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Political Stability, Country Risk and Bank Efficiency in East Asian Countries

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ABSTRACT

This paper uses Stochastic Frontier Analysis to estimate an output distance function for ten East Asian countries during 2000-2010. The results show significant political stability and country risk coefficients which indicates that the region could be influenced by unexpected events, such as systemic crises. The results further indicate the insensitiveness of regional bank outputs to each country's economic status. Hence, financial cooperation has integrated the East Asian countries market which have different operating environments,. Finally, the models show that banks benefit from the integrated market through the accessibility to technology, inputs and outputs of banks. However, this situation could weaken the banking system during systemic crisis which could influence the risk position of the countries.

Keywords: East Asian banks, Efficiency, Output distance function, Political stability, Country risk
JEL Classification: G01 G21 D24 D81 F36

INTRODUCTION

The analysis of efficiency helps us explain the causes of different responses to shocks from banks or countries. During financial crises, some countries are affected and some manage to prevent the contagion from spreading. In addition, some banks face insolvency and excessive risk taking. However, some other banks perform better to survive the crisis. There have been recriminations over whom to blame for different bank performance during crises. Although everybody blamed economic and bank conditions for low bank performance, politics and risk can influence operating environment and policy decisions. The recurrence of bankruptcies raises an important question regarding the efficiency, political stability, and country risk in modern finance.

The modern finance is more sophisticated and recognizes that the risk a bank faces is very complex. Previous studies believed that efficiency differences are attributable to economic environments and bank managerial decisions. However, it is possible that the regional countries are financially integrated, and efficiency differences can be explained by other factors. These factors can even influence assets-liabilities mix, capital flows and requirements, and hence, managerial decisions. If these factors have contributions in efficiency measurement, neglecting them would result in biased

efficiency scores. Dietsch and Lozano-Vivas (2000) documented that estimated efficiency scores in a model without controlling for operating environment are biased.

Studies, such as Dietsch and Lozano-Vivas (2000), Carvallo and Kasman (2005), and Fang, Hasan, and Marton (2011) specified a common frontier that controls for economic variables. They pointed out that efficiency scores obtained from a model without country-specific variables distort the relative efficiency of banks from different countries. However, the main issue is to summarize all information in an international comparison of banking efficiency. This issue motivated this study to control different environmental factors including political and economic conditions in an efficiency measurement study. The objective of this paper is to estimate the efficiency of the East Asian banks during the period of 2000-2010.

This paper contributes to the efficiency measurement by using three indices for environmental variables. The political stability, economic status, and country risk are indices that control the differences in operating environments. The indices are able to control corruption perception, regulatory conditions, government instability, financial and debt status, capital mobility, bank risk, monetary and currency instability, budget deficit, country risk, and economic conditions. Despite previous studies on efficiency measurement, this paper considers a wide range of environmental factors to provide more accurate estimates. The results show the significant impacts of the country risk and political stability in the estimated Stochastic Frontier Approach (SFA). Nonetheless, the differences in bank efficiencies are mainly attributable to managerial decisions.

Bank inefficiencies have much in common with the financial crises of the East Asia (1997-1998) and US (2007). The lessons that we can draw from crises support the importance of managerial decisions regarding inputs and outputs (Bordo, Meissner, & Stuckler, 2010; Hahm & Mishkin, 2000; Shleifer & Vishny, 2010). The liabilities and capital are inputs that banks use to produce loans and outputs. The mismatch between short-term funds (inputs) and long-term loans (outputs) were the underlying causes of inefficiencies and the crises. Moreover, the capital that is a buffer against losses failed to cover bank runs. In the aftermath of the U.S. crisis, many banks across the most advanced countries with prosperous economies went bankrupt. Nevertheless, East Asian banks performed better to survive the crisis. The evidence once again highlights the importance of policies related to the sustainable performance of banks. A politically unstable country with high country risk would suffer from lack of public confidence, which causes capital outflows.

As mentioned already, even advanced economies with free capital flow faced banking crises and risk. The risk prone nature of countries draws the attention of researchers and policy makers to bank performance as an investment evaluation tool. A key issue in risk management is to limit the contagious effects of insolvency risk. Berger and Humphrey (1997), Jonathan (2004), Podpiera and Weill (2008), Rötheli (2010), and FIordelisi, Molyneux, and Marqués Ibáñez (2010) related bank risks to low bank performance. The authors concluded that bank inefficiencies Granger caused future risks. The findings of this paper suggest that country-specific risk is a source of inefficiencies. Hence, researchers and bank managers are also concerned with the stability of countries that affects financial systems. In summary, the findings provide information for East Asian policy makers to take efficient policies.

The remainder of this paper is organized as follows. Section 2 reviews the literature related to the efficiency and is followed by a description of the methodology in Section 3. Section 4 presents the sample data and empirical specification of the efficiency. Section 5 reports the results related to the efficiency and environmental variables. Finally, Section 6 concludes this paper.

LITERATURE REVIEW

Previous studies on banking performance have considered managerial decisions as the internal causes of inefficiencies. The optimal choice of inputs and outputs by managers significantly influences the technical efficiency of banks. However, some literature has also attributed observed inefficiencies to external causes, such as economic and financial factors. The following literature briefly reviews the estimation process employed to measure bank efficiencies. Particularly, it historically takes into account the SFA and production process for depository institutions. The focus is on the potential contribution of environmental variables in the East Asia.

The banking performance is an important issue for policy makers to have economic stability. The primary goal of banks is to stabilize target markets under efficient use of available resources. They try to allocate resources to the most productive projects that direct them towards objectives. In order to improve the allocation, managers need to evaluate technical efficiencies that are subject to the

managerial decisions and environment. Previous studies have investigated the impact of internal environments and risks, as well as economic conditions on the performance of banks.

As mentioned already, the main function of depository institutions is an efficient use of deposits in producing loans. The problem of measuring the technical efficiency is subject to production function specification. The identification of inputs, outputs, environmental variables, and disturbance term are the cornerstone of a well-specified function. Given the estimated outputs of the production function, Farrell (1957) defined technical efficiencies as possible radial expansion in outputs holding inputs constant. Although Farrell (1957) tried to empirically define efficiency, Aigner, Lovell, and Schmidt (1977) and Meeusen and Broeck (1977) were first to add a two-component disturbance (error) term. They introduced the SFA to estimate technical efficiencies, which assumes two sources of deviations from a common frontier. The two-component disturbance term separates inefficiency from other sources of deviations. In another study, Sealey Jr and Lindley (1977) introduced the intermediation approach to identify inputs and outputs in depository institutions and commercial banks.

