CPS2245
The Impact of Financial Sector Masterplan on Cost Efficiency of Malaysian Banks: An Analysis of Stochastic Frontier Analysis

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21st August 2019, 2.00 pm – 3.40 pm, Room 409

62nd ISI WORLD STATISTICS CONGRESS 2019
18 – 23 August 2019, Kuala Lumpur
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Outline/ Content

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Introduction

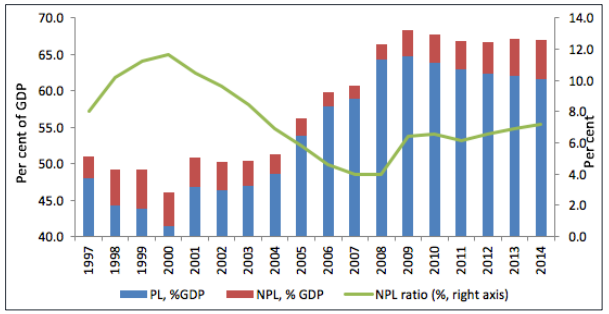
Adverse impact on Malaysian banking system during Asian Financial crisis…

- Malaysia was hit by the Asian financial crisis in 1997–98. The Malaysian Ringgit fell by 40% against the US Dollar; the stock market plunged by over 70%, resulting in extreme volatility in financial markets and the country's sovereign rating being downgraded.

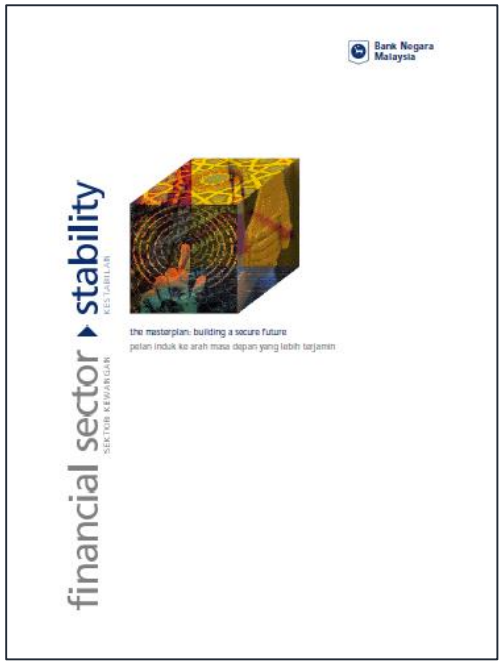
- The scenario worsened as economic activity declined: GDP contracted by 7.5% with weak regional export demand; companies were in distress and unable to service debt and over leveraging.

- In the banking system, the number of non-performing loans (NPLs) increased sharply, which caused capital erosion due to over-concentration of risk (mainly in the large corporate sector).

- At the same time, the intermediation process was also inefficient due to tight liquidity and loan growth moderated sharply.



The Financial Sector Master Plan aims to develop a more resilient, competitive and dynamic financial system…



- The FSMP initiatives changed the financial landscape of the banking industry. As of 2011, the banking industry was consolidated and rationalised, from 33 domestic financial institutions into eight banking groups

