Financial Supervision and Bank Profitability: Evidence from East Asia

Arisyi F. Raz*, Christopher Irawan, Tamarind P.K. Indra and Riki Darisman

Institute for Development Policy and Management (School of Environment and Development), University of Manchester, Manchester, UK

Abstract: The growing fragility of the financial system has led to the increasing importance of financial supervision's role. In particular, the financial supervision regime is expected to promote bank performance and maintain financial stability. Unfortunately, studies on the relationship between banking supervisory regimes and bank performance are still limited. To address this issue, this paper focuses on the following four aspects of banking supervision:(i) the structure of supervisory frameworks, (ii) the independence of supervisory institutions (iii) the scope of supervisory role; and (iv) the authority of central banks in the banking sector. We use country-specific data for seven East-Asian countries and data for 39 individual banks in those countries over the period of 2006–2011 to examine how different financial supervision regimes in the region influence bank performance. The results show strong evidence that the existence of a single bank supervisor, instead of multiple, will enhance bank profitability. Mean while, there is a mixed result regarding the role of central bank independence in improving bank profitability. Furthermore, the authority of central banks in the banking sector and the scope of bank supervision do not show strong relationship with bank performance.

Keywords: Supervision, Bank Regulation, Bank Profitability.

I. INTRODUCTION

Since the Asian Financial Crisis in 1997 that essentially caused the melt down of financial industries and subsequent economic slowdown in countries such as Thailand, Indonesia, and Korea, governments have introduced and implemented policies to better control the banking and financial industries in their countries. For instance, Bank Indonesia implemented a structural reform in 1999 and gained independence from the government by focusing on monetary and financial system stability. Another example is the case of South Korea, which reformed its financial sector by improving transparency and tightly monitoring insolvent institutions. Fortunately, after more than a decade, the banking industry in East Asia has recovered, albeit slowly, and grown in size and sophistication.

Despite the growing importance of the banking sector in East Asia in particular and the rest of the world in general, studies about the effects of regulation and supervision on banks remain inconclusive from a theoretical perspective. In this regard, some arguments arise as to whether bank regulation and supervision have any positive impact on bank performance. For instance, Barth *et al*. (2006) summarize two main opposing views concerning the role of banking supervisory frameworks in the banking sector, namely "public interest view" and "private interest view". According to the former, the government acts to improve public welfare and regulates banks to promote efficiency and mitigate market failures. Meanwhile, the latter argues that regulation is frequently encouraged to fulfil the interests of the few, instead of the broader public, which, in result, hampers bank efficiency. In addition to the inconclusive theoretical perspectives, empirical studies that comprehensively examine the relationship between banking supervision and bank performance are also still quite limited. As pointed out by Barth *et al*. (2013), this limitation is mainly a result of the minimal availability of bank regulation and supervision data.

Given this background, this paper aims to narrow the literature gap between theoretical and empirical studies with regard to the relation between bank supervision and bank performance using the recently updated bank regulation and supervision data provided by Barth *et al*. (2001, 2004, 2006, 2008) under the supervision of the World Bank. This paper limits its scope of study by focusing on four aspects of supervisory variables: (i) the structure of supervisory institutions; (ii) the independence of supervisory institutions; (iii) the scope of the supervisory role; and (iv) the authority of a central bank in the banking sector. In conducting the study, 165 observations have been collected from banks in East Asian countries over the period of 2006 to 2011, along with Barth's *et al*. (2004, 2006, 2008) bank regulation and supervision data. Then, using longitudinal regression analysis, the authors determine which bank supervision variables are able to strongly affect banking efficiency and

*Address correspondence to this author at the Perumahan Taman Gandaria Blok B No. 6, Kebayoran Lama, Jakarta, 12240, Indonesia; Tel: +62(0)21 822 0895; E-mail: arisraz@me.com

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profitability. The utilization of a panel database is aimed at improving the estimation technique to capture heterogeneity effects and provide a more accurate inference of model parameters.

The rest of this paper is organized as follows. Section 2 includes a discussion of the theoretical framework and review of related literature. Next, section 3 is a discussion of the research methodology, and section 4 presents the regression results and interpretations as well as further analysis. Finally, section 5 contains the study's conclusion.

II. LITERATURE REVIEW

Recognition of the importance of financial supervision, especially for banks, dates back to the late part of the 19th century, when central banks started to take part in the rescue effort for failing banks (Goodhart and Schoenmaker, 1995). As more funding was given to the banking system, the need for prudent financial supervision became more prominent. This was especially true since throughout the 20th century, in line with the growing size of the banking systems around the world, central banks no longer had sufficient funds to handle bank crises and thus needed to rely on the taxpayers. Supervisory authority provides a means to overcome information asymmetry that exists in the financial system (Mishkin, 2001). Therefore, it is necessary not only to ensure that taxpayers' money is used appropriately, but more generally to provide a safety net for depositors. Despite being developed through similar reasoning, financial supervision in different countries evolved rather differently. Points of difference vary between countries, and there is no single definite answer as to what constitutes the best practice of financial supervision. Financial supervision is multi-dimensional, and studies with regard to the topic often focus on four main issues: the independence of financial supervision authorities/ central banks, central banks' role in banking supervision, the unification of supervisory authorities, and the scope of banking supervision assumed by a responsible institution. This section will present a literature review on previous studies on these issues.

