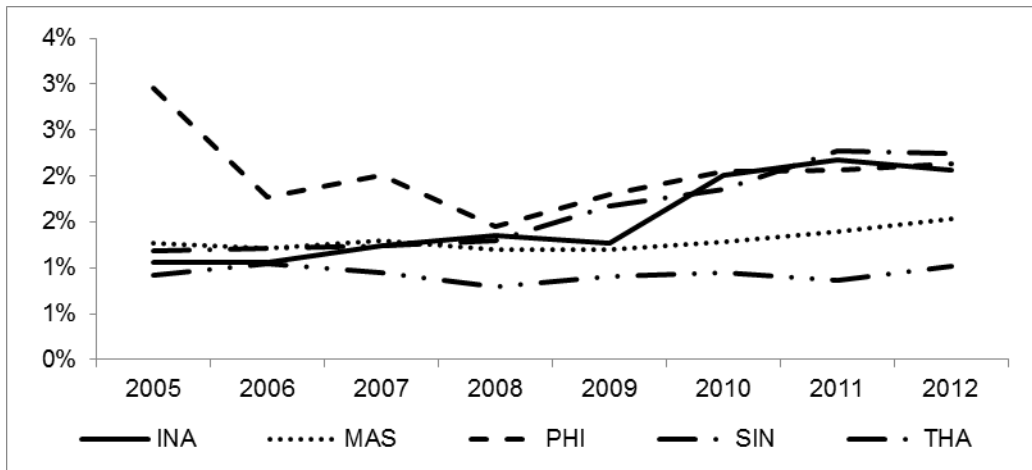
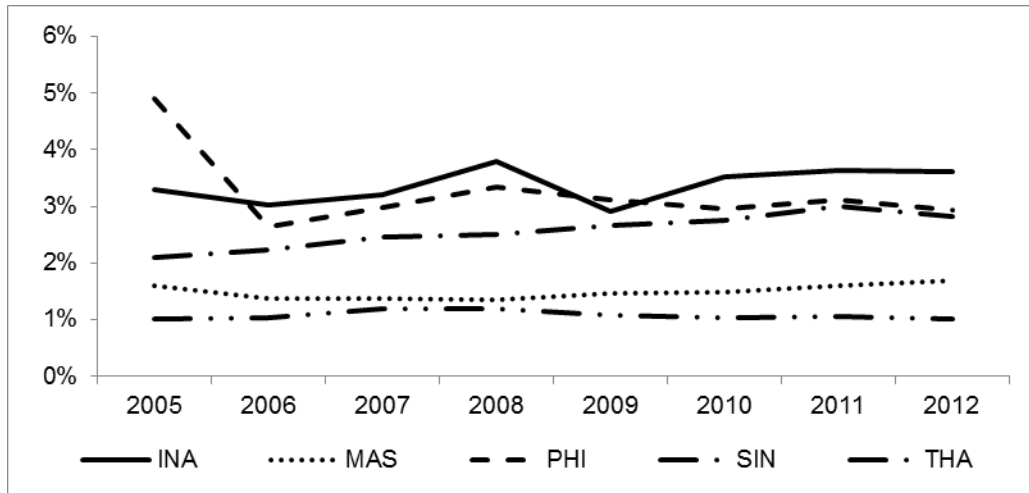**Figure 3** Ratio of Average Non-Interest Revenues to Average Asset