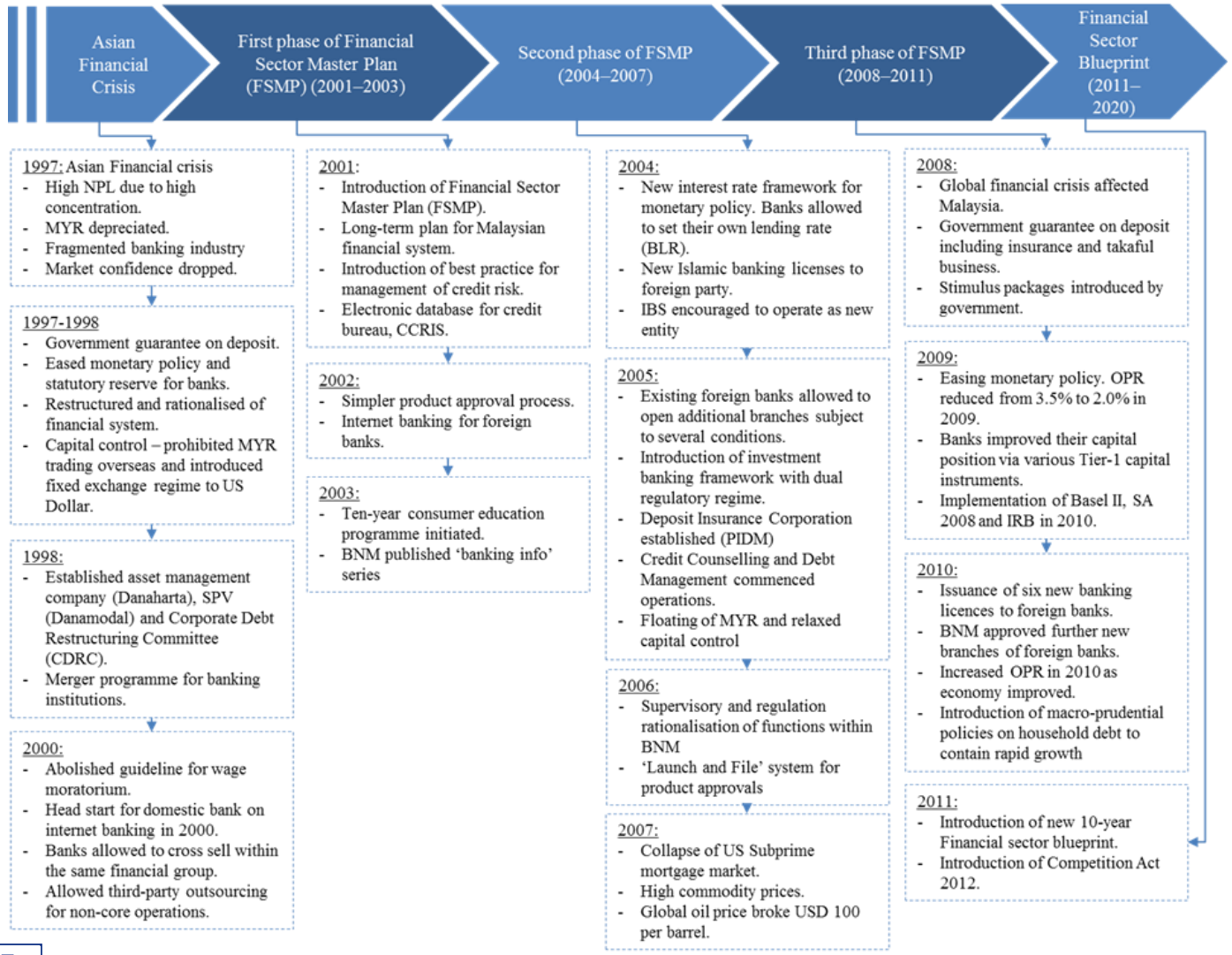
- Banks were also found to be diversifying and improved their efficiency in delivery channels for financial products and services by enhancing access to financing, particularly for SMEs and consumers.

- These changes diversified the financial sector, with a deep and liquid debt securities market and a better focus on investment banks assisting corporations to get alternative finance in the bond market.

"The objective of the FSMP is therefore 'to develop a more resilient, competitive and dynamic financial system with best practices, that supports and contributes positively to the growth of the economy throughout the economic cycle, and has a core of strong and forward looking domestic financial institutions that are more technology driven and ready to face the challenges of liberalisation and globalisation"

- Banks are now more focused on corporate governance and risk management, particularly with the implementation of principles-based regulations, coupled with an adequate supervisory and surveillance framework.