In general, theories on the impact of the independence of financial supervision institutions or central banks favor higher independence, as it is usually associated with higher bank efficiency and profitability. As explained in Barth *et al*. (2003:79), "Supervisors are independent to the extent they are insulated from, or able to resist, pressure and influence to modify supervisory practices in order to advance policy agenda that is odds with the maintenance of a safe and sound banking system." Thus, in theory, having more independence would enhance supervisory authorities' ability to enforce their actions, and as a result, banking sector efficiency should be higher (Barth *et al*., 2003). Another theory, the "independent supervision view," suggests the importance of supervisory authority independence in reducing the influence of "favoritism" caused by politicians or government (Beck *et al*., 2003). In turn, higher independence would reduce the incentives for financial institutions as well as government officials to be involved in nepotism and corruption. This theory is inline with efficient capital allocation. Furthermore, looking at examples from the financial crises in the 1990s, Quintyn and Taylor (2002) pointed out how a lack of independence on the supervisory authority's part exacerbated the crises. Meanwhile, a study by Barth *et al*. (2013) provides empirical evidence that higher independence is positively correlated with bank efficiency, and this is particularly true when the supervisory authority has extensive experience (for instance, see Barth *et al*., 2013).

Not all studies, however, agree with the set out theory. Gaganis and Pisouras (2013) found a negative correlation between central bank independence, both political and economic, and profitability. One study by Barth *et al*. (2002) indicated that supervisory independence has no relation to bank development, profitability, or the level of non-performing loans. Similarly, in another study, Barth *et al*. (2003) found a negative but not statistically significant relation between independence and bank profitability. The fact that these three studies do not support the general theory on supervisory authority independence may be attributed to several things. One explanation could be that, if the central bank acts as a bank supervisor, central banks' focus on monetary policies often impedes the effectiveness of their supervisory roles (for instance, see Gaganis and Pisouras, 2013). Another possible explanation may be due to the difficulties in quantifying the degree of independence.

As for the second issue, traditionally, central banks were primarily assigned the responsibility of macroeconomic monetary management, which was done by maintaining currency convertibility (Goodhart and Schoenmaker, 1995). With the importance of financial supervision being recognized in the late part of the 19th century, some central banks started to assume a financial supervisory role. While in some

countries central banks maintained the boundary between the two different functions, in others central banks continued to embody both monetary management and financial supervision functions. As such, this development led to two different kinds of regimes: central banks with centralized monetary and banking supervision functions and those with separate ones. Countries such as Australia, New Zealand, Hong Kong, and Ireland fall within the first categories. Meanwhile, countries such as those under the European Union and the United States belong to the second category. Again, theories and empirical evidence provide varying answers as to which regime is more preferable.

Arguments in favor of the separation of these two functions have mostly revolved around the possibility of conflicts of interest (for instance, see Goodhart and Schoenmaker, 1993; Di Noia and Di Giorgio, 1999). Goodhart and Schoenmaker (1993) suggested that such conflicts of interest may occur due to the different objectives, economic models, and preferences involved in macroeconomic and microeconomic policy-making process, as well as administrative complications. More specifically, Di Noia and Di Giorgio (1999) categorized this conflict of interest problem into inconsistent policy assignment, the private sector's expectation that a central bank's monetary policy is influenced by financial stability considerations, the utilization of macroeconomic tools to enforce the implementation of supervisory recommendations, and conflicting cyclical effects of micro and macroeconomic policy making. The same study also indicates that in countries where central banks are assigned financial supervisory responsibility, inflation rates are considerably higher and more volatile. Lastly, the authors found that countries where the two functions are combined usually have financial systems that are less competitive and more underdeveloped. Haubrich (1996, in Di Noia and Di Giorgio, 2000) also suggested that being responsible for two functions creates a reputational risk for central banks, as the failure to conduct proper banking supervision casts doubt upon a central bank's ability to conduct monetary policy making. Empirically, although not significant, a study by Barth *et al*. (2003) also indicated a significant negative relationship between central bank supervision and banking profitability.

On the other hand, combining the two functions may result in better systemic stability (Goodhart and Schoenmaker, 1993). This happens as central banks often assume the role of lenders of last resort for failing banks in their effort to manage systemic risk. In such cases, giving a financial supervisory role to central banks would be appropriate. Indeed, some studies, for instance, the one by Peek *et al*. (1999), point out the significance of confidential banking information as guidance in macroeconomic policy-making processes. Moreover, such information also leads to a better macroeconomic variables forecast. Similarly, Di Noia and Di Giorgio (1999) also highlighted the significance of banking information for systemic risk management. Although one can argue that information transfer across institutions is possible, on-time delivery of information may only be feasible when a central bank has a direct supervisory role (Haubrich, 1996 in Di Noia and Di Giorgio, 1999). In addition, Barth *et al*. (2003) suggested that other than the informational advantage, assigning a financial supervisory role to a central bank will enhance the supervisor's power in enforcing its actions and may guarantee better resource allocation, as the institution usually has a competitive advantage in recruiting and retaining qualified staff.

With respect to the unification of supervisory authority issue, many authors have highlighted several arguments in support of a single supervisory authority (for instance, see Llewellyn, 1999; Abrams and Taylor, 2000; Briault, 2002; Barth *et al*., 2003). First, considering a financial system's safety and soundness, a single supervisory authority may overcome problems such as gaps in consolidated supervision, regulatory arbitrage, conflict resolution, accountability, flexibility in responding to financial changes, and cross-border supervision. Further, looking at the costs of a supervisory authority, a single supervisory authority may benefit from better resource allocation and economies of scale and economies of scope in its operations, which can reduce costs and increase efficiency. Finally, as suggested by Barth *et al*. (2003), which consider costs of multiple supervisory authorities to market participants, unification reduces the cost burden that fall to the taxpayers as well as increasing transparency. In another study, Pellegrina and Masciandaro (2008) pointed out some of the advantages of the unified supervisory framework, which include higher efficiency in supervising financial conglomerates, economies of scale, improved accountability, the elimination of duplicates, and ensuring fairness across markets. Further, their study provides empirical evidence suggesting that a single supervisory authority is positively correlated with the absence of corruption, good governance, and judicial efficiency.