Although the intermediation approach attributes inefficiencies to managerial decisions, the bank's performance is also subject to operating environments. Hence, relative inefficiency differences in cross-country studies may be attributable to other factors beyond the control of banks. In a panel study, Dietsch and Lozano-Vivas (2000) found that inefficiency differences would be substantially reduced after controlling for environmental variables. They demonstrated that economic variables explain a part of inefficiencies. Put differently, common frontier estimates in a model without control variables would be biased.

Several studies suggested economic and financial variables in the estimation of a cross-country common frontier (e.g. Carvallo and Kasman (2005), Williams and Nguyen (2005), Kasman and Yildirim (2006), Maudos and de Guevara (2007), Carbó Valverde, Humphrey, and López del Paso (2007), Staikouras, Mamatzakis, and Koutsomanoli-Filippaki (2008), Mamatzakis, Staikouras, and Koutsomanoli-Filippaki (2008), Koutsomanoli-Filippaki and Mamatzakis (2009), Lozano-Vivas and Pasiouras (2010), Abdul-Majid, Saal, and Battisti (2010), Lozano-Vivas, Kumbhakar, Fethi, and Shaban (2011), Akhigbe and McNulty (2011), and Fang, et al. (2011)). However, the variables can partially explain important environmental differences originated in political and risk conditions.

A two-way relationship between risk and inefficiencies is an important issue for both bank managers and policy makers. As expected by bad management hypothesis, bank inefficiencies precede future risks and insolvency. Berger and Humphrey (1997), Jonathan (2004), Podpiera and Weill (2008), Rötheli (2010), and FIordelisi, et al. (2010) pointed out that lax supervision, high operating cost, low quality loans and profit are inefficiency factors that precede risks. On the other hand, shocks and risks direct the attention of managers with strategies that increase costs. Hence, the bad luck hypothesis suggests that country risk Granger causes inefficient performance. Koutsomanoli-Filippaki and Mamatzakis (2009) provided some evidence for the two-way relationship.

Bank-specific risks originate in supervisory and internal environment, whereas country-specific risks are beyond the control of banks. Managers that operate in a risk-prone country need to take precautionary strategies that prevent contagious effects. Political instability is a country-specific risk that requires more attention. Government stability, regulation, non-corruption, and issues-related to finance are some aspects of a politically stable country. Previous studies did not take into account these aspects in efficiency measurement. However, Leblang and Satyanath (2008) and Biglaiser, DeRouen Jr, and Archer (2011) provided evidence for the effects of the instability on systemic failures, uncertainty, and foreign funding. They also found that a combination of political and economic variables provide better information about the environment that investors operate. In sum, an unstable environment alerts international markets to increased risks in a country. Hence, domestic markets and banks need to provide more financial resources for companies, government, and projects, which can influence bank outputs. Meanwhile, this condition exposes banks to failures and bad loans, which adversely affect efficiencies.

A few numbers of studies have evaluated bank efficiencies in the East Asian countries. Thoraneenitiyan and Avkiran (2009) discussed that the stability of the region is important for the world. Moreover, they highlighted bank inefficiencies as a major cause of crises. In other studies, Abd Karim (2001) and Kwan (2003) found that bank efficiency estimates vary across the countries and over time. The results of Kwan (2003) show the significant impact of the instability of 1997-1998 on the estimates. With regard to the operating environment, Williams and Nguyen (2005) found a relationship between efficiencies and policies taken after instabilities. In another study, Ariff and Can (2009) found that policies have different influences on the performance of banks.

In summary, the previous literature on the East Asia supported the use of environmental variables in efficiency measurement. Particularly, it highlights that stabilities play a significant role in explaining efficiencies and policies taken to improve them. Nevertheless, it is admittedly difficult to

draw comprehensive conclusions about the impact of environment on bank performance. This paper contributes to the efficiency measurement by using three indices for political stability, county risk, and economic status.

METHODOLOGY

An efficiency study estimates a common frontier to compare the performance of banks against the efficient frontier. Farrell (1957) developed the technical inefficiency as the maximum possible radial expansion of an output from given inputs. Moreover, Aigner, et al. (1977), Meeusen and Broeck (1977) suggested taking into account two sources of deviations using parametric SFA. The model estimates a frontier production function under a two-component error term. The error term assumes that deviation from the frontier function is due to either inefficiencies or statistical noise.

The two-sided statistical noise has a normal distribution with zero mean and σ_v^2 variance $(IIDN(0,\sigma_v^2))$. With regard to the inefficiency component of the error term, Aigner, et al. (1977) assumed a half-normal distribution that is truncated above at zero $(IIDN^+(0,\sigma_u^2))$. However, Stevenson (1980) used a truncated normal distribution that is truncated above at μ $(IIDN^+(\mu,\sigma_u^2))$. In another study, Meeusen and Broeck (1977) employed a single-parameter (θ) exponential distribution $\left({}^{1}/_{\theta}, {}^{1}/_{\theta^2}+\sigma_v^2\right)$ to separate the two components. Finally, Greene (1990) developed a two-parameter gamma distribution $(G(\Theta,P))$ to separate inefficiency from statistical noise.

