


“Business efficiency of the commercial banks in ASEAN”

AUTHORS	Abdul Mongid  https://orcid.org/0000-0001-5778-9194
ARTICLE INFO	Abdul Mongid (2016). Business efficiency of the commercial banks in ASEAN. <i>Investment Management and Financial Innovations</i> , 13(1), 67-76. doi: 10.21511/imfi.13(1).2016.06
DOI	http://dx.doi.org/10.21511/imfi.13(1).2016.06
RELEASED ON	Friday, 04 March 2016
JOURNAL	"Investment Management and Financial Innovations"
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

0



NUMBER OF FIGURES

0



NUMBER OF TABLES

0

© The author(s) 2025. This publication is an open access article.

Abdul Mongid (Indonesia)

Business efficiency of the commercial banks in ASEAN

Abstract

This study examines the determinants of cost inefficiency of banks operating in 8 member countries of the Association of Southeast Asian Nations (ASEAN): Indonesia, Malaysia, Singapore, Thailand, the Philippines, Cambodia, Brunei and Vietnam. The author defines the cost inefficiency using accounting based efficiency known as business efficiency (CIR). Second, the researcher regresses the cost inefficiency ratio on a set of bank specific variables (size, equity to total asset, personnel expenses to total expenses) and economic variables (economic growth and inflation rate) using ordinary least squared (OLS) regression analysis. The dataset of 504 banks in the ASEAN countries is used for the period from 2008 to 2012. The results show that the average cost inefficiency ratio during the period is about 59%. Banks from Vietnam exhibit the lowest cost inefficiency relative to banks in the other ASEAN countries. It is found that cost inefficiency is positively determined by inflation, loan loss provision, personnel expenses, capital adequacy and negatively by asset size and liquidity position.

Keywords: cost inefficiency, ASEAN, economies of scale.

JEL Classification: G21, D24.

Introduction

Banking industry is very dominant sector in the economy because the development of the sector promotes economic growth (Levin, 1997). The role of banking system in financing the economy requires banking system to operate efficiently. Efficient banking system means it can provide service financing at lower cost. Shen, Liao and Weyman-Jones (2009), Sufian (2010) share similar view on the importance of bank efficiency.

Efficiency is a very important concept in economics as a measure of success in resource allocation. Efficiency is the ratio between the amount of resources or costs that must be sacrificed to achieve the result of an activity. Efficiency is the best comparison between the input (input) and output (result between the profit sources used). With other words, the efficiency of the optimal results are achieved with the use of limited resources.

In a general sense, an efficient company is a production enterprise in producing goods or services quickly, smoothly and with a minimum waste of resources. In conjunction with industry organizations, the term efficiency associated with the most productive way to utilize the resources are scarce. In this case, in general there are two types of efficiency, i.e. technical efficiency and economic efficiency.

Economic efficiency arises when the input used in such a way that the level of output produced with lower cost than others. Increased efficiency occurs when the existing output or output level produced by a lower cost. Unlike engineering or technological efficiency, economic efficiency allows comparing

the different production processes. Competition is usually considered by economists to encourage individual firms or economic agents in pursuit of efficiency. Increase the efficiency of business possibilities to survive and succeed, as well as the use of scarce resources as well as possible.

1. Objective

The objective of the study is to explore the determinant of bank cost inefficiency in ASEAN. The definition of the business efficiency here is cost efficiency and it is derived based on accounting information. The reason to measure using the definition is as it is simple in term of calculation technique and free from various methodological weaknesses such as efficiency distribution assumption and estimation technique. The ratio is also used by all banking regulators in the region as performance measure.

Study by Bos, Koetter, Kolari and Kool (2009) provide evidence that assumptions on parametric efficiency distribution give different impact on efficiency score. Further, different ways of treating accounting data for heterogeneity also result different in efficiency score. Literatures classify the sources of efficiency into two groups: internal and external factors. These internal factors include liquidity, the level of provisioning, capital adequacy, bank size and cost structure. External factors that contribute to efficiency are economic growth and inflation.

The specific objectives of this paper are:

1. To determine the contribution of bank-specific characteristic and macroeconomic conditions that may influence business efficiency of the bank (CIR).
2. To evaluate the impact of bank-specific variable on the business efficiency of the bank (CIR).

3. To evaluate the impact of macroeconomics environment variables, such as GDP growth and inflation, on the business efficiency of the bank (CIR).
4. To investigate whether bank specific or external variables influence more on the business efficiency of the bank (CIR).

2. Review of the previous studies

We are aware that banking efficiency is very important for financial development. Efficient banking system can provide loan at better rate because the difference between saving rate and lending rate is very small. Banks with high net interest margins usually own lower efficiency because they have less pressure to gain efficiency due to their ability to get higher profit amidst various economic constraints. That is why banks operating in a country that have higher net interest margin (NIM) tend to be less efficient. These conditions have a negative impact on financial developments measured by loan to GDP ratio. Further these will make investments and economic activity lower compared to its potential. That makes Lieberg and Schweiger (2009) stated the benefits of lowering cost of borrowing to the economy.