The natural response to aftermath of financial crisis involves structural reforms and liberalisations…



- The objectives of these reforms and liberalisations, via the FSMP, are to promote diversity, efficiency and productivity, and to facilitate a competitive banking system by improving resource allocation and building a stronger economy (Fry, 1995).

- As a consequence, banking efficiency received even more attention in the aftermath of the financial crisis, with structural reforms and liberalisations, rendering the examination of this banking efficiency an important issue for both the public and policymakers alike (Berger and Mester, 1997).

Objectives

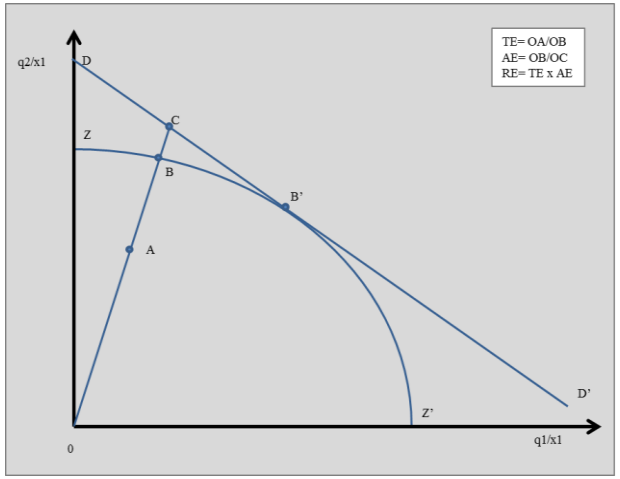
The objective of the study …

First, to carry out a cost-efficiency analysis of Malaysian banks for the years 2000–2011 using stochastic frontier approach and examining how changes in the financial services affected efficiency, productivity and the market structure of the banking industry in Malaysia.

Second, to examine the impact of market liberalisation initiatives, via the FSMP, on efficiency and productivity in Malaysian banks.

Methodology

Frontier measurement was employed in this study



- Frontier measurement is employed to measure the efficiency of Malaysian banks for the years 2000–2011.
- For better estimation of cost-efficiency, and taking into account the effect of heterogeneity (e.g. ownership structure, banks specialisation, inherent risks, and size), this study uses Battese and Coelli's (1995) one-stage approach.
- In this one-stage approach, a set of control variables (e.g. capital adequacy, asset quality and liquidity) and environmental variables (e.g. ownership, specialisation, financial liberalisation and size) are included into the specification of cost- and profit-efficiency functions.
- These different sets of control and environmental variables are tested in several stages using statistical testing (i.e. the log-likelihood ratio test), searching for the best fitting model that is later utilised for the estimation of efficiency scores in Malaysian banks.

Stochastic Frontier Analysis requires cost functional form

- The SFA model assumes that in producing a certain level of output, firms face various technical inefficiencies and a given combination of input levels. The firm's production is influenced by the sum of a parametric function of known inputs, with unknown parameters, and a random error (associated with the measurement error of the level of production and inefficiency).

- SFA requires a functional form, such as cost or profit, with a two-component error terms: random error and inefficiency. The single-equation stochastic cost function model is shown below:

$$lnY_{it} = \beta_{x_{it}} lnX_{it} + ln\varepsilon_{it} \qquad (1)$$

- where $lnYit$ is the natural logarithm of output for the i-th bank at time t, $lnXit$ is a vector of inputs of i-th bank at time t, βxit is a vector of unknown parameters to be estimated and $ln\varepsilon it$ is the error term.

Assumption of composed error term

- Following Aigner et al. (1977), the assumption of the composed error term is:

$$\varepsilon_{it} = Vi_t + U_{it} \qquad (2)$$

- where Vit and Uit are independently distributed;
- Vit represents random uncontrollable error and is assumed to be normally distributed with zero mean and variance $\sigma v2$ is drawn from a one-sided distribution that is assumed to capture inefficiency. Uit is assumed to be drawn from a half-normal distribution with mean zero and variance $\sigma u2$.
- Uit can be used to measure the level of inefficiency of banks. For instance, if Uit is equal to 0, it indicates that there is no inefficiency based on the production function imposed. On the other hand, if Uit is more than 0, it indicates that inefficiency is present.