This paper uses an exponential distribution to generate bank technical efficiencies. A common frontier in the East Asia region demonstrates the efficient levels of outputs for given inputs. In order to estimate the frontier, cost and profit functions assume behavioural assumptions and use price information. However, an output distance function can employ multi- inputs and –outputs without any assumptions or price information (Coelli, Rao, O'Donnell, & Battese, 2005; Cuesta & Orea, 2002; Feng & Serletis, 2010; Jiang, Yao, & Zhang, 2009; O'Donnell & Coelli, 2005). The general form of the output distance function is given as follows:

$$D_i^0 = D^0(x_{1i}, x_{2i}, \dots, x_{Ki}, y_{1i}, y_{2i}, \dots, y_{Mi}) \qquad (1)$$

The identification of K-inputs and M-outputs follows the Sealey Jr and Lindley's (1977) intermediation approach. Hence, banks use borrowed funds, labour and capital as inputs, $(x_{1i}, x_{2i}, \dots, x_{Ki})$, to produce loans and other earning assets as outputs, $(y_{1i}, y_{2i}, \dots, y_{Mi})$. In a panel study, country-specific variables allow us to control environmental differences between countries. The general form of the stochastic output distance function is as follows:

$$1 = D^0(Y_{it}, X_{it}, Z_{it}, \beta)\exp^{(u_{it}+v_{it})} \qquad (2)$$

Where, Y_{it} is a vector of outputs, $(y_{1,it}, y_{2,it}, \dots, y_{M,it})$, X_{it} is a vector of inputs , $(x_{1,it}, x_{2,it}, \dots, x_{K,it})$, and Z_{it} is a vector of country-specific control variables $(z_{1,it}, z_{2,it}, \dots, z_{g,it})$. The linear homogeneity of outputs facilitates the estimation of the stochastic output distance function. The homogeneity can be imposed as:

$$D^0\left(\frac{Y_{it}}{y_{M,it}}, X_{it}, Z_{it}, \beta\right) \Rightarrow \frac{1}{y_{M,it}} = D^0\left(\frac{Y_{it}}{y_{M,it}}, X_{it}, Z_{it}, \beta\right)\exp^{(u_{it}+v_{it})} \Rightarrow$$

$$\frac{1}{y_{M,it}} = D^0(Y_{it}^*, X_{it}, Z_{it}, \beta)\exp^{(u_{it}+v_{it})} \qquad (3)$$

Where, $Y_{it}^* = y_{1,it}/y_{M,it}, y_{2,it}/y_{M,it}, \dots, y_{M-1,it}/y_{M,it}$. Consistent with most empirical studies, a translog specification represents the functional form of the model:

$$-\ln y_{M,it} = \alpha_0 + \sum_{k=1}^{K} \alpha_k \ln x_{k,it} + \sum_{m=1}^{M-1} \beta_m \ln y^*_{m,it} + \frac{1}{2}\sum_{k=1}^{K}\sum_{s=1}^{K} \alpha_{k,s} \ln x_{k,it} \ln x_{s,it} +$$
$$\frac{1}{2}\sum_{m=1}^{M-1}\sum_{l=1}^{M-1} \beta_{m,l} \ln y^*_{m,it} \ln y^*_{l,it} \sum_{k=1}^{K}\sum_{m=1}^{M-1} \gamma_{k,m} \ln x_{k,it} \ln y^*_{m,it} + \sum_{k=1}^{K} \delta_{k,t} \ln x_{k,it} t + \sum_{m=1}^{M-1} \tau_{m,t} \ln y^*_{m,it} t +$$
$$\zeta_1 t + \frac{1}{2}\zeta_2 t^2 + \sum_{e=1}^{E} \psi_e z_{e,it} + u_{it} + v_{it} \qquad (4)$$

Where, $y^*_{m,it} = y_{m,it}/y_{M,it}$, m = 1, 2, ..., M and *l* =1, 2, ..., M are indices for output; $z_{e,it}$ denotes country-specific control variables; k = 1, 2, .., K and s = 1, 2, ..., K are indices for input; $u_{it} \equiv -\ln D^O_{it}$ or $TE_{it} = \frac{1}{D^O_{it}} = \exp(u_{it})$; and $\alpha_0, \alpha_k, \beta_m, \alpha_{k,s}, \beta_{m,l}, \gamma_{k,m}, \delta_{k,t}, \tau_{m,t}, \zeta_1, \zeta_2, \psi_e$ are unknown parameters. t represents a time trend and accounts for technology changes over time. Finally, $\alpha_{k,s} = \alpha_{s,k}$ and $\beta_{m,l} = \beta_{l,m}$ are symmetry constraints to the second order parameters (Battese & Coelli, 1995; Coelli, et al., 2005; Cuesta & Orea, 2002; Feng & Serletis, 2010; Jiang, et al., 2009; Michaelides, Vouldis, & Tsionas, 2010; O'Donnell & Coelli, 2005).

THE DATA AND THE EMPIRICAL SPECIFICATIONS

The data used to estimate the output distance function consist of 118 commercial banks from 10 East Asian countries, i.e. Cambodia, China, Indonesia, Malaysia, South Korea, Thailand, the Philippines, Singapore, Hong Kong, and Vietnam. The inputs and outputs were provided by the Bankscope (Bureau Van Dijk) database and span the period 2000-2010, giving an unbalanced panel of 1182 annual observations. The data are deflated by Gross Domestic Product (GDP) deflators in constant 2000 prices in Local Currency Units (LCU) and are expressed in the U.S. Dollar (USD). The conversion rates were drawn from the World Bank's World Development Indicators (WDI), and GDP deflators were provided by the International Monetary Fund (IMF). Table 1 shows the distribution of 118 commercial banks for a sample of 10 East Asian countries.

Please insert Table 1

The identification of inputs and outputs follows the intermediation approach. The transformation process for a bank involves the use of inputs to generate outputs. Two outputs, three inputs coupled with three indices for control variables determine the deterministic part of the SFA. Inputs are operating costs (x_1), deposits (x_2), and equity (x_3). Outputs are loans (y_1) and other earning assets (y_2). Table 2 shows the mean values of inputs and outputs, presented in million USD for each country under study. Cambodia has the smallest volume of inputs (94.49) and outputs (53.2), whereas Singapore has the greatest amount of inputs (97148.12) and outputs (103354.23). Although Singapore produces, on average, the largest volume of bank loans (55,920.72), South Korea has the highest ratio of outputs to inputs (1.19). Hence, it is expected that South Korean banks are, on average, the most efficient in the sample.

Deposits are less expensive than equity, whereas equity is a buffer against instability and sudden withdrawal. Capital requirement, capital adequacy, and capital stringency are equity policies that influence resource diversification, flexibility, asset portfolio, and bank efficiency. Equity capital represents 4.1% (China) to 19.7% (Cambodia) of all inputs. Deposits are the main resource for banks (between 79-95%) in producing loans and other types of outputs. Operating costs include personnel and other operating expenses. High personnel expenses in a competitive labour market may be due to overpaid employees or experienced personnel. If the company's staff is overpaid or too large, the performance will decrease in a competitive market. On the other hand, experience personnel improve the performance of banks. Hence, operating cost is another type of input that influences technical efficiencies. Operating costs represent 1% (Hong Kong) to 3.1% (Indonesia) of all inputs.