Capital regulation is a crucial point in the banking industry. According to Kasman, Tunc, Vardar and Okan (2009), capital adequacy ratio (CAR) is not only serving as compliance measure but it also serves as a common proxy for banks' creditworthiness of banking firm. In short, capital adequacy regulation is for preventing banks from accepting excessive risk compared to its capital position. Claey's and Van der Venet (2008) concluded that capital adequacy standard is important to make sure that banking sector is well capitalized and stable. That is why Lieberg and Schweiger (2009) using moral hazard framework concluded that less capitalized banks are more risk seeking for higher return. Berger and Mester (1997) stated that equity capital provides a cushion against portfolio losses and financial distress.

Under market discipline framework, low capitalized bank also reduces the market reputation so the bank has to pay a higher interest for its borrowings in the market as it is viewed as risky. That is why equity to total assets (ETA) ratio is viewed as risk preference as higher ratio means the bank takes less risk preference (leveraging). Karim (2001) confirmed that larger banks was more cost efficient.

There are two possible outcomes of bank capital position on efficiency. In one side, higher capital means higher creditworthiness. Higher creditworthiness means banks can borrow the fund at cheaper price and it increases efficiency. In other

side, higher capital ratio means banks have to hold less risky asset that will generate less income. The situation makes the ratio higher. When the efficiency is measured by cost to income ratio, the condition means banks are less efficient.

Impact of size on efficiency is clear. Size is positive to efficiency and it supports economies of scale and scope in the economics theory. Athanasoglou, Delis and Staikouras (2006), Akhavein, Berger and Humphrey (1997) concluded that size is a matter for efficiency. They all support mergers to improve efficiency. In contrast, Fries and Taci (2005) produced an opposite result. They conducted a study on bank cost efficiency in 15 transition countries covering 289 banks for the period of 1994-2001. The study concluded that efficiency is related to the changes in incentive, structural and institutional reforms and the rule of law. They also find evidences that an average-sized bank in the sample operates at a point that is close to constant returns to scales, while the smaller banks in the sample operate with significant unrealized economies of scale. This suggests that consolidation of smaller banks in region would contribute to greater cost efficiency in banking. The increase in cost efficiency of the banking is attributable to lower nominal interests and greater market share of majority of foreign-owned banks. Increase of higher intermediation ratio means the intermediation cost decreases. Bonin, Hasan and Wachel (2005) conclude that bank performance is related to efficiency and efficiency relates to ownership.

De Haan and Poghosyan (2012) underline the importance of the size of bank for efficiency. Under microeconomics framework, theoretically larger bank could enjoy economies of scale and economies of scope that make them enjoy lower average cost. When banks can produce outputs at lower cost due to size factor, it is efficient because of economies of scale. When banks can produce outputs at lower average cost due to joint cost advantage, the efficiency is from economies of scope.

External factors such as growth, inflation and discount rate contribute directly or indirectly to efficiency. Banks operating in the country with higher economic growth can enjoy lower cost of doing business as banks can easily find prospective debtors with less cost. In short, we can say that economic growth has positive impact on bank cost efficiency. However, during economic upturn, banks tend to invest more to enjoy market expansion. It increases cost but not income. In these possibilities, banks will experience higher cost but less income. Newer empirical studies by Tahir, Mongid and Haron (2012) and Zeitun (2012) provided evidence a direct positive relationship. In contrast, Athanasoglou et al. (2006) showed that real GDP per capita growth did not have a significant impact on bank financial position.

The characteristics of the ASEAN economy is relatively having higher inflation rate. As inflation rate is an important macro economic performance, central banks in the region are very active to make inflation rate lower. Inflation is also viewed as indicator of business risk. The high inflation economy indicates a high business risk. When inflation rises, banks must spend more to compensate depositors. The impact on bank cost efficiency depends on the ability of the bank to exploit interest rate dynamics in the market. Inflation rate should have negative impacts on bank business efficiency measured using cost to income ratio. When inflation rate is higher, deposit rate is also higher and at the same time banks are not willing to increase lending rate as it is too risky. In general, higher inflation implies lower interest margins.

Berger and De Young (1997) underlined the role of non-performing loans (NPL) for bank efficiency. A large proportion of problem loans may be due to “bad management”. These non-performing loans will hit inefficient banks that neglect good loan underwriting and monitoring practice. Hence bank will have higher losses due to non-performing loans. Problem loans may also be caused by short-run cost savings on the initial credit evaluation and loan monitoring (“skimping hypothesis”).

This would produce short term cost efficiencies artificially higher than a bank which spends adequate resources to ensure its loans are of higher quality. On the other hand, when credit risk is an event, banks experience lower efficiency because banks spend more resources to recover it. The problem loans make the asset less productive. Banks lose the income because the assets become tacit. Problem loans give two impacts on banks which are cost increase and income decrease.

Fiordelisi and Molyneux (2010) study the effect of personnel expenses on value added in the banking industry. The personnel expense is measured using

staff expenses to total assets. They find that personnel expenses to total assets positively increase the value added. In terms of personnel or staff, Evanoff and Israilevich (1991), suggest that larger banks may spend more to retain or hire qualified people to run banks to make them efficient. Qualified staff can control the operating cost and improve scale economies. Tahir et al. (2012) study the determinants of cost inefficiency of banks in ASEAN using Stochastic Frontier Analysis (SFA). The study concludes that bank specific variables and economic growth are important determinants of bank cost inefficiencies in ASEAN banking.