Output-oriented measure of technical efficiency…

- Equation 3 exhibits the common output-orientated measure of *TE* using the ratio of observed output to corresponding frontier output, which can be written as (Coelli et al., 2005):

$$TE_{it} = \frac{y_{it}}{\exp(\beta_{x_{it}} + v_{it})} = \frac{\exp(\beta_{x_{it}} + v_{it} - u_{it})}{\exp(\beta_{x_{it}} + v_{it})} = \exp(-u_{it}) \qquad (3)$$

- where *TE* is technical efficiency of *i*-th bank at time t, yit is the observed output and exp ($\beta xi + vi$) is the corresponding frontier output.

- *TE* has a value between 0 and 1, in which *TE* derives from the output of *i*-th bank relative to a fully-efficient bank's output, located on the estimated frontier curve that utilises the same input vector (Coelli et al, 2005).

Cost Efficiency

- The cost-efficiency of the *i*-th bank is the estimated cost needed to produce bank *i*'s output vector if the bank were as efficient as the best-practice bank (on the frontier curve) in the sample facing the same inputs and outputs, control, and environmental variables(w,y,c,z), divided by the actual cost of *i*-th bank, and adjusted for random error. It can be written as:

$$CE_{it} = \frac{\exp(f(w_{it},y_{it},c_{it},z_{it},\beta) + v_{it}}{\exp(f\ (w_{it},y_{it},c_{it},z_{it},\beta) + v_{it} + u_{it}} = \frac{1}{\exp(u_{it})} \qquad (5)$$

- where $CEit$ is the cost-efficiency of *i*-th bank. The numerator in equation 5 indicates the minimum cost that can be incurred by the best practice banks and the denominator in equation 5 denotes the actual cost incurred by *i*-th bank at time *t.*

- Hence, cost-efficiency $CEit$ is measured against the ratio of minimum cost banks (best-practice banks on the frontier) and the actual cost of *i*-th bank. Cost-efficiency $CEit$ could also be seen as a proportion of cost that is either being used efficiently or being wasted.

- For example, if $CEit$ of *i*-th bank is 0.60, it indicates that *i*-th bank is 60.0% efficient and 40.0% of its cost is being wasted when compared to the best-practice bank. Cost-efficiency ranges between 0 and 1. Banks with a cost-efficiency of 1 are considered to be best-practice banks within the observed data.

Banks as intermediaries, utilizing funds, capital and labour to distribute loans and investments…

- Input variables used in this analysis are funds, labour and physical capital.
- Outputs are loans, investments and other earning assets.
- Control variables used in this research are asset quality, capital adequacy, liquidity, and time trends to capture the effect of heterogeneity.
- Environmental variables: ownership, specialisation, liberalisation phases (based on the FSMP three-stage liberalisation process), global credit crisis period.