Please insert Table 2

In order to specify a common frontier for a panel data, environmental variables are identified. Operating environment variables control for country-specific differences. They need to take into account distinctive features of each country in politics, economics, and risk. In order to examine different aspects of environment, three indices are employed, which avoid the problem of multicollinearity. Data on political stability (z_1) and economic status (z_3) were obtained from the EUROMONEY. The country risk (z_2) was compiled by the OECD (Organisation for Economic Co-operation and Development). Table 3 shows the mean values of political stability, country risk and economic status indices for each country.

Please insert Table 3

The first control variable (z_1) is the political stability index and ranges from 0 to 25. A country with the greatest stability in its financial sector, external sector, real sector, and regulatory structure receives 25. Banks that operate in Cambodia (9.83) and Indonesia (10.08) are exposed to the highest political instability. On the other hand, the operating environments of Singapore (23.15) and Hong Kong (20.88) provide the greatest stability. The underlying causes of instability help us find the effects of this variable on bank outputs and efficiency. Corruption, regulations, government instability and turnover, instability in financial payments, capital repatriation and outflow, and restrictions on capital flow are some features of an unstable country. In sum, these conditions destabilize different sectors of a country, increase bankruptcy costs and failures, and reduce bank efficiencies. However, the effects on bank loans can be either positive or negative, because an unstable economy can barely access to international resources and loans. Hence, domestic banks may face more demand for loans, which both increase outputs and bad loans. The mentioned interaction will be discussed more in the following paragraphs.

Political corruption, government instability and turnover instigate uncertainty among investors about a crisis. Moreover, they adversely influence investor's confidence, reduce financing, and finally destabilize external and real sectors (Biglaiser, et al., 2011). Restrictive regulatory conditions and non-competitive financial market may increase the current profitability of banks. Nevertheless, they increase corruption and adversely affect future growth and performance. On the other hand, a more competitive market allows bank entry and boosts bank performance (Wieneke & Gries, 2011). Foreign banks and investors can accelerate investment, capital inflows, government revenues, and improve risk management (Goldberg, Dages, & Kinney, 2000). However, corruption, government instability, and capital flow restrictions reduce international investment. Reductions in foreign funding and loans to domestic firms destabilize financial and real sectors, especially during crises.

Political instability is another type of country-specific risk that affects economies, bank outputs and performance. It is beyond the control of banks and diverts financial resources to strategies and monitoring that aim to reduce the contagious effects of risks. Hence, political instability reduces bank performance and inputs required to provide loans and other earning assets. Moreover, it worsens economic performance and debt status of the country, firms, and investors. Weak performance coupled with informational asymmetries (originated in uncertainty) exacerbates bank performance. Meanwhile, they reduce external financing and the profitability of firms. These conditions urge highly leveraged firms and investors to finance from domestic banks. From this angle, political instability may temporarily increase bank outputs. At the same time, lack of a sufficient amount of resources exposes banks to the probability of insolvency that reduces future bank performance.

The second control variable (z_2) is the country risk index and ranges from 0 to 7, with 0 representing the lowest risk. The index describes "country ceilings" (convertibility risk, exchange controls) and force majeure (e.g., natural catastrophe, revolution, expropriation). Singapore (0) and South Korea (0.37) have the lowest risk, whereas Cambodia (6.25) and Indonesia (5.37) have the highest risk. The additional financial burden of operating in a high-risk environment influences the accessibility of inputs. Risk exposures are accompanied by sudden deposit withdrawals, increasing non-performing loans and default risk, which reduce the efficiency of banks (Berger & DeYoung, 1997; Koutsomanoli-Filippaki & Mamatzakis, 2009). Although country risks (systematic risks) have repercussions that banks cannot prevent, managers can take strategies to reduce contagious effects. However, precautionary strategies, stricter monitoring system, and increasing insolvency divert inputs from a production process to risk and crisis management. Hence, banks operating in high-risk countries produce lower outputs and perform less efficiently.

The third control variable (z_3) is the economic status index and ranges from 0 to 65, with 65 representing the best status. This index includes three categories, namely, bank-specific conditions,

macroeconomic environment, and debt status. Singapore (54.14) and Hong Kong (52.77) have the highest economic performance, whereas Cambodia (23.81) and Indonesia (29.71) have the lowest performance. The first category describes the stability of bank and industry. As discussed already, the bad luck hypothesis supports the impact of risk on low bank efficiency. According to the hypothesis, banks operating in a risky environment incur more non-performing loans. Problem loans cause banks to incur greater expenses to contend with risk, which lead to the lower performance of banks.

The second category identifies differences in macroeconomic and financial conditions. This category includes variables, such as economic growth, unemployment, country's accessibility to financial markets (banks and capital markets). High economic growth, low unemployment, and better access to financial markets provide a mature banking environment. Moreover, they boost economic activities, reduce costs, and increase bank outputs (Abdul-Majid, et al., 2010; Carvallo & Kasman, 2005; Dietsch & Lozano-Vivas, 2000; Kasman & Yildirim, 2006). The third category describes the debt status of countries. It includes variables, such as debt, budget deficit, and current account balance. External debts, current account and budget deficits will offset revenues earned from economic activities, increase costs, and hence, reduce bank efficiency.

In summary, it is expected that banks in countries with high economic performance and low country risk operate more efficiently and produce more outputs. Although political instability reduces bank efficiency, it may temporarily increase bank outputs. The following section provides technical efficiency estimates and the direction of influences of control variables.

RESULTS

Table 4 shows the SFA estimates for parameters of the output distance function for banks of 10 East Asian countries by two models A-B. Model A is similar to Model B except that the former has economic status variable $(\hat{\psi}_3)$ as one of environmental variables. The log likelihood of model A (554.007) and B (553.852) shows that differences in the performance of economies have little contribution to the potential levels of bank outputs. In addition, the estimated coefficients of the two models are the same. While there are differences in the operating environment of countries (Table 3), significant effects on the common frontier depend on various conditions. The insignificant economic status, $(\hat{\psi}_3)$, demonstrates that countries have been potential to integrate financially. Integrated financial markets benefit banks through accessibility to diversified inputs-outputs markets or handicap banks during systemic crises. Hence, the regional cooperation may help banks improve their outputs (Arnold, 2012; Sussangkarn, 2011).