Figure 4 shows the ratio of average interest expenses to average total asset of ASEAN banks. Singaporean banks' cost drop sharply since 2007 and is now at the bottom of the group. Thai banks' interest expense ratio is lower than Malaysia. Indonesian banks' ratio (INA) is the highest for all periods.
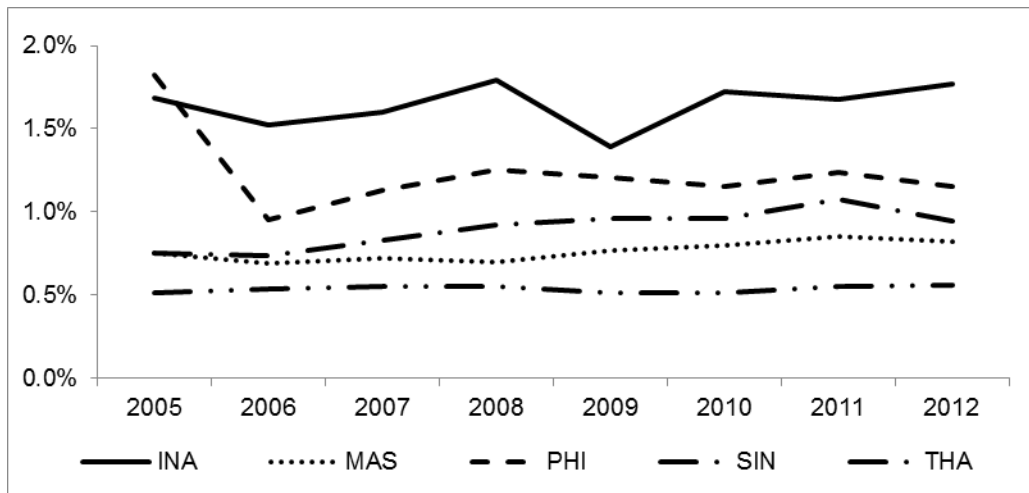

Figure 4 Ratio of Average Interest Expenses to Average Asset

Figure 5 shows the ratio of average non-interest expenses to total assets. All banks seem to have stable ratios for all periods. The ranking of the ratio is similar to the interest ratio shown in Figure 4. However, Thai bank (THA) revenues are at par with Malaysian counterparts but their costs are much higher in all periods. This represents that Thai banks underperform their peers in reducing the non-interest expenses. Figure 6 shows the ratio of average salary to average total assets. Indonesian banks ratio (INA) is the highest while the ratio of Singaporean

banks (SIN) is the lowest among the group. This ratio might represent the use of technology and efficiency in banking service.

Figure 5 Ratio of Average Non-interest Expenses to Average Asset

Figure 6 Ratio of Average Salary Expenses to Average Asset

The first part of the study measures the efficiency levels of ASEAN banks. The second part tries to identify contributing factors to the performance. Following previous studies in relating firm's performance with capital structure, this study will define the following models for the study.

$$E_{n,i} = f\left(DE_i, DE_i^2, ROE_i, TA_i\right)$$ (1)

Where $E_{n,i}$ is the efficiency score of bank *i* from DEA,

DE_i is Debt to Equity Ratio of bank *i*,

ROE_i is Return on Equity of bank *i*,

TA_i is logarithm of total asset of bank *i*.

Note that we also include the squared value of DE into our model to capture the possible non-linear relationship found in Kim (2006). Total asset variable is added to take the size effect found in many studies into account.

This study is also interested to check the country effect on performance. This is due to different regulations imposed in different countries. The country dummy variables are used to capture this effect. Moreover, the interaction term between size and country dummies are added as variations of model (1).

These models will be estimated by a panel regression method with fixed effect on Tobit model. The next section presents DEA and panel regression results.