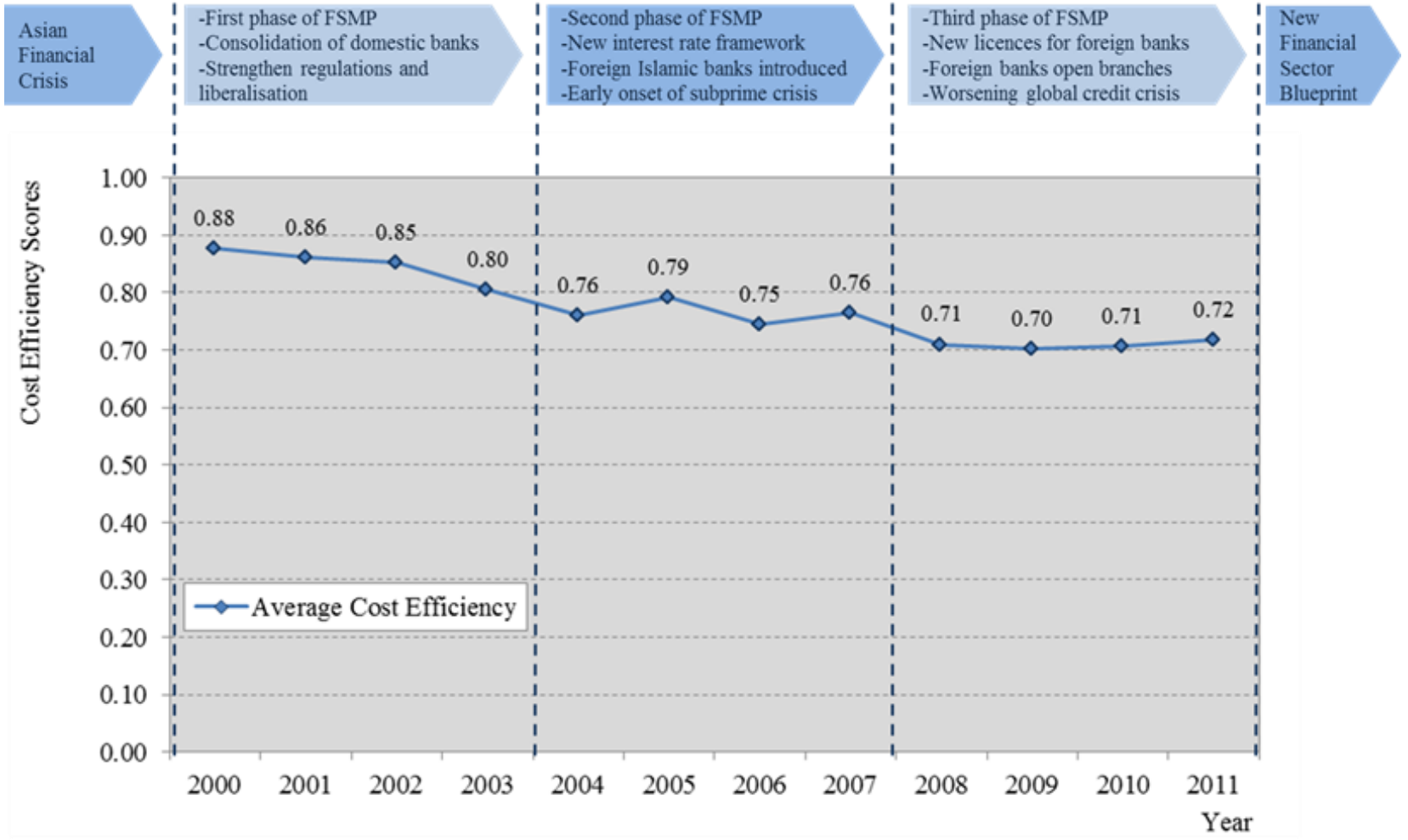
Results

Average cost efficiency of Malaysian banks trended downward

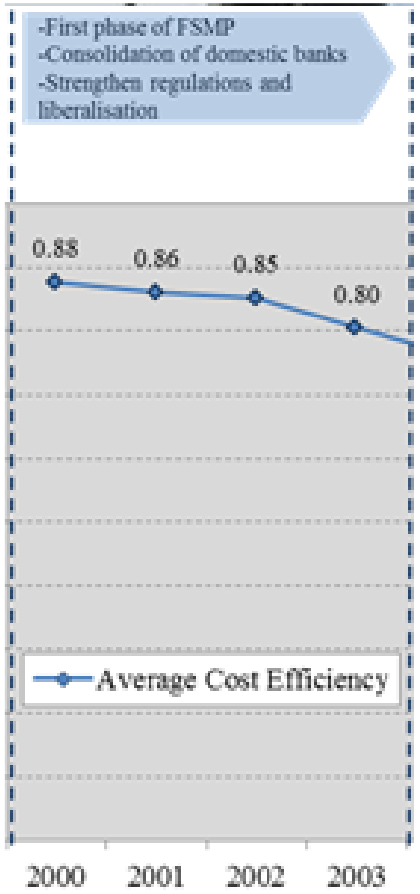
Year	Count	Mean	Standard Deviation	Minimum	Maximum
2000	24	0.8760	0.1519	0.2600	0.9721
2001	26	0.8614	0.1537	0.2698	0.9787
2002	24	0.8523	0.1524	0.3253	0.9725
2003	24	0.8103	0.1528	0.3731	0.9582
2004	25	0.7596	0.1734	0.2404	0.9270
2005	26	0.7913	0.1554	0.2088	0.9418
2006	29	0.7450	0.2095	0.2033	0.9317
2007	31	0.7648	0.1440	0.2704	0.9402
2008	36	0.7098	0.1783	0.0509	0.9324
2009	37	0.7025	0.1877	0.0296	0.9271
2010	37	0.7065	0.1884	0.0738	0.9478
2011	35	0.7177	0.2157	0.0848	0.9702
2000-2003	98	0.8502	0.1523	0.2600	0.9787
2004-2007	111	0.7647	0.1707	0.2033	0.9418
2008-2011	145	0.7090	0.1909	0.0296	0.9702
2000-2011	354	0.7655	0.1834	0.0296	0.9787

- The average cost efficiency score for Malaysian banks between 2000 and 2011 is 82.7%.
- The average score of cost efficiency was at 85.1% in 2000 and ended with 75.0% in 2011
- Malaysian banks wasted around 20.0% of their input to produce the same level of outputs of the best performing banks.