Focusing on political stability ($\hat{\psi}_1$), the results show that this variable significantly influences bank outputs. It encompasses government stability, non-corruption perception, regulation stability, and non-restrictions on capital flow, hence, has a direct relationship with investor's confidence. As discussed already, a stable country has better access to foreign resources and receives international investment. As the result, the potential level of bank outputs in this country drops by 1.4 per cent. Instability is a type of country-specific risk that has a negative effect on bank performance. Although banks that operate in an unstable country may face more demand for outputs, they are exposed to crises and inefficiencies (Biglaiser, et al., 2011; Goldberg, et al., 2000; Wieneke & Gries, 2011).

With regard to the country risk, $(\hat{\psi}_2)$, the results show that with 1 per cent increase in country risk, bank output would reduce by 4.1 per cent. Risk exposures are accompanied by a lack of public confidence, sudden runs on banks, increasing non-performing loans and default risk which reduce bank efficiency and outputs (Berger & DeYoung, 1997; Koutsomanoli-Filippaki & Mamatzakis, 2009). Hence, the lower the country risk, the higher the bank output.

Please insert Table 4

In summary, the estimated models took into account internal and external operating environment in the estimation of the common frontier. The findings suggest that country-specific conditions have on average less influence on bank outputs than bank-specific conditions. As the result, the finding supports internal environment as the main source of managerial inefficiency. Banks are operating on the same frontier, despite the different economic status of their countries. Nevertheless, the political instability and country risk are spreading channels of instability and risk in the East Asia that require managers to pay more attention to unexpected events and systemic crises. With regard to

the estimated models, the dependent variable is the negative value of other earning assets. The positive coefficient of loan output implies that loans and other earning assets are substitutes. Recalling the average value of equity (1,400.54) and deposits (17,995.54), the estimated coefficients of equity (-0.409) and deposits (-0.284) suggest deposits as the main source of funds.

Once the operating environment has estimated the common frontier, deviations from the frontier show either inefficiencies or other sources. In order to separate the two sources of deviations, the two-component error term employs an exponential distribution. If we substitute the estimated parameter $\hat{\theta}$ in $(1 - (\hat{\theta}/_{1+\hat{\theta}}))$, we will find that banks (on average) can increase their efficiency by 17 per cent. With regard to the performance of each country in each year, Table 5 demonstrates efficiency differences across countries.

The efficiency scores of an output distance function can range from one to infinity, and one represents the highest efficiency. The yearly efficiency scores of banks report the average technical efficiency of 1.144 for the period 2006-2007 and 1.245 for the period 2008-2010. However, this deterioration is due to missing results for Cambodia during 2000-2006. Apart from this country, the average efficiency has improved from 1.185 in the post East-Asian crises year of 2000 to 1.142 during 2006-2008. Hence, the region has faced banking industry improvement, even during the U.S. crisis period of 2007-2008.

Please insert Table 5

Recalling from Table 2, the outputs-inputs ratio ranges from 0.563 for Cambodia to 1.192 for South Korea. Therefore, it is expected that South Korean banks were operating, on average, more efficiently than others during 2000-2010. The estimated efficiency scores from the sample are, on average, between 1.074 for South Korea and 1.820 for Cambodia, which are consistent with the expectations. The South Korean banks have efficiencies between 1.038 in 2008 and 1.171 in 2000. On the other hand, Cambodian banks have performance between 1.146 in 2007 and 2.219 in 2008. The results rank China, Hong Kong, and Vietnam 2nd to 4th. The hierarchies of these countries are consistent with the outputs-inputs ratio measured from Table 2 and imply the importance of managerial decisions.

In order to test whether differences are statistically significant, Table 6 conducts a test of mean equality as discussed further in below. The test examines the average bank efficiency of each country against other countries. A diagonal separates Table 6 into two parts of above and below. Above the diagonal represents the average efficiency difference between each country and the country on the first column. Below the diagonal reports a *t*-test corresponding to each difference mentioned on the above to show whether the difference is significant. For example, the first row shows that, on average, banks in Hong Kong have 0.010 less efficiency performance than China. However, the corresponding *t*-test (-0.667) demonstrates that this difference is statistically insignificant. In addition, the average efficiency differences of China-Vietnam, and Vietnam-Hong Kong are not significant. Although, banks in China, Hong Kong, and Vietnam have, on average, different performance, the dissimilarity is insignificant. Hence, the results rank the bank efficiency of them 2nd. Likewise, the average efficiency differences of banks in Singapore with Thailand, Indonesia, and the Philippines are not significant statistically, ranking Singapore 5th.

While there is evidence for various operating environments across countries, Table 6 shows a similarity in their performance. The differences are mainly due to managerial decisions, which are consistent with the outputs-inputs ratio obtained from Table 2. However, the advanced economy of Singapore with zero country risk provides high potential to realize, which influences the efficiency.

Please insert Table 6

CONCLUSION

This paper uses the SFA to estimate an output distance function for ten East Asian countries during 2000-2010. A common frontier with three country-specific indices estimates bank efficiency scores. The indices control the effects of politics, economy, and risk on potential bank outputs. Despite different operating environments of East Asian countries, financial cooperation has integrated their markets. Hence, banks operate on a regional common frontier.

The results show that the contribution of country-specific conditions is much lower than internal environment. The potential levels of bank outputs are insensitive to each country's economic

status. Nevertheless, the significant coefficients of the political stability and country risk show that countries can be influenced by unexpected events, such as systemic crises.

The findings suggest regional cooperation among East Asian countries and their financial markets. The models show an integrated market for banks, which can benefit them with the accessibility to technology, inputs and outputs. Banks can diversify away temporary volatility in their markets and survive better bad economic and political conditions. This diversification from integration helps them to access to more funds, produce more loans, and hence improve their efficiencies. Technology efficiency emphasizes on managerial decisions which are related to technologies. Regional cooperation can both increase managers' motivation and equip them with new technologies which are necessary to survive in competitive markets.