Meanwhile, the use of multiple supervisory authorities can also yield some benefits and therefore provide arguments against unification. Using the same approach in their review on the arguments in support of unification, Barth *et al*. (2003) reviewed previous studies on the benefits of multiple supervisory authorities. These benefits include better information gathering through the use of multiple approaches, avoiding diseconomies of scale that may arise in a unified supervisory framework, encouraging competition among supervisory authorities, as well as overpowering one institution. In addition to this, Pellegrina and Masciandaro (2008) also suggested a moral hazard problem and issues that may arise in the integration process, such as the influence of political or other special interests and the loss of key staff members. A study by Gaganis and Pisouras (2013) further indicates that banks operating in countries with unified supervisory authorities exhibit less profit efficiency. Barth *et al*. (2002) also found that countries with multiple supervisory authorities usually have lower capital ratios and exhibit higher financial system liquidity. This result, however, is no longer valid when countries with economic transition are included in the regression data.

Finally, we look into studies on the issue of the scope of bank supervisory authorities. Barth *et al*. (2003) point out some of the arguments for assigning a broader scope of supervision to a single authority. These arguments include more thorough and coordinated supervision for financial conglomerates, which usually engage in providing various kinds of financial services. Further, the argument of cost savings from economies of scale and lower cost burdens for supervised institutions also provides support for a broader scope of a single supervisory authority. Finally, having one authority in charge of the whole financial system would likely result in better management of systemic risks.

On the other hand, Barth *et al*. (2003) also acknowledged that there are several disadvantages of having a supervisory authority with a broad scope of supervision. Not only that would institution with a broader scope of authority possibly be overpowered, complicated bureaucracy and possible mismanagement may reduce efficiency. Gaganis and Pisouras (2013) focused on central banks with financial supervisory responsibility and found a negative and statistically significant relation between the scope of a central bank's supervisory authority and bank efficiency. They pointed out two possible explanations for this result. First, a larger scope implies that resources are divided to deal with a greater number of objectives, products, etc. and therefore can no longer focus on increasing the efficiency of banks in particular. Second, assigning higher responsibility increases an authority's power, which can be harmful, especially in countries with low central bank independence.

III. METHODOLOGY

In the preceding sections, the advantages and disadvantages of bank supervision in terms of the scope, independence, and authority are described from a theoretical perspective. In addition, previous empirical research about the impact of a specific supervisory framework on the banking systems is summarized. Meanwhile, this section focuses on the study's empirical framework and variable descriptions.

Empirical Model

To analyze the factors that affect bank profitability, the authors specified a model incorporating variables that measured a bank's financial ratios and supervisory framework. In addition, it also included control variables for other important determinants of bank profitability.[1]

Hence, the empirical model yielded the following form:

$$P_{ijt} = \alpha + \beta B_{ijt} + \chi S_{jt} + \delta M_{jt} + \varepsilon_{ijt} \quad \text{Equation (1)}$$

where P_{ij} is the profit before tax divided by the total assets for bank i in country j in year t; B_{ij} is a vector consisting of bank variables for bank i in country j in year t; M_j is a vector consisting of macroeconomic variables for country j in year t; S_j is a vector of supervisory framework for country j in year t; ε_{ij} is an error term.

Bank variables consisted of equity divided by total assets lagged one period (*ETA–1*), total loans divided by total assets (*LOAN*), non-interest earning assets divided by total assets (*NIEA*), deposits and other short-term funding divided by total assets (*STF*), overhead expenses divided by total assets (*OHE*), and taxes divided by profits before tax (*TAX*). From Equation (1) *ETA–1* was expected to have a positive

[1]This study incorporates important determinants of bank profitability provided by Demirgüç-Kunt and Huizinga (1999) and Barth *et al*. (2003). In addition, for control variables, this study draws on empirical models from various studies as guidance (for instance, see Barth *et al*., 2003; Barth *et al*., 2013; Gaganis and Pasiouras, 2013).

sign. The reason was that the bigger portion of a bank's own assets financed by its own equity, the higher the amount of returns, as it does not have to pay any interest compared to assets that are financed by other liabilities. *LOAN* was also expected to have a positive sign because loans are interest-paying assets that decrease profitability. On the contrary, the authors of this paper expected *NIEA* to be negatively correlated with pre-tax profits since *NIEA* consists of non-productive assets that do not increase profitability. Meanwhile, *STF* should be positively correlated with pre-tax profits because it provides funding to banks with lower costs. *OHE* was expected to be negatively correlated since higher overhead expenses lead to less efficient business activity and intuitively undermine a bank's profitability. On the other hand, the authors expected *TAX* to be positively correlated with pre-tax profits. Demirgüç-Kunt and Huizinga (1999) suggested that this positive relationship expectation is based on two things: 1) banks in high-tax environments need to make higher pre-tax profits in order to pay these taxes; and 2) there is a possibility that banks are able to pass all or some of their taxes to their customers.