Results

The optimizations of DEA framework for all banks are processed for each different year by genetic algorithm. Figure 7 presents the computed results of the efficiency scores. To save space, the results are averaged by countries.
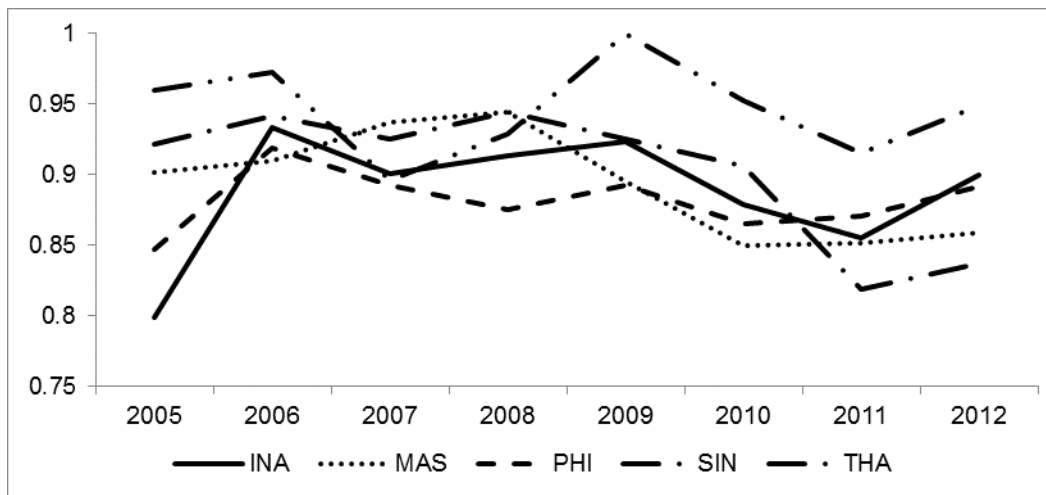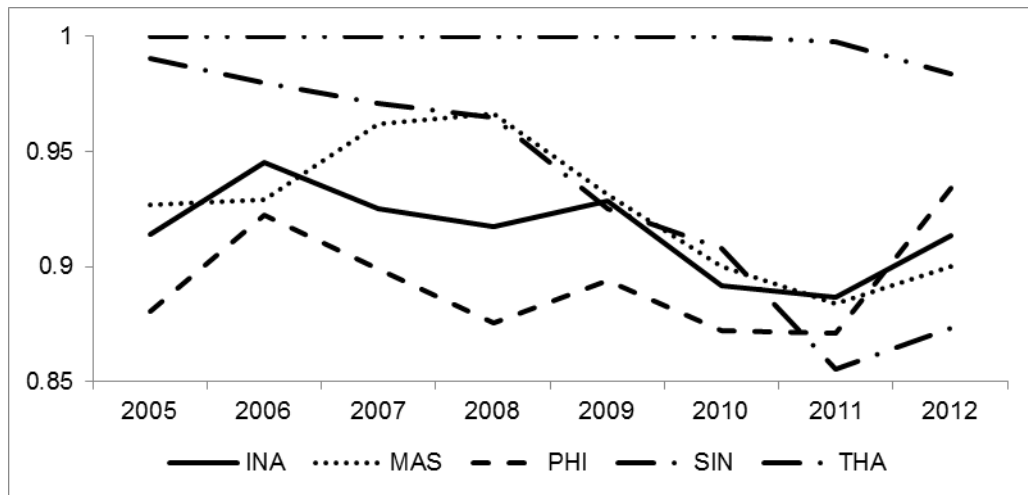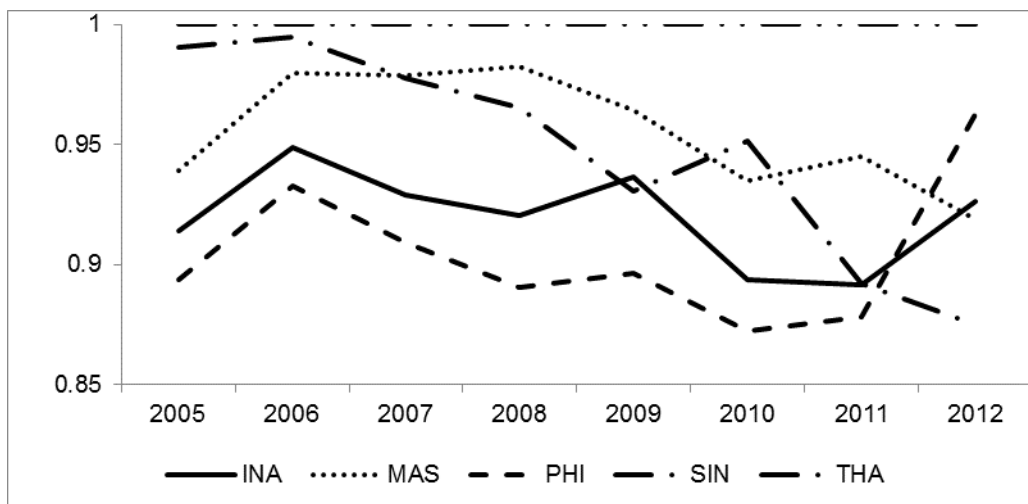

Figure 7 Average of E_n by Countries

Figure 7 shows that Singaporean banks are the most efficient with the average efficiency score of 0.9468. Thai banks are, on average, the second with the score of 0.9025 while Malaysian banks follow with 0.8937. The Indonesian banks and the Philippines banks are at par with the average values of 0.8882.