- consistent with past findings in literatures

Declining cost efficiency demonstrated by Malaysian Banks…



First phase of FSMP was the period of strengthening the banking system



- The first phase of the FSMP (2000–2003) is period of initial reform in the banking industry. The banking sector witnessed the emergence of large domestic banks from a guided consolidation exercise.

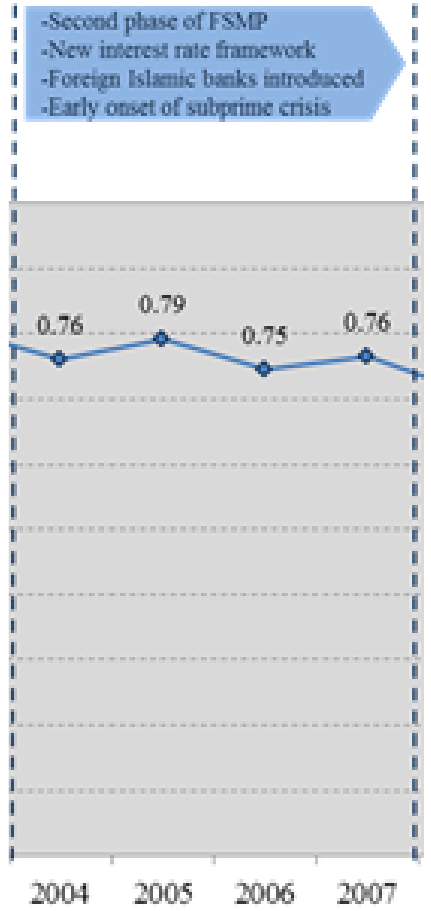
- During this period, cost efficiency scores were trending downward.
  - With the severe losses faced by the Malaysian banks, rescue scheme established to acquire shares in some of the ailing commercial banks and absorb problem assets in distressed banks.
  - Consolidation of fragmented banking institutions
  - Banks were forced to implement rationalisation programmes including, restructuring of duplicated branch networks, managing staff redundancy, synchronising technology with the acquiring partner and implementation of internet banking services.