Moreover, this study followed previous literature by incorporating real GDP growth (*GRO*), the real interest rate (*INT*), the inflation rate (*CPI*), and domestic credit provided by the banking sector as a share of GDP (*BCGDP*)to control for macroeconomic conditions (for instance, see Demirgüç-Kunt and Huizinga, 2000; Barth *et al*., 2003; Gaganis and Pasiouras, 2013). This paper expected *GRO* to have a positive relationship with pre-tax profits since the growing economy may lead to a higher demand for credit. Consequentially, bank profitability will rise as its total revenues increase. *INT* and *CPI*, however, have a more complex relationship with bank profitability. On one hand, higher inflation and interest rates lead to higher bank margins and profitability (Claessens *et al*., 2001). On the other hand, they also cause higher operating costs, which undermine bank efficiency and profitability (Claessens *et al*., 2001; Barth *et al*., 2013). This paper, however, considered that the effect of the former is stronger, and thus inflation is expected to have a positive association with profitability. *BCGDP*, which reflects the maturity of the banking system, was expected to have a negative correlation with bank profitability. A more matured banking system leads to fiercer competition in the banking industry. As a consequence, a bank has to lower its margins in order to compete in the market.

Supervision variables were divided into two groups. The first group represented central bank independence, consisting of two indices: (1) economic independence (*ECON*) and; (2) political independence (*POLIT*).[2] The second group was a proxy of supervisory framework variables. It consisted of the minimum capital adequacy ratio imposed by central banks (*CAR*), a single bank supervisor dummy (*SINGLE*), a central bank dummy (*CBANK*), the scope of the bank supervisor dummy (*SCOPE*), and the bank supervisor independence dummy (*SUPIND*).

Furthermore, due to the longitudinal nature of the data, this model could be estimated using a random effects or fixed effects models. The use of random effects model allows the inclusion of time-invariant variables in the model, whereas fixed effects model drops these variables by assuming that time-invariant variables are unique to the entity. Since this paper incorporates several time-invariant variables, Equation 1 was estimated using a random effects model instead of fixed effects. Then, the presence of random effects was confirmed by conducting a Breusch-Pagan Lagrange Multiplier test. A strong rejection of the null suggests the presence of random effects in the model. Then, to ensure that the estimates do not suffer from serial correlation and/or heteroscedasticity, the Hubber/White cluster-robust covariance estimator was used in the estimation by treating each piece of bank-level data as a cluster to estimate the correct standard error.

Table 1: Number of Banks in Each Country

Country	No. of Banks
Indonesia	7
Japan	5
Korea	5
Malaysia	6
Philippines	6
Singapore	3
Thailand	7
Total Banks	39

[2]The central bank economic and political independence indices introduced by Arnone *et al.* (2007) are used as proxies for supervision political and economic independence. Currently, data on economic and political supervision independence are unavailable. Therefore, by assuming that financial supervision has a relatively similar degree of independence to central bank, this paper uses central bank independence data to represent supervision political and economic independence. As an alternative, this paper also incorporates Supervisory Independence index provided by Barth *et al.* (2001, 2003), which has relatively simpler methodology and does not separate between political and economic independence. Please see Gaganis and Pasiouras (2013) for similar study.

Table 2: Variable Definitions and Data Sources

Variables	Definition	Original Sources
Dependent variable		
P	Profit before tax divided by total assets	Bank's individual financial report
Bank variables		
ETA–1	Equity divided by total assets lagged one period*	Bank's individual financial report
LOAN	Total loans divided by total assets	Bank's individual financial report
NIEA	Non-interest earning assets divided by total assets	Bank's individual financial report
STF	Deposits and other short-term funding divided by total assets	Bank's individual financial report
OHE	Overhead expenses divided by total assets	Bank's individual financial report
TAX	Taxes paid by a bank divided by its profit before tax	Bank's individual financial report
Macroeconomic variables		
GRO	Real GDP growth	World Bank's World Development Indicators (WDI)
INT	Real interest rate	World Bank's World Development Indicators (WDI)
CPI	Annual percentage change in consumer prices	World Bank's World Development Indicators (WDI)
BCGDP	Domestic credit provided by the banking sector divided by GDP	World Bank's World Development Indicators (WDI)
ADV	High incomeeconomies dummy, highincome economy =1, others=0	
Supervision variables		
ECON	Sub-index of economic independency of a central bank with the range between 0 and 1. Higher values indicate higher independence. Calculated based on criteria (1) to (8) representing a central bank's economic independence.	Arnone *et al*. (2007) update of GMT index
POLIT	Sub-index of political independency of a central bank with the range between 0 and 1. Higher values indicate higher independences. Calculated based on criteria (1) to (8) representing a central bank's political independence.	Arnone *et al*. (2007) update of GMT index
CAR	Minimum capital adequacy ratio required by a central bank	World Bank database on Bank Regulation and Supervision (Barth *et al*. 2001, 2004, 2006, 2008)
SINGLE	Bank supervision dummy, there is only a single bank supervisor=1, more than one bank supervisors=0	World Bank database on Bank Regulation and Supervision (Barth *et al*. 2001, 2004, 2006, 2008)
CBANK	Bank supervision dummy, central bank is a bank supervisor=1, otherwise=0	World Bank database on Bank Regulation and Supervision (Barth *et al*. 2001, 2004, 2006, 2008)
SCOPE	Bank supervision dummy, bank supervisor has supervisory responsibilities beyond the banking sector=1, otherwise=0	World Bank database on Bank Regulation and Supervision (Barth *et al*. 2001, 2004, 2006, 2008)
SUPIND	Alternative indicator of degree of supervisory independence, taking a value of 1 for a low degree of independence, the value of 2 for a medium degree of independence, and the value of 3 for a high degree of independence. The indicator is based on three questions: (1) How is the head of supervisory agency (and other directors) appointed? (2) To whom are the supervisory bodies responsible or accountable? (3) How is the head of the supervisory agency (and other directors) removed?	Barth *et al*. (2001, 2003)

*The use of lagged term follows the practice in the literature to show that a bank's current performance is affected by its equity structure in the previous period (for instance, see Demirgüç-Kunt and Huizinga, 1999, 2000; Barth *et al*., 2003).