However, the cooperation handicaps banks during systemic events affecting the risk position of countries. For instance, the Asian crises of 1997-98 demonstrate how Thailand's shocks influenced the region and hit many companies including banks. Bank managers need to consider these issues to adjust equity capital as a buffer against losses. Multinational banks can also adjust the contribution of some branches operating in low stable countries which expose them to sudden shocks. Policymakers have crucial roles in regulating capital mobilities and providing a stable environment to benefit from long-term investment instead of short-term debts which are important factors causing systemic banking crises.

REFERENCES

Abd Karim, M. Z. (2001). Comparative Bank Efficiency across Select ASEAN Countries. [Article]. *ASEAN Economic Bulletin, 18*(3), 289.

Abdul-Majid, M., Saal, D. S., & Battisti, G. (2010). Efficiency in Islamic and conventional banking: an international comparison. *Journal of Productivity Analysis, 34*(1), 25-43.

Aigner, D., Lovell, C. A. K., & Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics, 6*(1), 21-37.

Akhigbe, A., & McNulty, J. E. (2011). Bank monitoring, profit efficiency and the commercial lending business model. *Journal of Economics and Business, 63*(6), 531-551.

Ariff, M., & Can, L. (2009). IMF Bank-Restructuring Efficiency Outcomes: Evidence from East Asia. *Journal of Financial Services Research, 35*(2), 167-187.

Arnold, P. J. (2012). The political economy of financial harmonization: The East Asian financial crisis and the rise of international accounting standards. *Accounting, Organizations and Society, 37*(6), 361-381.

Battese, G. E., & Coelli, T. J. (1995). A model for technical inefficiency effects in a stochastic frontier production function for panel data. *Empirical Economics, 20*(2), 325-332.

Berger, A. N., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. [doi: DOI: 10.1016/S0378-4266(97)00003-4]. *Journal of Banking & Finance, 21*(6), 849-870.

Berger, A. N., & Humphrey, D. B. (1997). Efficiency of financial institutions: International survey and directions for future research. *European Journal of Operational Research, 98*(2), 175-212.

Biglaiser, G., DeRouen Jr, K., & Archer, C. C. (2011). Politics, Early Warning Systems, and Credit Rating Agencies. *Foreign Policy Analysis, 7*(1), 67-87.

Bordo, M. D., Meissner, C. M., & Stuckler, D. (2010). Foreign currency debt, financial crises and economic growth: A long-run view. [doi: DOI: 10.1016/j.jimonfin.2010.01.002]. *Journal of International Money and Finance, 29*(4), 642-665.

Carbó Valverde, S., Humphrey, D. B., & López del Paso, R. (2007). Do cross-country differences in bank efficiency support a policy of "national champions"? *Journal of Banking & Finance, 31*(7), 2173-2188.

Carvallo, O., & Kasman, A. (2005). Cost efficiency in the Latin American and Caribbean banking systems. [doi: DOI: 10.1016/j.intfin.2004.02.002]. *Journal of International Financial Markets, Institutions and Money, 15*(1), 55-72.

Coelli, T. J., Rao, D. S. P., O'Donnell, C. J., & Battese, G. E. (2005). *An Introduction to Efficiency and Productivity Analysis* (2nd ed.). New York: Springer US.

Cuesta, R. A., & Orea, L. (2002). Mergers and technical efficiency in Spanish savings banks: A stochastic distance function approach. *Journal of Banking and Finance, 26*(12), 2231-2247.

Dietsch, M., & Lozano-Vivas, A. (2000). How the environment determines banking efficiency: A comparison between French and Spanish industries. [doi: DOI: 10.1016/S0378-4266(99)00115-6]. *Journal of Banking & Finance, 24*(6), 985-1004.

Fang, Y., Hasan, I., & Marton, K. (2011). Bank efficiency in South-Eastern Europe. *Economics of Transition, 19*(3), 495-520.

Farrell, M. J. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society. Series A (General), 120*(3), 253-290.

Feng, G., & Serletis, A. (2010). Efficiency, technical change, and returns to scale in large US banks: Panel data evidence from an output distance function satisfying theoretical regularity. [doi: DOI: 10.1016/j.jbankfin.2009.07.009]. *Journal of Banking & Finance, 34*(1), 127-138.

FIordelisi, F., Molyneux, P., & Marqués Ibáñez, D. (2010). Efficiency and Risk in European Banking. *http://www.ecb.europa.eu, 1211*.

Goldberg, L., Dages, B. G., & Kinney, D. (2000). Foreign and Domestic Bank Participation in Emerging Markets: Lessons from Mexico and Argentina. *National Bureau of Economic Research 7714*.

Greene, W. H. (1990). A Gamma-distributed stochastic frontier model. *Journal of Econometrics, 46*(1-2), 141-163.

Hahm, J.-H., & Mishkin, F. S. (2000). The Korean financial crisis: an asymmetric information perspective. *Emerging Markets Review, 1*(1), 21-52.

Jiang, C., Yao, S., & Zhang, Z. (2009). The Effects of Governance Changes on Bank Efficiency in China: A Stochastic Distance Function Approach. [doi: DOI: 10.1016/j.chieco.2009.05.005]. *China Economic Review, 20*(4), 717-731.

Jonathan, W. (2004). Determining management behaviour in European banking. *Journal of Banking & Finance, 28*(10), 2427-2460.

Kasman, A., & Yildirim, C. (2006). Cost and profit efficiencies in transition banking: the case of new EU members. *Applied Economics, 38*(9), 1079 - 1090.

Koutsomanoli-Filippaki, A., & Mamatzakis, E. (2009). Performance and Merton-type default risk of listed banks in the EU: A panel VAR approach. *Journal of Banking & Finance, 33*(11), 2050-2061.

Kwan, S. H. (2003). Operating performance of banks among Asian economies: An international and time series comparison. *Journal of Banking & Finance, 27*(3), 471-489.

Leblang, D., & Satyanath, S. (2008). Politically generated uncertainty and currency crises: Theory, tests, and forecasts. *Journal of International Money and Finance, 27*(3), 480-497.

Lozano-Vivas, A., Kumbhakar, S., Fethi, M., & Shaban, M. (2011). Consolidation in the European banking industry: how effective is it? *Journal of Productivity Analysis, 36*(3), 247-261.