The average scores are fluctuating with different cycles for different countries. It shall be noted that while the descriptive statistics discussed in the previous section show Philippines banks as the least efficient, their efficiency scores show the opposite result. The Philippines banks seem to be the least fluctuating and share the second rank in 2012 with Indonesian banks. Thai banks, on the other hands, started as the second most efficient banks in 2005 and dropped sharply in 2008 and 2010 and they are still the least efficient in 2012

For robustness check, we recalculate the DEA framework that allows variable return to scale, S_n, as shown in Figure 8. The cases when banks cannot adjust inputs freely, Cn, are shown in Figure 9. [See SCRCSSP (1997) for a good review on DEA technique]

Figure 8 Average of S_n classified by Countries

Figure 9 Average of C_n classified by Countries

The results in Figure 8 and Figure 9 are consistent with the CCR model presented earlier. Singaporean banks are the most efficient while Thai banks are the second on the average but the weakest in recent years. However, if Thai banks are imposed with input inflexibility, they will rank the third behind Malaysian banks. The Philippines banks are the least performers averaged across years but they will be the second most efficient banks if we consider only the latest year.

Dividing E_n by S_n can indicate scale efficiency. If the ratio is equal to one, it means that there is no constraint in adjusting input and the banks are in the state of constant return to scale. If the ratio is less than one, we need another framework which extends CCR framework by adding the constraint that all weights' sum must be less than or equal to one. The result from this framework will give us R_n. Together with the scale efficiency, if E_n/S_n is less than one and E_n is equal to R_n, then the banks are in the state of increasing return to scale. On the other hand, the state of decreasing return to scale will be the case when the ratio is less than one and E_n is less than R_n.