Sample and Variables

The sample of this study consisted of 39 banks from seven East Asian countries (Indonesia, Japan, Malaysia Singapore, South Korea, Thailand, and the Philippines) over 2008–2011. The selection of these ASEAN 5+2 economies is based on these countries' economic size in representing East Asian region.[3] In

[3]Initially, People's Republic of China was also included in the sample but then omitted due to data limitation.

Table 3: Summary Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
P	156	1.456	0.924	-0.265	4.744
ETA–1	156	9.859	3.532	2.711	21.857
LOAN	156	57.159	14.294	2.052	83.992
NIEA	156	18.278	16.669	0.056	53.647
STF	156	74.468	11.269	36.466	90.563
OHE	156	3.080	3.397	0.735	25.870
TAX	156	29.823	99.506	-426.316	1135.667
GRO	156	2.202	3.625	-5.419	12.749
INT	156	3.002	3.469	-3.904	14.103
CPI	156	4.006	5.051	-7.645	18.150
BCGDP	156	92.452	49.794	26.472	179.812
ADV	156	0.333	0.473	0.000	1.000
ECON	156	0.651	0.175	0.375	0.875
POLIT	156	0.356	0.169	0.125	0.625
CAR	156	8.551	0.818	8.000	10.000
SINGLE	156	0.821	0.385	0.000	1.000
CBANK	156	0.872	0.335	0.000	1.000
SCOPE	156	0.487	0.501	0.000	1.000
SUPIND	156	1.718	0.451	1.000	2.000

terms of banks, this paper selects the biggest banks in terms of assets size in respective economy, ranging between 3 to 7 banks in each country depending on data availability. The details are presented in Table **1**.

In the end, this sampling results in a balanced dataset of 154 bank-year observations. Table **2** above identifies the data sources and short descriptions of the variables.

IV. RESULTS AND INTERPRETATION

Before proceeding to the estimation results, this paper firstly shows the summary statistics and correlation of all the variables. Summary statistics of the variables is presented in Table **3** above. Meanwhile, the correlation table is provided in the appendix.

Bank Profitability and Central Banks' Independence

First, the authors estimated the relationship between bank performance and the independence of central banks. The results (Regressions 1–7) are presented in Table **4**. The results show that equity variable (*ETA–1*) is positive and is significant in all regressions. On the other hand, the loan to assets (*LOAN*) variable has no significant impact on bank profitability. One possible explanation is that banks in some East Asian countries such as Singapore, South Korea, and Japan have relatively low interest rates. As a consequence, these banks try to acquire other sources of profit from trade finance, foreign currency transactions, and deposits. Another possible explanation is that different banks have different core businesses. Hence, not all banks rely on bank loans as their main source of profit. Next, the size of non-interest earning assets (*NIEA*) has negative coefficients, but these are only significant in two regressions (Regressions 3 and 6). These results provide modest evidence for the assertion that profits tend to decline as non-interest earning assets increase. Meanwhile, contrary to our expectation, the size of short-term funding (*STF*) has a negative relationship with profitability despite its modest significance. Particularly for retail banks, this result can be explained by the costly banking branching networks. Meanwhile, as expected, the overhead expenses variable (*OHE*) is negatively correlated with pre-tax profits and significant in all regressions. This implies that business efficiency plays a crucial role in affecting bank profitability. The

Table 4: Bank Profitability and Central Banks' Independence – Random Effects Estimation

	1	2	3	4	5	6	7
Constant	1.984** (0.953)	1.806* (1.066)	1.316 (1.000)	0.665 (1.227)	1.612 (1.118)	1.055 (0.999)	0.579 (1.209)
ETA–1	0.106*** (0.027)	0.099*** (0.031)	0.112*** (0.274)	0.104*** (0.029)	0.102*** (0.030)	0.098*** (0.026)	0.095*** (0.028)
LOAN	–0.008 (0.005)	–0.008 (0.005)	–0.008 (0.006)	–0.009 (0.006)	–0.007 (0.006)	–0.008 (0.006)	–0.008 (0.006)
NIEA	–0.011 (0.008)	–0.005 (0.115)	–0.015* (0.009)	–0.007 (0.012)	–0.002 (0.013)	–0.023** (0.010)	–0.015 (0.013)
STF	–0.006 (004)	–0.006 (0.004)	–0.006 (0.004)	–0.006 (0.004)	–0.007* (0.004)	–0.009 (0.004)	–0.009* (0.005)
OHE	–0.023*** (0.008)	–0.021*** (0.008)	–0.025*** (0.009)	–0.023*** (0.009)	–0.020** (0.008)	–0.022*** (0.008)	–0.020** (0.008)
TAX	–0.000 (0.000)	–0.000 (0.000)	–0.000 0.000	–0.000 (0.000)	–0.000 (0.000)	–0.000 (0.000)	–0.000 (0.000)
GRO	0.015** (0.007)	0.013* (0.007)	0.013* (0.007)	0.010 (0.007)	0.013* (0.007)	0.012* (0.007)	0.010 (0.007)
CPI	0.017 (0.036)	–0.026 (0.055)	0.016 (0.035)	–0.053 (0.055)	–0.033 (0.057)	–0.002 (0.036)	–0.055 (0.054)
BCGDP	–0.003 (0.003)	–0.004 (0.003)	–0.002 (0.003)	–0.003 (0.003)	–0.004 (0.003)	–0.002 (0.003)	–0.003 (0.003)
INT	0.018 (0.359)	–0.026 (0.054)	0.017 (0.035)	–0.054 (0.054)	–0.032 (0.056)	–0.002 (0.036)	–0.056 (0.054)
ADV	–0.858*** (0.274)	–0.662* (0.383)	–1.100*** (0.319)	–0.833** (0.393)	–0.100 (0.703)	0.542 (0.564)	0.738 (1.200)
POLIT		1.309 (1.443)		2.208 (1.505)	1.650 (1.591)		1.797 (1.574)
ECON			1.138** (0.564)	1.560*** (0.565)		2.740*** (0.887)	2.812*** (0.861)
POLIT*ADV					–1.760 (1.400)		–0.478 (1.956)
ECON*ADV						–3.005*** (0.962)	–2.678** (1.186)
LM test	217.82	245.46	242.29	272.84	257.87	249.16	269.50
R^2	62.18%	62.61%	64.55%	66.66%	63.75%	66.45%	67.56%
No. of banks	39	39	39	39	39	39	39
No. of countries	7	7	7	7	7	7	7
No. of obs.	156	156	156	156	156	156	156