Lozano-Vivas, A., & Pasiouras, F. (2010). The impact of non-traditional activities on the estimation of bank efficiency: International evidence. *Journal of Banking & Finance, 34*(7), 1436-1449.

Mamatzakis, E., Staikouras, C., & Koutsomanoli-Filippaki, A. (2008). Bank efficiency in the new European Union member states: Is there convergence? *International Review of Financial Analysis, 17*(5), 1156-1172.

Maudos, J., & de Guevara, J. F. (2007). The cost of market power in banking: Social welfare loss vs. cost inefficiency. *Journal of Banking & Finance, 31*(7), 2103-2125.

Meeusen, W., & Broeck, J. v. D. (1977). Efficiency Estimation from Cobb-Douglas Production Functions with Composed Error. *International Economic Review, 18*(2), 435-444.

Michaelides, P. G., Vouldis, A. T., & Tsionas, E. G. (2010). Globally flexible functional forms: The neural distance function. [doi: DOI: 10.1016/j.ejor.2010.02.013]. *European Journal of Operational Research, 206*(2), 456-469.

O'Donnell, C. J., & Coelli, T. J. (2005). A Bayesian approach to imposing curvature on distance functions. *Journal of Econometrics, 126*(2), 493-523.

Podpiera, J., & Weill, L. (2008). Bad luck or bad management? Emerging banking market experience. *Journal of Financial Stability, 4*(2), 135-148.

Rötheli, T. F. (2010). Causes of the financial crisis: Risk misperception, policy mistakes, and banks' bounded rationality. [doi: DOI: 10.1016/j.socec.2010.02.016]. *Journal of Socio-Economics, 39*(2), 119-126.

Sealey Jr, C. W., & Lindley, J. T. (1977). Inputs, Outputs, and A Theory of Production and Cost at Depository Financial Institutions. [Article]. *Journal of Finance, 32*(4), 1251-1266.

Shleifer, A., & Vishny, R. W. (2010). Unstable banking. [Article]. *Journal of Financial Economics, 97*(3), 306-318.

Staikouras, C., Mamatzakis, E., & Koutsomanoli-Filippaki, A. (2008). Cost efficiency of the banking industry in the South Eastern European region. *Journal of International Financial Markets, Institutions and Money, 18*(5), 483-497.

Stevenson, R. E. (1980). Likelihood functions for generalized stochastic frontier estimation. *Journal of Econometrics, 13*(1), 57-66.

Sussangkarn, C. (2011). Chiang Mai Initiative Multilateralization: Origin, Development, and Outlook. *Asian Economic Policy Review, 6*(2), 203-220.

Thoraneenitiyan, N., & Avkiran, N. K. (2009). Measuring the impact of restructuring and country-specific factors on the efficiency of post-crisis East Asian banking systems: Integrating DEA with SFA. [doi: DOI: 10.1016/j.seps.2008.12.002]. *Socio-Economic Planning Sciences, 43*(4), 240-252.

Wieneke, A., & Gries, T. (2011). SME performance in transition economies: The financial regulation and firm-level corruption nexus. *Journal of Comparative Economics, 39*(2), 221-229.

Williams, J., & Nguyen, N. (2005). Financial liberalisation, crisis, and restructuring: A comparative study of bank performance and bank governance in South East Asia. [doi: DOI: 10.1016/j.jbankfin.2005.03.011]. *Journal of Banking & Finance, 29*(8-9), 2119-2154.

TABLE 1: Sample of commercial banks, 2000-2010

Country	Number of commercial banks	Observations
China	15	154
Indonesia	29	309
Hong Kong	6	41
Malaysia	21	229
Vietnam	7	74
The Philippines	11	78
Singapore	3	21
Thailand	12	131
Cambodia	1	4
South Korea	13	141
Total	118	1,182

Note: the data on 118 commercial banks from 10 East Asian countries were obtained from the Bankscope.

TABLE 2: Average values of outputs and inputs by country, 2000-2010 (USD mil)

Country	Inputs[1]			Outputs[2]	
	Operating costs	Deposits	Equity	Loans	Other earning assets
China	697.12	54,980.97	2,391.23	32,214.41	24,742.39
Indonesia	69.89	1,936.04	225.92	966.96	1,159.75
Hong Kong	332.52	29,353.44	2,758.74	17,553.76	15,556.24
Malaysia	166.38	9,338.44	876.41	6,540.06	2,513.59
Vietnam	6.00	389.82	45.76	219.27	211.72
The Philippines	117.67	3,319.13	425.43	1,637.68	1,925.85
Singapore	1,102.21	83,818.78	12,227.13	55,920.72	47,433.51
Thailand	295.83	11,535.06	1,119.75	9,113.49	3,396.43
Cambodia	1.33	74.55	18.61	26.66	26.54
South Korea	872.26	37,617.71	3,287.00	37,351.13	12,445.17
All countries	317.43	17,995.54	1,400.54	12,906.91	7,397.55

[1,2] Inputs and outputs were deflated using local GDP deflators, then they were expressed in USD using nominal exchange rate
Source: BankScope

TABLE 3: Political stability, country risk and economic status by country, 2000-2010

	Political stability[1]	Country risk[2]	Economic status[1]
China	17.03	2.00	37.87
Indonesia	10.08	5.37	29.71
Hong Kong	20.88	1.41	52.77
Malaysia	17.46	2.00	38.48
Vietnam	11.79	4.97	30.50
The Philippines	12.75	4.58	31.64
Singapore	23.15	0	54.14
Thailand	15.59	3.00	36.79

Cambodia	9.83	6.25	23.81
South Korea	18.48	0.37	42.81
All countries	14.92	3.11	36.21

[1] Political stability and economic status are two indices for the political and economic conditions of the sample. The political stability is comprised of regulatory and political variables. It ranges from 0 to 25, with 25 representing the best political conditions. The economic status is comprised of variables for macroeconomic conditions, debt status, financial structure and accessibility. It ranges from 0 to 65, with 65 representing the best economic conditions.
[2] Country risk is an index for convertibility risk (e.g., exchange controls), and force majeure (e.g., natural catastrophe). The index ranges from 0 to 7, with zero exhibiting the minimum country risk.
Sources: EUROMONEY, OECD

TABLE 4: Stochastic Frontier Approach (SFA) estimates for parameters of the output distance function for East Asian banks, 2000-2010