Hsiao, Shen and Bian (2015) study the cost and profit efficiency of the Chinese domestic banking sector after a comprehensive financial reform since 1978. Foreign banks perform better due to the advancement in technologies and better trained labor force. However, domestic banks have gradually been able to follow the cost advantage of foreign banks. Unfortunately, the profit is lower for domestic banks because of non economic and economic reasons such as scale economy.

3. Methodology

3.1. Research framework. The study combines both bank specific and macroeconomic data that influence the business efficiency of banks in ASEAN. We are aware that banking firm is intermediary institution so the financial conditions depend on both borrowers and depositors' condition too. That makes both macroeconomic and bank-specific factors appear to have a role to play in determining the business efficiency. We expect GDP growth and bank size is being the most important determinants following to industrial economic theory. Under agency theory, a negative relationship is expected between bank equity capital and efficiency. The framework basically replicates the work previously done by Louzis, Vouldis, Vasilios and Metaxas (2012) on Greece banking market.

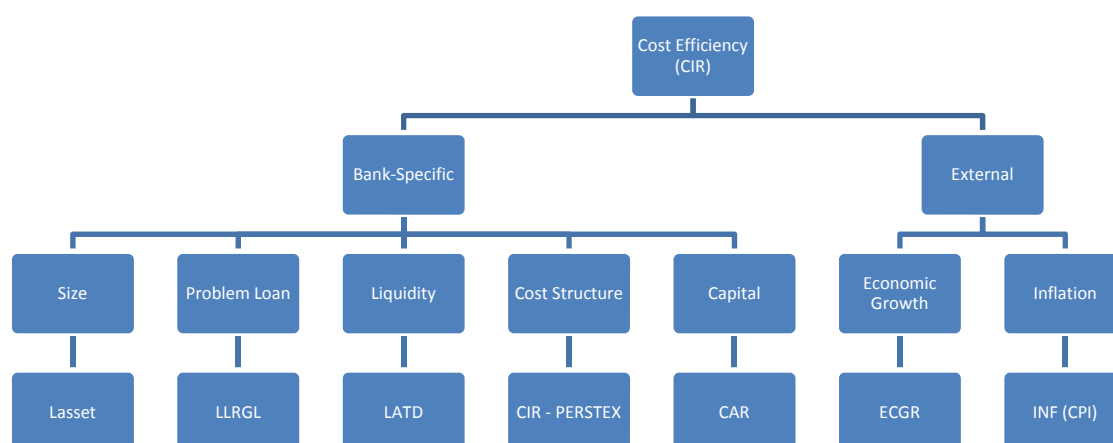


Fig. 1. Research framework

3.2. Model. To examine the determinant of business efficiency (CIR) in ASEAN Banking, we use simple linear regression model which is a linear relationship between response variable, y and the predictor variable, x_i , $i = 1, 2, \dots, n$. The model is:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \varepsilon, \quad (1)$$

where $\beta_0, \beta_1, \dots, \beta_n$ are regression coefficients and ε is the error due to variability in the observed responses. In our study, we apply panel data and the model can be formulated as:

The model for this study can be formulated as follow:

$$\begin{aligned} CIR_i = & \alpha + \beta_1 SIZE_{it} + \beta_2 PERSTEX_{it} + \beta_3 CAR_{it} + \\ & + \beta_4 LLRGL_{it} + \beta_5 LIQUID_i + \beta_6 EGRW_i \\ & + \beta_7 INFL_i + \varepsilon. \end{aligned} \quad (2)$$

To assess the ability of the model to explain cost efficiency (CIR), we use linear regression testing technique such as t-tests and F-test. F-test is used to test the capability of the model to explain the variability of the CIR. To assess the capacity of the individual variable, we use t-test.

3.3. Variables. Predictor variables in this study are derived from previous empirical studies discussed above. There are two types of variables in this study. The first are data derived from individual bank financial report statement. These data are used to measure the individual bank characteristics. Second is data from economic condition where the bank is operating. Data are collected from Bankscope Database for bank-specific data and for economic growth and inflation, data are collected from Asia Regional Information Centre (ARIC) under Asian

Development Bank Website. These variables and their definition are presented in Table 1

Table 1. Variable and sources of data

Number	Variable	Observation	Sources of data	Measurement
1	CIR	Business efficiency	Bank level	Percentage
2	EGRW	Economic growth	Country level	Percentage
3	INFL	Consumer price index/inflation rate	Country level	Percentage
4	SIZE	Logarithm of asset size	Bank level	Logarithm
5	LLRGL	Loan loss provision to total loan	Bank level	Percentage
6	PERSTEX	Personnel expense to total expenses	Bank level	Percentage
7	CAR	Capital adequacy ratio	Bank level	Percentage
8	LIQUID	Liquid asset to deposit funds	Bank level	Percentage

3.4. Hypothesis. In this study we use time series and cross sectional model mostly known as panel data. Panel data models combine a cross-section observations with a time series dimension. The cross-section nature of the panel explain the variability in the bank-specific factors and how these vary across banks in the samples. However, as our samples are not fully balanced, we decided to apply simple linear regression for simplicity.