*N*otes: P-values are computed by the heteroskedasticity-robust standard errors clustered for banks and are presented in brackets.
*Statistical significance at the 10% level.
**Statistical significance at the 5% level.
***Statistical significance at the 1% level.

tax rate (*TAX*) is not statistically significant in affecting bank profitability. One possible reason is that the dataset of this study is drawn from the largest banks' financial results from their respective countries. Hence, they do not consider higher tax rates as an incentive to increase their profitability since, in terms of assets size and revenues, their businesses are already large from the beginning.

For macroeconomic variables, economic growth (*GRO*) is positively related to bank performance even though the evidence is weak. This suggests that economic growth plays some role, even though limited, in improving bank profitability. On the other hand, inflation (*CPI*) and interest rates (*INT*) are not significant. As mentioned in the previous section, this may be caused by the two-way impacts of inflation and interest rates on bank profitability. That is to say, even though these variables lead to higher revenues, they also increase bank costs. Domestic credit (*BCGDP*) is also insignificant, despite its negative relationship with pre-tax profits. Next, the advanced economies dummy (*ADV*) has a negative relationship with bank profitability and statistically significant in four regressions. One possible explanation is because banks in emerging countries tend to have a relatively higher interest rate spread attributable to higher risk premium and information asymmetry (for instance, see Hellman *et al*., 2000; Mirzaei *et al*., 2011). Moving to a central bank's independence variables, the political independence of a central bank (*POLIT*) does not have significant impacts on bank profitability in all regressions. However, as shown by Regressions 3, 4, 6, and 7, the economic independence of a central bank (*ECON*) is positively related to bank profitability and statistically significant, confirming our initial expectation.

Bank Profitability and Financial Supervision Regimes

Next, the analysis of this paper moves to bank profitability and its relation to financial supervisory frameworks. The results (Regressions 8–14) are presented in Table **5**. According to these results, both bank and macroeconomic variables do not differ significantly from the previous results. Hence, in this paper, the authors omit the analysis of these results and proceed directly to the relationship between bank profitability and financial supervisory frameworks.

The minimum capital regulation required by central banks (*CAR*) is negatively related to bank profitability in both Regressions 8 and 14. However, it is only significant in Regression 8, indicating weak evidence, which, to some extent, supports the previous study (for instance, see Barth *et al*., 2004). Meanwhile, a central bank being a supervisory authority (*CBANK*) does not have significant impact on bank profitability, supporting the findings of Barth *et al*. (2003). On the other hand, the scope of a bank supervisor's responsibilities (*SCOPE*) only shows weak evidence despite its negative coefficient. This finding is consistent with that of Barth *et al*. (2003). Meanwhile, on the contrary to economic independence of a central bank (*ECON*), the independence of a supervision authority (*SUPIND*) also does not appear to have strong relationship with bank profitability.

Finally, the results also show that a single supervisor (*SINGLE*) is statistically significant and has positive relationship with bank profitability. These results confirm the theory that a single supervisor has better chance to ensure better risk management in the banking system and is able to take actions more decisively, which, consequentially, benefits the performance of the banking system (for instance, see Barth *et al*., 2003).

Further Discussion and Analysis

The estimation in the previous section has shown the main determinants of and how different financial supervision frameworks affect bank profitability. Now, our discussion focuses on providing further justifications and analyses to clarify what was found in the previous section.