Figure 10 to 13 show the results of the banks at each state of return to scale. Most banks are either in the state of constant return to scale or decreasing return to scale. Only few banks in Indonesia, Thailand, and Philippines show sign of increasing return to scale only in 2012.
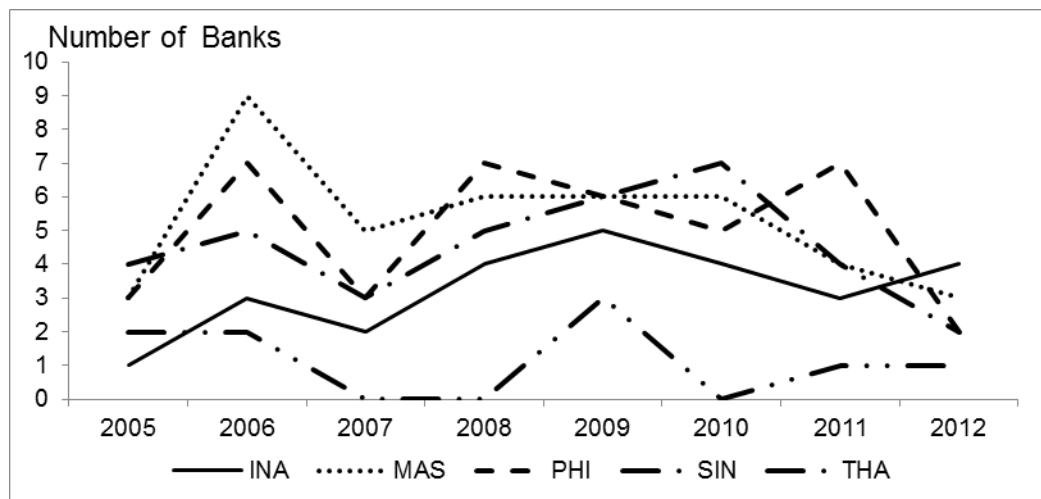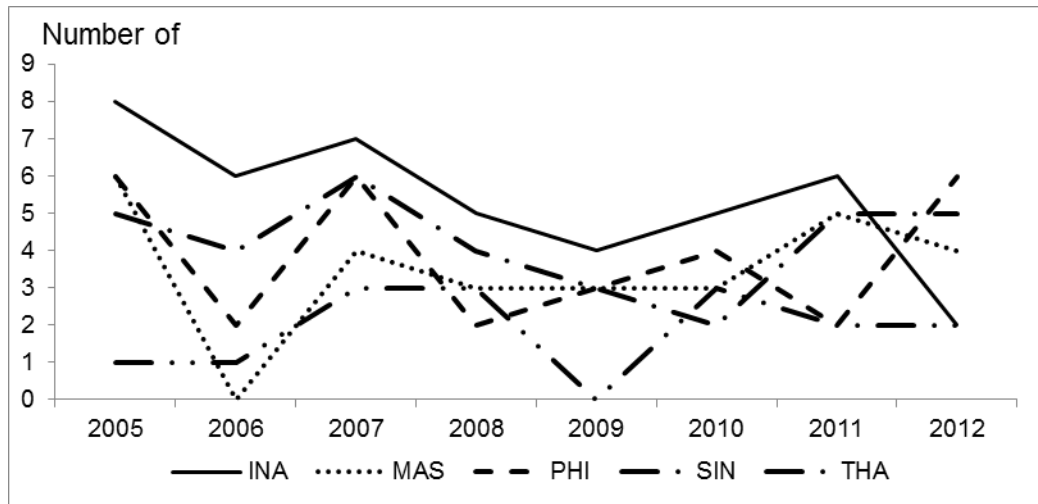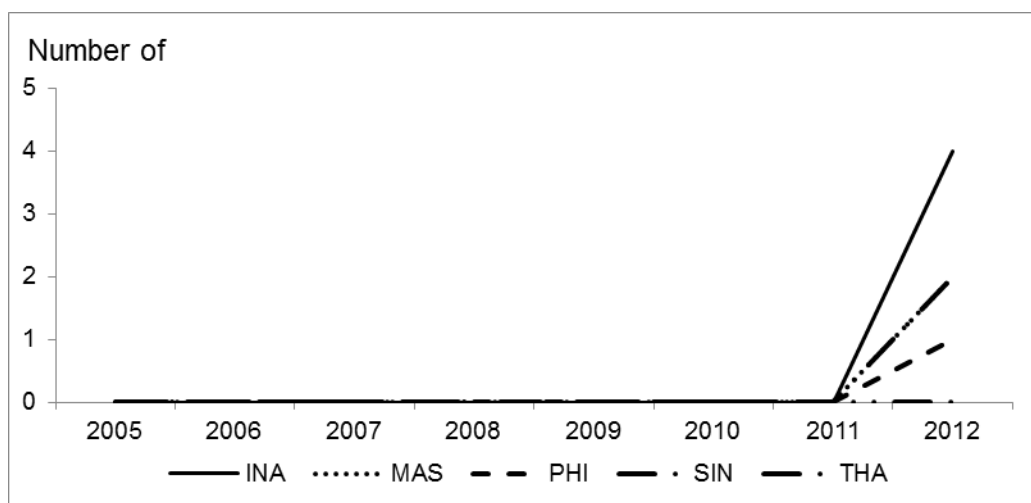

Figure 10 Number of Banks Operating at Constant Return to Scale

Figure 11 Number of Banks Operating at Decreasing Return to Scale

Figure 12 Number of Banks Operating at Increasing Return to Scale

Since there is not much difference in computing the efficiency score by three different models, this paper will use the CCR score, E_n, as the basis to investigate the factors behind the efficiency. This is to make the result more convenient to compare with other studies which mostly use E_n in measuring performance by DEA framework.