The hypotheses to test are that cost efficiency (CIR) is related to bank-specific characteristics such as size (+/-), capital adequacy (-), personnel expense (+) and loan provisions (-). For macroeconomic variables we expect GDP/Economic Growth (+) to efficiency. Inflation is expected to have negative sign on profitability (-).

Table 2. Hypotheses relationship between business efficiency and predictors

	Statement of hypothesis	Expected sign
1	There is a negative relationship between economic growth (ECGR) and Business Efficiency (CIR)	Negative
2	There is a significant and positive relationship between inflation rate (INFL) and Business Efficiency (CIR)	Positive
3	There is a significant and positive relationship between the size of bank's asset (LASSET) and Business Efficiency (CIR)	Negative
4	There is a significant relationship between ratio of personnel expenses to total expenses (PERSTEX) and Business Efficiency (CIR)	Negative/Positive
5	There is a significant relationship capital adequacy ratio (CAR) and Business Efficiency (CIR)	Negative/Positive
6	There is a significant relationship between liquidity position (LIQUID) and Business Efficiency (CIR)	Negative/Positive

4. Empirical results

4.1. Data description. Table presents the sample distribution for this study. Total samples are 54 banks from eight countries of the Association of the Southeast Asia Nations (ASEAN). There are three samples from Brunei (BN) and they contribute 1% of total samples. Indonesia, as the biggest economy, contributes 230 observations. Almost 50% of the samples are from Indonesia. Cambodia (KH) contributes 11 samples or 2% of total samples. Samples from Malaysia are 44 banks and contribute

9% of total samples. Total samples from the Philippines are 78 and they are 15% of total samples.

Singapore banking system is the most sophisticated in the region. In term of asset size, it is also the biggest. Total samples from Singapore are 27 banks and contribute 5%. Thailand is second biggest contributor for this study. There are 85 bank observation and contribute to 17% of the total samples. Vietnam is relative different from other members as it is politically socialist country. Total sample from Vietnam is 26 bank observations or 5% of total samples.

Table 3. Samples distribution

	Country	Sample	Contribution
1	BN	3	1%
2	ID	230	46%
3	KH	11	2%
4	MY	44	9%
5	PH	78	15%
6	SG	27	5%
7	TH	85	17%
8	VN	26	5%
Total		504	100%

Business efficiency (CIR) is a measure of how efficient is a banking firm in generating income. Higher ratio indicates less efficient and in other way around. Our empirical data show that mean value for CIR is 58.89 with standard deviation 30.42. In general we can say that every one hundred income, bank must spend 58.89. It means the average cost to spend is 59% of income. Data are relatively centralized according to coefficient variation ratio (CV). Coefficient variation is measured as standard deviation (SD) divided by its mean value (mean).

Table 4. Variable description

	Variable	Observation	Mean	Standard deviation	Min	Max
1	CIR	503	58.89	30.42	4.60	340.56
2	ECGR	503	4.96	2.67	-2.33	14.47
3	INFL	503	5.15	3.53	-0.85	23.16
4	LASSET	503	15.01	1.79	10.05	19.30
5	LLRGL	503	3.48	3.70	0.03	47.57
6	PERSTEX	503	18.17	5.49	0.70	34.98
7	CAR	503	22.08	22.15	0.78	284.98
8	LIQUID	503	30.29	20.44	0.01	154.66

Sources: ADB, Fitch-Bankscope.

ASEAN economy is growing and dynamics economic region. During global financial crisis in 2008-2012, this region is viewed as the only region that has positive economic growth after China and India. During that time, ASEAN economic growth reached 5% on average. The growth is also stable

because the CV is less than 70%. The range is relatively widespread, where the highest is Singapore and the lowest is Thailand. Inflation rate is measured by consumer price index (CPI). The average is 5.15% and standard deviation 3.53%. From Table 4, inflation rate in ASEAN is relatively stable but high.

Asset size in ASEAN banking is quite widespread where Singapore is the biggest and Cambodia is the smallest. On average the total asset is USD 13.8 billion and standard deviation is USD 3 billion. The minimum asset is USD 23.193.340 and maximum is USD 2.420 billion. Loan loss reserve (LLRGL) is a measure of provision made to cover default risk. Higher loan loss reserve ratio indicates that bank experiences high probability of default. On average, LLRGL is 3.48 meaning bank already set 3.5% provision on total loan. As performed loan requires 1%, it means the provision is 2.5% for less qualified loan.

PERSTEX is a measure the portion of personnel expenses to total expenses. The higher ratio indicates the bank is focusing on personnel expenses than other operating expenses. On average, 18% of total operating expenses are for personnel and the rest is for funding and other operating expenses. There is almost regularity in ASEAN banking as the CV is very small only 30%. Capital Adequacy Ratio (CAR) is regulatory capital to measure how much equity invested divided by total risky asset. Higher ratio is better because bank has enough equity to cover risk. On average ASEAN banking is excess capital because of the mean value is 22%. Minimum CAR is 1% and maximum 284%.

As ASEAN economy is not very well developed in money market except Singapore. It is problem for banks in managing liquidity. Banks are mostly relying on central bank promoted market for liquidity management. As consequences of this situation, liquidity ratio measured as liquid asset divided by total customer and short term fund is very high about 30%. There is diverse variability in liquidity ratio.