First, Regressions 5 and 7 show that a central bank's political independence is not a significant determinant of bank profitability. One possible explanation is that our analysis coverage is limited to emerging East Asian countries that have a relatively more stable political condition. This explanation is supported by a study by Cukierman and Webb (1995), which measured the political vulnerability of central banks by estimating the percentage of times that a political transition is followed by a change in the central bank governor. The study only showed that low and medium levels of political change—mainly by changing a party's head government, which then results in political change in the central banks—does not result in significant changes. On the other hand, unlike political independence, the economic independence of central banks has a positive correlation with bank profitability. This evidence can be explained by the fact that higher economic independence from the central bank allows banks to make decisions and set its banking policy through the basis of market conditions rather than having to conform to the political factors and constraints set by the central bank (Barth *et al*., 2003). Barth *et al*. (2003) also provided an example of low economic independence of central banks through "directed lending" in which central banks act as "development agent" and force banks to provide loans based on central bank policy objectives without

Table 5: Bank Profitability and Financial Supervision Regimes – Random Effects Estimation

	8	9	10	11	12	13	14
Constant	4.328*** (1.581)	2.220** (0.999)	2.326** (1.048)	2.047** (0.987)	1.501 (0.917)	–0.144 (1.627)	1.521 (1.481)
ETA–1	0.110*** (0.027)	0.106*** (0.027)	0.105*** (0.027)	0.099*** (0.028)	0.102*** (0.025)	0.088*** (0.029)	0.091*** (0.028)
LOAN	–0.009 (0.006)	–0.006 (0.005)	–0.010 (0.006)	–0.007 (0.006)	–0.007 (0.005)	–0.006 (0.006)	–0.008 (0.006)
NIEA	–0.010 (0.008)	–0.010 (0.008)	–0.017* (0.010)	–0.010 (0.008)	–0.023** (0.010)	–0.018 (0.012)	–0.013 (0.013)
STF	–0.007 (0.004)	–0.007 (0.004)	–0.007 (0.005)	–0.010** (0.005)	–0.008* (0.004)	–0.008* (0.005)	–0.006 (0.005)
OHE	–0.023*** (0.009)	–0.022*** (0.008)	–0.023*** (0.008)	–0.018** (0.008)	–0.023*** (0.008)	–0.020** (0.008)	–0.022** (0.009)
TAX	–0.000 (0.000)	–0.000 (0.000)	–0.000 (0.000)	–0.000 (0.000)	–0.000 (0.000)	–0.000 (0.000)	–0.000 (0.000)
GRO	0.012* (0.007)	0.015** (0.007)	0.014* (0.007)	0.014** (0.007)	0.014** (0.007)	0.013** (0.006)	0.011* (0.006)
CPI	–0.005 (0.036)	0.016 (0.036)	0.023 (0.036)	–0.014 (0.042)	0.021 (0.036)	–0.035 (0.045)	–0.066 (0.054)
BCGDP	–0.006* (0.003)	–0.004 (0.003)	–0.005 (0.003)	–0.007* (0.004)	–0.000 (0.003)	0.002 (0.005)	0.003 (0.005)
INT	–0.003 (0.036)	0.018 (0.036)	0.024 (0.036)	–0.012 (0.041)	0.020 (0.036)	–0.036 (0.046)	–0.069 (0.053)
ADV	–0.829*** (0.279)	–0.892*** (0.266)	–1.225*** (0.400)	–0.727** (0.305)	–1.597*** (0.407)	–1.021* (0.601)	–0.609 (0.771)
CAR	–0.221* (0.118)						–0.240 (0.156)
CBANK		–0.204 (0.263)				0.762 (0.542)	1.193* (0.696)
SCOPE			0.389 (0.297)			–0.842 (0.612)	–1.318* (0.802)
SUPIND				0.419 (0.284)		0.547 (0.353)	0.535 (0.329)
SINGLE					0.970** (0.388)	1.584*** (0.582)	1.731*** (0.603)
LM test	224.89	216.89	231.41	253.22	233.76	299.00	301.16
R^2	65.02%	62.36%	63.22%	63.66%	65.58%	66.18%	68.17%
No. of banks	39	39	39	39	39	39	39
No. of countries	7	7	7	7	7	7	7
No. of obs.	156	156	156	156	156	156	156

*N*otes: P-values are computed by the heteroskedasticity-robust standard errors clustered for banks and are presented in brackets.
*Statistical significance at the 10% level.
**Statistical significance at the 5% level.
***Statistical significance at the 1% level.

conducting any appropriate risk-based evaluations of the borrowers' creditworthiness. This significantly diminishes profitability due to low profitability levels and/or the greater likelihood of the investment becoming impaired. Mean while, supervision independence variable introduced by Barth *et al*. (2001, 2003) is not significant despite its positive coefficient. This weak evidence is consistent with Barth's *et al*. (2003) study. As previously mentioned, one possible explanation may be explained by its relatively simplified methodology and difficulties in quantifying the degree of independence.

Second, our results show only weak evidence for a higher capital adequacy ratio reducing profits. This contradicts our belief, since we expected that banks

with a higher CAR would be able to enjoy a higher profitability level. Ghosh and Das (2005) argued that banks with a higher capital adequacy ratio are able to enjoy better interest margin, and capitalized banks are able to enjoy lower average interest on their deposits. They further argued that banks with a higher return on equity are also able to enjoy lower borrowing costs, while banks with higher non-performing loans face higher interest expense ratios. The latter causes depositors to be concerned about the riskiness of their investment. As a consequence, banks that are perceived as riskier because of the higher non-performing loans are "punished" by higher borrowing costs. On the other hand, these authors also argued that "while additional capital lower borrowing costs, it does so at a decreasing rate" (Ghosh and Das, 2005:10).This means that banks that are well-capitalized enjoy much less improvement in their interest margins in comparison to inadequately capitalized banks when they increase their adequacy ratios. Considering that the majority of the banks tested are some of the biggest banks in each of their countries, we believe that the impact of a higher CAR on their borrowing costs were relatively minimal. We also argue that higher CAR requirement imposed by central banks might cause banks more difficult to obtain additional lending channeled from depositors. As a consequence, the bigger the banks are, the more impacted their profitability was due to the constrained investing activities while the improvements in interest margin were relatively negligible.