Coefficients[a]	Parameters	Estimated value A[b]	Estimated value B[b]	Standard error
$\ln y_1^*$	$\hat{\beta}_1$	0.439***	0.439***	$0.027^{A,B}$
$\ln x_1$	$\hat{\alpha}_1$	-0.161**	-0.159*	$0.082^{A,B}$
$\ln x_2$	$\hat{\alpha}_2$	-0.284**	-0.285**	$0.112^{A,B}$
$\ln x_3$	$\hat{\alpha}_3$	-0.409***	-0.409***	$0.067^{A,B}$
$(\ln y_1^*)^2$	$\hat{\beta}_{1,1}$	0.156***	0.156***	$0.004^{A,B}$
$(\ln x_1)^2$	$\hat{\alpha}_{1,1}$	0.017	0.017	$0.024^{A,B}$
$(\ln x_2)^2$	$\hat{\alpha}_{2,2}$	-0.165***	-0.165***	0.038^{B} 0.037^{A}
$(\ln x_3)^2$	$\hat{\alpha}_{3,3}$	-0.128***	-0.129***	$0.017^{A,B}$
$\ln y_1^* \ln x_1$	$\hat{\gamma}_{1,1}$	-0.024**	-0.024**	$0.009^{A,B}$
$\ln y_1^* \ln x_2$	$\hat{\gamma}_{1,2}$	0.024***	0.024***	$0.007^{A,B}$
$\ln y_1^* \ln x_3$	$\hat{\gamma}_{1,3}$	-0.004	-0.004	$0.009^{A,B}$
$\ln x_1 \ln x_2$	$\hat{\alpha}_{1,2}$	0.027	0.027	$0.024^{A,B}$
$\ln x_1 \ln x_3$	$\hat{\alpha}_{1,3}$	-0.002	-0.002	$0.013^{A,B}$
$\ln x_2 \ln x_3$	$\hat{\alpha}_{2,3}$	0.106***	0.106***	$0.021^{A,B}$
t	$\hat{\zeta}_1$	0.027*	0.027*	$0.014^{A,B}$
t^2	$\hat{\zeta}_2$	-0.001	-0.001	0.001^{B} 0.002^{A}
$t \ln y_1^*$	$\hat{\tau}_{t,1}$	0.002	0.002	$0.001^{A,B}$
$t \ln x_1$	$\hat{\delta}_{t,1}$	0.004	0.004	$0.003^{A,B}$
$t \ln x_2$	$\hat{\delta}_{t,2}$	-0.008**	-0.007**	$0.004^{A,B}$
$t \ln x_3$	$\hat{\delta}_{t,3}$	0.004*	0.004*	$0.003^{A,B}$
Political stability	$\hat{\psi}_1$	0.014***	0.014***	$0.005^{A,B}$
Country risk	$\hat{\psi}_2$	0.041***	0.043***	0.012^{B} 0.013^{A}
Economic status	$\hat{\psi}_3$	-0.001		0.003^{A}
Theta	$\hat{\theta}$	4.940***	4.936***	1.271^{B} 1.303^{A}
Sigma v	$\hat{\sigma}_v$	0.133***	0.133***	$0.002^{A,B}$
Log likelihood		554.007	553.852	

[a] y_1, x_1, x_2, x_3 and t refer to loans, operating costs, deposits, equity and year
[b] *, **, *** Significant at the 10%, 5% and 1% level

TABLE 5: Average efficiency scores of banks in East Asian countries, 2000-2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	All years
CN	1.159	1.095	1.104	1.081	1.059	1.106	1.089	1.077	1.098	1.110	1.132	1.101
ID	1.194	1.187	1.188	1.182	1.169	1.181	1.156	1.155	1.134	1.147	1.206	1.173
HK					1.111	1.077	1.063	1.088	1.111	1.145	1.144	1.106
MY	1.275	1.222	1.303	1.374	1.370	1.421	1.351	1.404	1.323	1.406	1.377	1.348
VN	1.175	1.214	1.145	1.085	1.070	1.059	1.060	1.091	1.177	1.111	1.034	1.111
PH				1.296	1.213	1.184	1.167	1.180	1.136	1.149	1.118	1.180
SG					1.155	1.131	1.156	1.164	1.132	1.207	1.311	1.179
TH	1.134	1.142	1.130	1.135	1.154	1.162	1.135	1.149	1.100	1.120	1.113	1.134
KH								1.146	2.219	2.041	1.875	1.820
KR	1.171	1.070	1.046	1.106	1.076	1.070	1.059	1.049	1.038	1.065	1.066	1.074

Note: CN - China, ID - Indonesia, HK - Hong Kong, MY - Malaysia, VN - Vietnam, PH - the Philippines, SG - Singapore, TH - Thailand, KH – Cambodia, KR - South Korea.

TABLE 6: Relative difference in country's estimated mean of inefficiency scores and *t*-test

	CN	ID	HK	MY	VN	PH	SG	TH	KH	KR
CN		-0.072	-0.010	-0.247	-0.010	-0.086	-0.084	-0.033	-0.716	0.027
ID	-6.808		0.058	-0.175	0.062	-0.014	-0.015	0.039	-0.660	0.099
HK	-0.667	3.895		-0.273	0.020	-0.058	-0.074	-0.027	-0.698	0.045
MY	-12.224	-8.906	-15.411		0.237	0.198	0.200	0.214	-0.443	0.274
VN	-0.523	3.273	0.926	9.270		-0.095	-0.094	-0.023	-0.717	0.037
PH	-4.088	-0.657	-3.410	8.744	-3.793		-0.016	0.047	-0.675	0.114
SG	-3.273	-0.598	-2.754	7.312	-3.136	-0.582		0.046	-0.617	0.119
TH	-3.368	4.494	-1.856	11.100	-1.241	2.237	1.815		-0.700	0.060
KH	-3.038	-2.796	-2.960	-1.874	-3.022	-2.861	-2.584	-2.970		0.766
KR	1.925	7.597	3.504	12.690	1.761	5.479	4.868	4.822	3.251	

Notes: Figures above the diagonal show the difference in the mean inefficiency estimates of each country under study in the first column relative to other countries.
Figures below the diagonal represent *t*-test for the difference in the mean inefficiency scores of each country under study in the first column relative to other countries.