Table 5. Variable distribution by country

Country	CIR	EGRW	INFLATION	ASSET	LOAN LOSS	PERSTEX	CAR	LIQUID
BN	45.65	1.01	1.18	14.59	4.17	21.91	10.67	44.07
ID	63.07	5.91	5.84	14.33	2.73	17.76	21.24	29.63
KH	92.72	4.73	2.94	12.00	5.97	23.24	79.96	86.45
MY	40.54	4.70	2.56	15.73	2.78	16.50	24.71	48.94
PH	62.86	4.72	4.81	15.17	6.22	18.69	18.51	29.13
SG	54.91	3.93	3.85	16.34	3.01	19.90	37.92	22.00
TH	56.17	2.91	2.93	16.03	3.74	20.66	16.47	17.55
VN	41.40	6.02	14.42	15.81	1.66	10.26	14.51	32.87
Total	58.89	4.96	5.15	15.01	3.48	18.17	22.08	30.29

Sources: data set, ADB, Fitch-Bankscope.

In term of country, the lowest cost efficiency ratio (CIR) is banks from Malaysia and the most inefficiency is Cambodia. On economic growth, Vietnam is the highest and Indonesia is the second. The lowest is Brunei. On inflation rate, Vietnam is the highest and the lowest is Brunei. Indonesia and Vietnam are all above average. In term of size, Bank from Singapore is the biggest. Cambodia is the smallest in asset size. It seems that bank asset is related to economic level of economic development. In term of credit risk, Philippines are relatively higher than other member as it is around 6.22%. Please note loan loss provision is also influenced by managerial decision. Some banks may prefer to put more provision as part of financial management strategy.

In term of PERSTEX, the highest is Cambodia and the lowest is Vietnam. It is interesting to note that PERSTEX in Singapore, Indonesia, Thailand and Indonesia are relatively similar around 20% of total expenses. CAR is basically determined internationally by Basel Committee on Banking Supervision. It is clear that all banks in the sample are above minimum standard 8%. Singapore is the highest and Brunei is the lowest. However, on average all are above minimum. On liquidity ratio, the highest is Cambodia and the lowest is Thailand. Singapore and Thailand are lower because their money market is relatively well established.

4.2. Determinant of business efficiency. To investigate the determinant of bank cost efficiency, we use statistics Software Stata Version 10. Total 504 samples are used in this study for period of the observation from 2008 to 2012. The study combines both micro data from bank level and macroeconomic conditions. The result shows that in general we can conclude that the model can explain the cost efficiency of commercial banks from ASEAN banking market.

Table 6. Model fit indicator

Source	Summ square	Degree of freedom	Mean square
Model	160636.17	7	22948.02
Residual	304167.67	495	614.48
Total	464803.84	502	925.90
F (7, 495) =	37.35	Adj R-squared	0.34

It is based on the Anova test which for F-table for (K = 7 and n-K = 493) is 3.23. Our empirical result shows the value for F-test is 37.35 and significant at 1%. Adjusted R-squared is 34% meaning that all variability can be explained by the predictor variables. Again, we can infer that the model is eligible for use as cost efficiency model. Other indicators to assess the fits of model, such as Log likelihood ratio (LLR) is -2324, Akaike information criterion (AIC) is 4665, are significant confirming that the model is appropriate for further analysis.

Table 7. The determinant of business efficiency

Variable	Coefficient	Std. err.	t-statistic	P > t
ECGR	0.31	0.44	0.70	0.48
INFL	1.16	0.37	3.17	0.00
LASSET	-4.83	0.69	-7.01	0.00
LLRGL	2.47	0.31	8.07	0.00
PERSTEX	1.84	0.22	8.30	0.00
CAR	0.34	0.06	5.51	0.00
LIQUID	-0.19	0.06	-2.89	0.00
CONSTANT	79.85	11.98	6.66	0.00

Sources: stata output.

Hypothesis 1. We expect that inefficiency will decrease when economic growth is high. From table we can conclude that there is no negative relationship between economic growth and business efficiency (CIR). The sign is positive indicating economic growth increases inefficiency. The coefficient is 0.31 with standard error (SE) 0.44. The T-statistics is 0.70. In short we reject hypothesis that economic growth improves efficiency.

The coefficient of Economic growth variable is positive meaning higher economic growth reduces bank efficiency. The finding rejects hypothesis that economic growth reduces cost because bank can easily find debtors, which is not valid. It is clear that higher economic growth tends to make banks to expand that makes their expense higher than their income. Correlation between economic growth and cost inefficiency is positive although it is very small only 5%. This finding is valid in ASEAN banking market where bank is expanding from time to time. On average asset size in 2008 is only USD 1.06 billion but in 2012, average size is USD 2.06 billion. It is a 100% hike in just five years. In the current competitive environment and tendency among bankers to expand the size, the result is not astonishing. Bank economic growth is higher, banks are racing to expand by investing in new branches. Business expansion in the short run is always meaning more expenses without quick income.

Hypothesis 2. Relating to hypothesis 2 that there is a significant and positive relationship between inflation rate and business efficiency (CIR), we can accept it and conclude inflation reduces bank efficiency. The coefficient is 1.16 with SE 0.37 then t-statistics is 3.17. Inflation is significant at 1%. In short we can conclude lower inflation increases bank business efficiency.