Third, we also found weak evidence regarding the scope of the supervisory regime on bank profitability. This may be explained by the argument of information-related synergies, which stresses the importance of confidential information collected for supervisory purposes. A paper by the European Central Bank (2001) argued that a supervisor that also supervises non-banks financial services will be able to obtain timely insight into money and financial market development in order to conduct prudent monitoring. Moreover, market participants will have greater readiness to speak with the supervisor, since these contacts are outside of the scope of formal scrutiny. On the other hand, even though the supervisor only supervises banks, this kind of information can be obtained indirectly by separate supervisory agencies, although with limited availability and a time lag. However, the advancement of information technology will accelerate the process of information sharing and reduce the time lag. Thus, we believe that there are no significant differences between the supervisors that only supervise banks or include other non-banking financial institutions.

Fourth, there is weak evidence in terms of the relationship between banking profitability and the role of the central bank as one of the banking supervisors. Goodhart *et al*. (1993; 1995) noted that a major argument for divorcing the bank regulatory from the monetary authorities, i.e., central banks, is to avoid conflict of interest between central banks and the banking industry, through inputting high-powered reserves into the banking system. On the other hand, the main argument for combining the function of monetary and supervisory management is for a central bank's concern for the systemic stability of the financial system. However, these assumptions are case scenarios for failed banks, whereas in normal business conditions, the relation of central banks being one of the supervisors has relatively little influence in normal banking operations.

Finally, we found strong evidence that a regulatory framework with a single bank supervisor has a significant influence on improving bank profitability. This evidence thus strengthens previous literature supporting the unification of regulatory supervisors into one single entity since it improves the effectiveness of financial conglomerates' supervision, regulatory flexibility and efficiency, staff professionalism, and institution accountability (for instance, see Llewellyn, 1999; Barth *et al*., 2003; Briault, 2002).

V. CONCLUSIONS

Despite the rapid development in the financial industry, particularly the banking sector, literature that captures the role of regulatory frameworks in maintaining the banking sector's performance is still limited. Most available studies are only focused on the theoretical aspect of the relationship between financial supervisory framework and bank performance. Nevertheless, there is still an ongoing debate covering all aspects of the institutional design of supervision, and there are many pros and contras in this debate; thus, the literature is not yet conclusive. Therefore, further analysis to support these theoretical arguments that investigates the empirical evidence between these variables is still required.

To fill this gap, in this study, the authors investigated the relationships between a broad array of financial supervisory frameworks and bank performance. We conducted this analysis using a

APPENDIX

Table A1: Correlation of the Variables

	P	ETA–1	LOAN	NIEA	STF	OHE	TAX	GRO	CPI	BCGDP	INT	CAR	SINGLE	CBANK	SCOPE	INDSUP
P	1.000															
ETA–1	0.703	1.000														
LOAN	0.095	0.183	1.000													
NIEA	0.476	0.351	-0.152	1.000												
STF	0.134	-0.135	-0.246	0.478	1.000											
OHE	-0.130	-0.076	0.156	-0.163	-0.393	1.000										
TAX	-0.107	-0.145	-0.058	-0.061	0.033	-0.033	1.000									
GRO	0.333	0.260	0.105	0.197	0.043	0.035	-0.117	1.000								
CPI	0.469	0.276	0.168	0.388	0.108	0.125	-0.093	0.575	1.000							
BCGDP	-0.613	-0.539	-0.037	-0.657	-0.154	-0.133	0.150	-0.393	-0.624	1.000						
INT	-0.055	0.051	-0.068	-0.113	-0.058	-0.005	0.028	-0.480	-0.729	0.059	1.000					
CAR	0.120	0.423	-0.187	0.224	0.003	-0.166	-0.092	-0.009	-0.101	-0.351	0.141	1.000				
SINGLE	-0.056	-0.222	-0.463	0.334	0.245	0.086	0.030	0.107	0.052	-0.292	0.010	0.029	1.000			
CBANK	0.459	0.547	0.485	0.411	-0.186	0.176	-0.245	0.310	0.419	-0.632	-0.025	0.259	-0.179	1.000		
SCOPE	-0.582	-0.591	-0.193	-0.299	-0.069	0.017	0.078	-0.191	-0.479	0.625	0.039	-0.282	0.456	-0.393	1.000	
INDSUP	0.107	-0.054	0.019	-0.097	0.312	-0.387	0.125	-0.050	0.017	0.363	-0.015	-0.415	-0.293	-0.240	0.041	1.000

sample of 39 commercial banks in seven East Asian countries from 2008–2011 longitudinal data that allow us to capture the heterogeneity effects in the data. The contributions of this paper are twofold. First, the empirical analysis shows that there is strong evidence supporting the relationships between the structure of supervisory institutions and bank performance in the observed economies, particularly within East Asian region. This finding strengthens the arguments provided by previous studies with similar results. Second, the empirical results presented in this paper could also provide some insights into policy decision-making, particularly to the extent of the effectiveness of the unification of supervisory agencies into one single institution.

Finally, the scope of this study is limited to the period of the stable banking sector. Even though the data in our study cover the period of 2008 Global Financial Crisis, most of the banks included in the database are relatively unscratched by the crisis since they are among the biggest banks in their country and whose assets were not concentrated on derivative transactions. In addition, this study is also supported by limited availability of banking supervision data, which may affect the consistency of its results. Therefore, to confirm the validity of this study, further research is required and should be facilitated by the extended version of the data.

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