Table 4 shows panel regression results of model 1 and variations. The results suggest that debt negatively affects ASEAN bank's performance. This supports the empirical evidence in Korea found by Kim (2006). The non-linear relationship of the capital structure and performance is also found in this study. The results suggest that the relationship is a concave and downward

slope. The turning is where debt to equity is around thirteen. Within our sample, Malaysian banks operate at twelve while the others run at eight to nine on average.

The ROE is not significant in determining the performance. Total assets which is a proxy of size has negative impact on the performance. This is consistent with Kwan (2006) study of Hong Kong banks.

The country effects are significant in all but Malaysia. When the interaction terms between country dummies and debt ratio are used, only the Philippines bank is significant. The country effect and banks' size together adversely affect the efficiency as being shown in model 3. All interaction terms are significant with virtually identical coefficients suggesting no difference among countries on size effect.

Table 4 Panel Regression Results of E_n Model

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	***1.3528	***1.7627	***1.6409	***1.6168	***1.6416
DE	**-0.0210	**-0.0229	**-0.0229		
DE^2	**0.0008	**0.0008	**0.0008		0.0006
ROE	0.0215	0.0387	0.0377	0.042	0.0348
TA	-0.0141	***-0.0264		***-0.0290	***-0.0270
D_{INA}		**-0.1186			
D_{MAS}		-0.0882			
D_{PHI}		***-0.1599			
D_{THA}		**-0.0973			
$DE \times D_{INA}$				-0.0044	*-0.0177
$DE \times D_{MAS}$				-0.0017	-0.0163
$DE \times D_{PHI}$				***-0.0116	**-0.0246
$DE \times D_{SIN}$				0.0074	-0.0063
$DE \times D_{THA}$				-0.004	**-0.0174
$TA \times D_{INA}$			**-0.0262		
$TA \times D_{MAS}$			**-0.0251		
$TA \times D_{PHI}$			***-0.0280		
$TA \times D_{SIN}$			**-0.0217		
$TA \times D_{THA}$			**-0.0255		

*** is significant at 99%, ** is significant at 95% and * is significant at 90%

Ownership concentration of major shareholders in the banking industry is normal in ASEAN. The negative relationship between debt to equity and performance found in this study suggests that the performance shall improve when equity increases according to Myer's (1977) underinvestment hypothesis. This might not be the case if the entrenchment effect persists as being suggested by

Oswald et al. (2009) who found the declining performance from an increase of control by major shareholders. In order to shed more light on the issue, we add another variable into the model, the BvD independence indicator. This indicator is graded from *A* to *D* by the structure of major shareholders. The A-grade represents the company with no major shareholder holding shares more than 25% or has direct control on the company. This is the most shareholder independent company. The D-grade company is the company with one shareholder recording more than 50% of controlling shares and a severe entrenchment effect is anticipated.

Since the BvD indicator is categorical, not the real number, we need to add this independence indicator as a dummy variable into our model in order to avoid the estimation problem. Unfortunately, we can access the BvD data only for the year 2012. We need to truncate our panel sample and study only the data in 2012 as cross-section. The estimation results are shown in Table 5.