Inflation rate reduces bank cost efficiency. It is rational as banks in ASEAN are serving as intermediary between depositors and borrowers. Positive sign in the model shows that higher inflation rate increases cost inefficiency (CIR). It is because during higher inflations, banks tend to

follow the policy of central bank to increase interest rate benchmark. Higher interest rate is mostly for compensating deposits. It means bank spend more to counter inflation rate. At the same time, banks tend to keep interest rate during high inflation because banks do not want their loan portfolio quality decrease. It is possible explanation why inflation rate reduces cost efficiency. In the high inflation economy, banks are also spending more to catch up with increasing expenses such as personnel as well as other inputs.

Hypothesis 3. Relating to hypothesis 3, there is a negative and significant relationship between the size of bank's asset (LASSET) and business efficiency (CIR), we can conclude to accept it. The coefficient is -4.83 with SE 0.69 and t-statistics -7.01. It means big bank is more efficient than smaller bank. The coefficient for asset is the biggest to support the importance economies scale in the bank business efficiency.

Economies of scale and scope are positive to efficiency. The coefficient is negative to show that higher asset size reduces bank cost inefficiency. It is rational as bank with big size is able to enjoy economies of scale and economies of scope. Big banks are able to borrow from market or accept deposits at lower price because of their strong position in the market. Position in the market makes a bank enjoy cheaper interest rate because depositors believe that the bank is safe and will not fail. In term of procurements, big banks also enjoy benefit in term of lower price. Big banks also enjoy benefit of joint cost of production among services they can provide. Economies of scope make banks enjoy cheaper cost to produce a range of service together than to produce each one of them on a single entity. Economies of scale are becoming the reason behind mergers and accusation among banks in ASEAN. Banks are benefiting from size in term of reputation and quantity benefits.

Hypothesis 4 is on the impact of problem loan on cost efficiency. We measure problem loan using loan loss provision as a proxy to accommodate different definition of problem loan in ASEAN. Loan provision has negative impact on bank cost efficiency. Ratio of loan loss provision to total loan is positive meaning that higher loan provision means higher cost for bank (less efficient). It means higher loan loss provision has two impacts. On cost side, it increases expenses. At the same time, it reduces income because problem loan means no interest and principal repayment. Bank with higher loan loss provision will have higher cost and lower income. That discussion is consistent to the empirical result.

This finding is consistent to Berger and De Young (1997) that cost-inefficient banks tend to have problems loan for a number of reasons. It is called as the 'bad luck' hypothesis. When a bank experienced an increase in problem loans, the bank begins to expend additional managerial effort and expense dealing with these problem loans. These extra operating costs may be for additional monitoring of the delinquent borrowers and the value of their collateral, the expense of analyzing and negotiating possible workout arrangements, the costs of seizing, maintaining, and eventually disposing of collateral if default later occurs and the diversion of senior management attention away from solving other operations problems. These additional costs reduce bank efficiency. Fiordelisi, Marques-Ibanez and Molyneux (2011) find similar conclusion that risk reduces bank business efficiency.

Hypothesis 5. Hypothesis 5 states that there is a significant relationship between ratio of personnel expenses to total expenses (PERSTEX) and business efficiency (CIR). The result shows that coefficient is 1.84 with SE 0.22 and t-statistics 8.30. The result implies that personnel expense is negative to cost efficiency. The size of personnel expense in ASEAN banking is around 18%. It is basically confirmed that personnel expense is very significant cost for banking. Banking in ASEAN can be classified as human capital intensive process.

Personnel expenses make ASEAN banking less efficient. Personnel expense becomes a significant cost of ASEAN banking as it reaches 1.3% of asset. Less availability of professional bankers make the competition quite high. Competitions make personnel expenses increase. Interesting point is the bigger the bank, the lower personnel expenses ratio. It is indicating the existence of economies of scale and scope. Improving cost efficiency of ASEAN banking requires strong commitment to apply performance based salary. Other choice is by expanding asset size. There is negative correlation between asset size and personnel expenses to asset.

Hypothesis 6 is on the impact of capital position on inefficiency. There is a significant relationship between capital adequacy ratio (CAR) and business efficiency (CIR). CAR is basically a measure of capital strength of banking firm. However, CAR has weak side and does not guarantee that higher ratio is always having higher capital position. The coefficient is positive meaning higher CAR will increase inefficiency. It is on opposite with assumption that strength in capital position improving business efficiency.

Regulatory capital reduces cost efficiency of ASEAN banking. Bank with higher CAR tends to have lower efficiency because there is barrier to

gain more income. Bank with higher capital ratio means two possibilities. The bank that owns high CAR takes less risk taking such as loan. As loan is more profitable, bank's income will be less if bank prefers to have less loan. However less loan means higher capital ratio. When bank takes more risk, its CAR will be lower but the income will be higher. Positive sign of CAR is rational as higher CAR means less risk taking. Less risk taking is lower income that has direct impact cost to income ratio.

Hypothesis 7 is the positive and significant relationship between liquidity positions (LIQUID) and business efficiency (CIR). The finding is in accordance to our expectation that better liquidity is positive to cost efficiency.

Liquidity has positive impact on cost efficiency. Bank that holds more liquid asset is more efficient.