Slight positive outcome upon liberalization of interest rate in phase 2

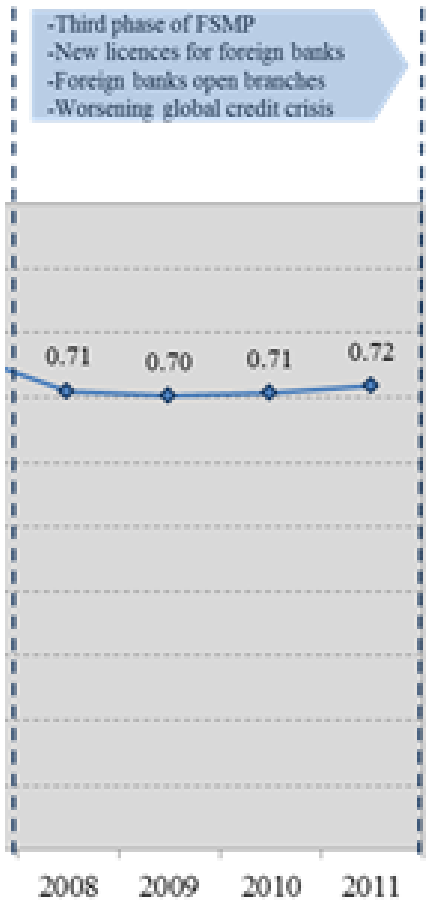
- During the FSMP's second phase (2004–2007), BNM introduced a new interest rate framework (NIRF) that aimed to facilitate more efficient pricing of financial products.
  - As a result of the deregulation of interest rates, banks were forced to adjust their inputs and outputs to remain competitive. With the introduction of NIRF, Malaysian banks were able to price their funding costs and revenues based on their own cost structure and compete for customers using their own interest pricing structure.

- Slight increase in cost efficiency scores in 2005, due to liberalisation of BLR, indicating some increasing level of competition in terms of pricing among Malaysian banks.

- At the end of the second phase of the FSMP, the cost efficiency scores dropped marginally due to inception of new foreign Islamic banks.
  - Cost efficiency scores worsened because these new or de-novo foreign Islamic banks inherently faced higher operational costs during their early phase of operations.



Challenging operating environment in third phase of FSMP due to GFC



- Malaysian GDP contracted by 1.7% in 2009. The NPLs of banks increased slightly in 2009. The declining trend of cost efficiency scores is driven by greater operating costs when managing excess liquidity from large inflows of foreign funds, and placing greater resources into managing potentially delinquent loans.

- BNM reduced its policy interest rate (OPR) from 3.5% to 2.0% in November 2008 to February 2009. The policy interest rates required banks to drastically adjust their input prices and outputs according to the indicative market interest rate (i.e., the OPR).

- A slower response in adjusting to changes resulted in Malaysian banks experiencing lower cost efficiencies during the third phase of the FSMP. Basel II was also implemented between 2008 and 2010 (Standard Approach and Internal Ratings Based Approach) and Malaysian banks invested heavily in technology, physical assets, external consultants and specialised labour to comply with the new capital regulation.

Conclusion

Initiatives under FSMP may not resulted in immediate impact…

- Before the Asian crisis, banks were found to lack effective risk management and corporate governance, resulting in a high level of fragility.

- the FSMP was introduced to strengthen and further liberalise the Malaysian banking industry following the Asian financial crisis in 1997–98.

- The implementation of the FSMP changed the financial landscape of the banking industry.
  - A series of financial liberalisation measures introduced including; liberalisation of interest rate to market players, introduction of new foreign banks (both Islamic and conventional banks), branch liberalisation by allowing foreign banks to increase their branches, de-pegging of Malaysian Ringgit to US Dollars, simplified product approval process, lifting of wage moratorium, and allowing of outsourcing of banks' non-core activities.

- This study found that the cost inefficiencies in Malaysian banks are approximately 20.0% less cost-efficient when compared to best-practice banks. Therefore, in order to produce the same level of outputs of the best-practice banks, these inefficient banks should improve their cost by approximately 20.0% respectively.

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