Table 5 Regression Results of 2012 Sample with Shareholder Independence

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	0.1355	-0.0219	-0.0821	0.0855	0.1258	0.0451	0.0727	0.157	0.0558
DE	-0.0356	-0.0351	***-0.0153		-0.0371	**-0.0158	**-0.0155	-0.0353	**-0.0156
DE^2	0.0011	0.0011			0.0012			0.0011	
ROE	***0.9746	***0.9615	***0.9860	***1.0317	***0.8892	***0.9102	***0.9783	***0.9651	***0.9885
TA		***0.0393	***0.0380	*0.0309	**0.0363	**0.0356	**0.0327	**0.0329	
D_{INA}					-0.0365	-0.0342	-0.0222	-0.0261	
D_{MAS}					-0.0266	-0.0202	-0.0145	-0.0223	
D_{PHI}					-0.0011	0.0032	-0.0345	-0.0402	
D_{THA}					-0.0344	-0.0323	-0.0364	-0.0392	
$DE \times D_{INA}$				**-0.0164					
$DE \times D_{MAS}$				**-0.0148					
$DE \times D_{PHI}$				**-0.0177					
$DE \times D_{SIN}$				-0.0123					
$DE \times D_{THA}$				**-0.0163					
$TA \times D_{INA}$	**0.0327								**0.0324
$TA \times D_{MAS}$	**0.0329								**0.0327
$TA \times D_{PHI}$	*0.0321								**0.0318
$TA \times D_{SIN}$	**0.0338								**0.0333
$TA \times D_{THA}$	**0.0323								***0.0319
A+	**0.0578	**0.0533	**0.0538	*0.0545			**0.0588	**0.0581	**0.0586
A	***0.2054	***0.1988	***0.2003	***0.2053			***0.2044	***0.2042	***0.2058
B+	*0.0569	*0.0520	*0.0523	**0.0573			*0.0556	*0.0560	*0.0566
C+	0.0153	0.0144	0.0168	0.0139			0.0131	0.0142	0.014
C	0.0379	0.0308	0.0307	0.0342			0.0321	0.0368	0.0328

When the shareholder independence indicator is added, ROE now plays a significant role. It is positively significant in all models. The capital structure still negatively relates to performance but not significant in all models. Only the three top grades of the indicator, namely A+, A, and B+, are positively significant. This shows that shareholder independence is very important in ASEAN banks. Model (4) investigates the role of interaction term between *DE* and the country factor when we include the independence indicator. All countries but Singapore show a significant role of equity in enhancing performance. Judging from the size of the coefficient, the magnitude is not different among countries. This somehow can be interpreted as superior corporate governance in the Singapore exchange. Assets are now positive and significant in all models. When this variable is interaction with the country effect as shown in Model (1) and Model (9), they are all identical suggesting no difference among countries. However, the interpretation of positive relationship of size and performance should be viewed cautiously. We use only data in 2012 to estimate the models and Figure 12 shows that 2012 is only year that we have the sample of banks operating at increasing return to scale. Further study with lengthy sample of shareholder independence is needed.

Conclusions

This paper is the first to investigate the efficiency of ASEAN banks and explain how capital structure relates to the performance. As ASEAN is moving towards AEC, the efficiency of banks is important in the success of economic integration. There are three main conclusions that can be drawn from this study.

First, the efficiency score shows that Singaporean banks are the most efficient in the region. This might be due to more liberalization of the banking industry in Singapore. The number of local banks still dominates the number of foreign banks by the factor of two to four in other member countries. Singapore is the only country with the ratio of local to foreign banks lower than one. For the whole period of the study, Thai banks rank the second after Singaporean banks on the average. However, the recent trend shows gloomy signs for the country. On the contrary, the Philippines banks have been improving substantially in terms of efficiency in recent years.

Secondly, the study on the relationship between capital structure and the performance might be misleading if one ignores the ownership concentration. Once the shareholder independence indicator is added, the capital structure lessens the role while *ROE* plays a more important role to explain performance.

Thirdly, the study rejects the agency problem that proposes debt as a substitute for corporate control. Most ASEAN banks maintain low debt to equity ratio. The study suggests that the debtholders will contribute to the performance when the ratio is more than thirteen. The equity and the independence of shareholders play this role in ASEAN countries excluding Singapore. Singapore is the only country for which the interaction term between *DE* and country

variable is not significant. Transparency and superior regulatory framework in Singapore exchange might explain this finding and is worth further investigation.

References

Ariff, M. & L. Can. (2008). Cost and Profit Efficiency of Chinese Banks: a Non-parametric Analysis. *China Economic Review* , *19*, 260–273.

Charnes, A., W. Cooper & E. Rhodes. (1978). Measuring the Efficiency of Decision Making Units, *European Journal of Operational Research, 2*, 429–44.

Drake, L. & B. Howcroft. (2002). An Insight into the Size Efficiency of a UK Bank Branch Network. *Managerial Finance, 28*, 24–36.