The result underlines the unavailability of money market in ASEAN economy. ASEAN economy in general is having volatile financial market. Bank that relies on financial market for its liquidity management will experience difficult condition. This finding is in contrast to established understanding that lower liquidity means bank has more opportunity to invest the fund on more profitable investment. However as the money market is very volatile, bank must pay high interest rate to get liquidity. It is then rational for bank managers to put more on liquid asset to prevent from having to pay interest in the money market when the bank is in liquidity shortage. In general, internal factors are stronger to influence inefficiency than external factor. To summarize the results, we arrange them in Table 8.

Table 8. Summary of the results

	Variable	Sign	Significance	Null hypothesis	Interpretation
1	ECGR	+	No	Accepted	Higher economic growth reduces cost efficiency
2	INFL	+	Yes	Rejected	Higher inflation rate decreases bank cost efficiency
3	LASSET	-	Yes	Rejected	Higher asset size increases bank cost efficiency
4	LLRGL	+	Yes	Rejected	Higher loan loss provision reduces bank cost efficiency
5	PERSTEX	+	Yes	Rejected	Higher ratio of personnel expense ratio reduces bank cost efficiency
6	CAR	+	Yes	Rejected	Higher capital adequacy ratio reduces bank cost efficiency
7	LIQUID	-	Yes	Rejected	Higher liquidity ratio increases bank cost efficiency

Conclusion

This study aims to identify the sources of bank cost inefficiency from the ASEAN countries. The dataset is collected from Fitch database published by Thomson. In short we conclude as follows:

1. The impact of economic growth on bank cost inefficiency is not statistically significant. This result is in contrast to our expectation that economic growth will lead to a greater increase on cost efficiency. Our finding shows that economic growth reduces cost efficiency.
2. Inflation has a positive impact positively on efficiency. These results indicate that countries with high inflation rates tend to be less efficient banking. The implication of this result is the ASEAN economy should continue to keep inflation low as a way to encourage the banking industry to have better cost efficiency, which in turn, will increase the efficiency of the national economy.
3. Size of business efforts as measured by total asset has a positive impact on cost efficiency. This means banks with large-scale business tend to have better cost efficiency. It is very natural that ASEAN countries, especially Indonesia are trying to encourage mergers that increased levels of banking efficiency.
4. Nonperforming loans as measured by Loan loss Provision (LLRGL) showed positive results

- against inefficiency. This means that the higher non-performing loans decreased cost of efficiency.
5. In relation to labor costs, when banks pay their employees higher salary will tend to be more efficient. However the facts show that high labor costs make banking firm more inefficient.
6. The capital adequacy ratio of banks as measured by the Capital Adequacy Ratio (CAR) showed that the coefficient is positive. Higher CAR levels increase cost inefficiency. These results prove that high capital adequacy ratio is not a result of paid in capital but rather the impact of holding low-risk asset. Indonesian banks have high capital adequacy ratio mainly due to holding securities issued by central bank and government.
7. Liquidity is negative and significant, which means that the bank that has a good liquidity position tends to be more efficient. This finding proves that in the ASEAN countries, the banking system does not yet have a comprehensive system that is capable of providing money market liquidity with efficient and low cost.
8. Internal factors play stronger role in efficiency than external factors such as economic growth and inflation.

The implication of this research is the ASEAN banks are still required to make efforts to improve the efficiency. It is in short, to have a better role in the development process, improving cost efficiency is necessary.

Acknowledgement

Researcher acknowledged the Financial Support under the National Research Grant Scheme from the Ministry of Research, Technology and Higher

Education, Indonesia. Travel grant from STIE Perbanas Surabaya to attend The IPAFEM conference, 7-9 April 2015, Adam Smith Business School, The University of Glasgow – The UK is highly appreciated.

References

1. Akhavein, J.D., Berger, A.N. and D.B. Humphrey. (1997). The effects of megamergers on efficiency and prices: Evidence from a bank profit function, *Review of Industrial Organization*, 12, pp. 95-130. Available at: <http://www.federalreserve.gov/pubs/feds/1997/199709/199709pap.pdf>.
2. Athanassoglou, B.P., Delis, M.D. and Staikouras, C.K. (2006). Determinants of bank profitability in the South and Eastern European region, Bank of Greece. Working Paper No. 47, September. Available at: <http://www.bankofgreece.gr/BogEkdoseis/Paper200647.pdf>.
3. Berger, A.N. and Mester, L.J. (1997). Efficiency and productivity change in the U.S. commercial banking industry: a comparison of the 1980s and 1990s. Working Papers 97-5. Federal Reserve Bank of Philadelphia. Available at: <http://www.philadelphiafed.org/research-and-data/publications/working-papers/1997/wp97-1.pdf>.
4. Berger, A.N., and De Young, R. (1997). Problem loans and cost efficiency in commercial banks, *Journal of Banking and Finance*, 21 (6), pp. 849-870. Available at: <http://www.sciencedirect.com/science/article/pii/S0378426697000034>.
5. Bonin, J.P., Hasan, I. and Wachtel, P. (2005). Bank performance, efficiency and ownership in transition countries, *Journal of Banking and Finance*, 29, pp. 31-53, Available at: <http://www.sciencedirect.com/science/article/pii/S0378426604001141>.
6. Bos, J.W., B.M. Koetter, J.W. Kolari, C.J.M. Kool. (2009). Effects of heterogeneity on bank efficiency scores, *European Journal of Operational Research*, 195 (1), 16 May, pp. 251-261. Available at: <http://www.sciencedirect.com/science/article/pii/S0377221708001495>.
7. Claeys, S. and Van der Venet, R. (2008). Determinants of Bank Interest Margins in Central and Eastern Europe: A Comparison With the West, *Economic Systems*, 32 (2), pp. 197-216. Available at: <http://www.sciencedirect.com/science/article/pii/S0939362507000416>.
8. De Haan, J., and Poghosyan, T. (2012). Bank size, market concentration, and bank earnings volatility in the US, *Journal of International Financial Markets, Institutions and Money*, 22 (1), pp. 35-54. Available at: <http://www.sciencedirect.com/science/article/pii/S1042443111000436>.
9. Evanoff, D.D. and P.R. Israilevich. (1991). Productive Efficiency in Banking, *Economic Perspectives*, 15 (4), pp. 11-32. Available at: <https://de.chicagofed.org/~media/publications/economic-perspectives/1991/ep-jul-aug1991-part2-evanoff-pdf.pdf>.
10. Fries, Steven, Anita Taci. (2005). Cost Efficiency Of Banks In Transition Evidence From 289 Banks In 15 Post-Communist Countries, *Journal of Banking and Finance*, 29, pp. 55-81. Available at: <http://www.sciencedirect.com/science/article/pii/S0378426604001153>.
11. Fiordelisi, F., Marques-Ibanez, D. and Molyneux, P. (2011). Efficiency and risk in European banking, *Journal of Banking & Finance*, Elsevier, 35 (5), pp. 1315-1326. Available at: <http://www.sciencedirect.com/science/article/pii/S0378426610003869>.
12. Fiordelisi, Franco and Molyneux, Phil. (2010). Total factor productivity and shareholder returns in banking, *Omega*, Elsevier, 38 (5), pp. 241-253, October. Available at: <http://www.sciencedirect.com/science/article/pii/S0305048309000371>.
13. Hsiao, C., Shen, Y., Bian, W. (2015). Evaluating the effectiveness of China's financial reform – The efficiency of China's domestic banks, *China Economic Review*, 35, pp. 70-82. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2611235.
14. Karim, M.Z.A. (2001). Comparative Bank Efficiency across Select ASEAN countries, *ASEAN Economic Bulletin*, 18 (3), pp. 289-304. Available at: <http://www.jstor.org/stable/25773688>.
15. Kasman, A., Tunc, G., Vardar, G. and Okan, B. (2010). Consolidation and commercial bank net interest margins: Evidence from the old European Union members and candidate countries, *Economic Modeling*, 27, pp. 648-655. Available at: http://www.researchgate.net/profile/Goekce_Tunc/publication/46493437_Consolidation_and_commercial_bank_net_interest_margins_Evidence_from_the_old_and_new_European_Union_members_and_candidate_countries/links/54edd980cf2e55866f18037.pdf.
16. Levin, R. (1997). Financial Development and Economic Growth: Views and Agenda, XXXV (June), pp. 688-726. Available at: <http://pascal.iseg.utl.pt/~aafonso/eif/pdf/Levine.pdf>.
17. Lieberg, D., and Schwaiger, M.S. (2009). What Drives the Interest Rate Margin Decline in EU Banking – The Case of Small Local Banks, *Kredit Und Kapital*, 42 (4), pp. 509-538. Available at: <http://econpapers.repec.org/article/kukjournal/>.
18. Louzis, D.P., Vouldis, A.T., Metaxas, V.L. (2012). Macroeconomic And Bank-Specific Determinants Of Non-Performing Loans In Greece: A Comparative Study Of Mortgage, Business And Consumer Loan Portfolios, *Journal of Banking and Finance*, 36 (4), April, pp. 1012-1027. Available at: <http://www.sciencedirect.com/science/article/pii/S0378426611002895>.

19. Shen, Z., Liao, H. and Weyman-Jones, T. (2009). Cost Efficiency Analysis in Banking Industries of Ten Asian Countries and Regions, *Journal of Chinese Economics and Business Studies*, 7 (2), pp. 199-218. Available at: <http://www.tandfonline.com/doi/abs/10.1080/14765280902847734>.
20. Sufian, F. (2010). The Impact of the Asian Financial Crisis on Bank Efficiency: The 1997 Experience of Malaysia and Thailand, *Journal of International Development*, 22 (7), pp. 866-889. Available at: <http://onlinelibrary.wiley.com/doi/10.1002/jid.1589/full>.
21. Tahir, I.A. Mongid and S. Haron. (2012). The Determinants of Bank Cost Inefficiency in ASEAN Banking, *Journal Pengurusan*, 36, p. 69-76. Available at: <http://ejournals.ukm.my/pengurusan/article/view/2139>.
22. Zeitun, R. (2012). Determinants of Islamic and Conventional Banks Performance In GCC Countries Using Panel Data Analysis, *Global Economy A end Finance Journal*, 5 (1), pp. 53-72. Available at: <http://gefjpapers.com/static/documents/March/2012/4.%20Rami.pdf>.