Fang, C., & J. Hu. (2009). A Metafrontier Study of Securities Broker and Dealer Efficiency under Zero-sum Gains. *Investment Management and Financial Innovations, 6*, 25-34.

Haas, D. J. (2003). Productive Efficiency of English Football Team - A Data Envelopment Analysis Approach. *Managerial and Decision Economics*, *24*, 403-410.

Hadad, Y., L. Friedman & M. Z. Hanani. (2007). Measuring Efficiency of Restaurants Using the Data Envelopment Analysis Methodology. *Computer Modeling and New Technologies, 11*, 25-35.

Jensen, M. & W. Meckling. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics, 3*, 305-360.

Khan, M. I. (2012). Capital Structure, Equity Ownership and Firm Performance: Evidence from India. Available at SSRN: http://ssrn.com/abstract=2016420

Kim, E. (2006). The Impact of Family Ownership and Capital Structures on Productivity Performance of Korean Manufacturing Firms: Corporate Governance and the "*Chaebol* Problem". *J. Japanese Int. Economies, 20*, 209-233.

Krishnasamy, G. (2003). Malaysian Post Merger Banks' Productivity: Application of Malmquist Productivity index. *Managerial Finance*, *30*, 63–74.

Kwan, S. (2006). The X-efficiency of Commercial Banks in Hong Kong. *Journal of Banking and Finance*, *30*, 1127–1147.

Lauterbach, B. & A. Vaninsky. (1999). Ownership Structure and Firm Performance: Evidence from Israel. *Journal of Management and Governance, 3*, 189-201.

Margaritis, D. & M. Psillaki. (2010). Capital Structure, Equity Ownership and Firm Performance**.** *Journal of Banking & Finance*, *34*, 621-632.

Miller, S. & A. Noulas. (1996). The Technical Efficiency of Large Bank Production. *Journal of Banking and Finance, 20*, 495–509.

Mostafa, M. (2009). Modeling the Efficiency of Top Arab Banks: A DEA–neural Network Approach. *Expert Systems with Applications*, *36*, 309–320.

Myer, S. (1977). The Determinant of Corporate Borrowing. *Journal of Financial Economics*, *5*, 147-175.

Oswald, S., L. Mus & M. Rutherford. (2009). The Influence of Large Stake Family Control on Performance: Is it Agency or Entrenchment? *Journal of Small Business Management, 47*, 116-135.

Repkova, I. (2014). Efficiency of the Czech Banking Sector Employing the DEA Window Analysis Approach. *Procedia Economics and Finance*, *12*, 587 – 596.

SCRCSSP (Steering Committee for the Review of Commonwealth/State Service Provision). (1997). Data Envelopment Analysis: A Technique for Measuring the Efficiency of Government Service Delivery, AusInfo, Canberra.

Seiford, L. & J. Zhu. (1999). Profitability and Marketability of the Top 55 US Commercial Banks. *Management Science*, *45*, 1270–1288.

Staub, R., G. Souza & B. Tabak. (2010). Evolution of Bank Efficiency in Brazil: A DEA Approach. *European Journal of Operational Research*, *202*, 204–213.

Toth, R. (2009). Data Envelopment Analysis and the Efficiency of Higher Education. *International Conference on Applied Economics*, ICOAE.

Tzeremes, N. & G. Halkos. (2010). A DEA Approach for Measuring University Departments' Efficiency. Available at http://mpra.ub.uni-muenchen.de/id/eprint/24029

Wu, D., Z. Yang & L. Liang. (2006). Using DEA–neural Network Approach to Evaluate Branch Efficiency of a Large Canadian Bank. *Expert Systems with Applications*, *31*, 108–115.

Yen, F. L. & M. Othman. (2011). Data Envelopment Analysis to Measure the Efficiency of Hotels in Malaysia. *SEGi Review*, *4*, 25-36.

Yildirim, C. (2002). Evolution of Banking Efficiency within an Unstable Macroeconomic Environment: The Case of Turkish Commercial Banks. *Applied Economics*, *34*, 2289–2301.