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THE NUMBER OF FINANCIAL REGULATORY AUTHORITIES AND FINANCIAL STABILITY: CROSS-COUNTRY EXPERIENCES

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Abstract

This paper attempts to provide evidence whether or not the unification of regulatory institutions for different types of financial sector creates challenges for financial stability. From a sample of 91 countries that provide data on the financial unification index and the central bank involvement index, the empirical results reveal that higher financial unification index or the convergence toward a single supervisory institution outside the central bank, in order to control three different sectors (banking, insurance, and securities), is detrimental for financial stability. However, this finding only holds for developed countries, but dissapears for less developed countries. In parallel, the central bank involvement in financial sector supervision has no impact on financial stability in both developed and less developed countries.

Keywords: Supervisory Regimes, Financial Sectors, Financial Stability
JEL Classification: G18, G21, G28

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I. Introduction

The combination of globalization, liberalization, and deregulation forces has significantly reduced cost of capital and its ability to move around the globe. Those phenomena have been accompanied by the development of sophisticated new financial instruments and the emergence of new players, such as sovereign wealth funds. These changes are beneficial overall, but they have also been accompanied by frequent financial disruptions, such as the Asian currency crisis in 1997, Russian financial crisis in 1998, the Argentine crisis in 2001 and the sub-prime mortgage crisis in 2007.

Admittedly, such financial crises had incurred large macroeconomic costs. Goldstein et al (2000) find that the cost of public-sector bail-out of banking crises could add up to 10 percent or more of the gross domestic product (GDP) of the country. During Asian financial crisis, for instance, the cost of banking crisis amount to 10 percent of GDP in the case of Malaysia, 16 percent for South Korea, 30 percent for Thailand, and even up to 58 percent of GDP for Indonesia.

Singala and Asher (2008) argue that financial innovations, exemplified by the growing complexity as well as variety of financial products, along with the emergence of new global financial players have led to an unprecedented increase in global financial assets and flows. While these changes have brought about improved liquidity, reduced transaction costs and more risk management options, they have created major challenges for macroeconomic policymakers. As incidents of financial disruption and volatility increase and as their economic costs become significant, ensuring financial stability has become a major preoccupation of financial supervisory authorities including central banks. Achieving financial stability has therefore become an increasingly dominant objective in economic policymaking, as financial stability is now considered as a public good (Schinasi, 2005b).

This paper attempts to focus on one of issues of achieving financial stability through the role of supervisory authorities. Previous studies as described in this paper (Section 2) have highlighted the pros and cons of the unification of financial supervisory authorities, since it might affect the effectiveness of financial supervision within each sector (i.e. bank, financial market, and insurance). Aside from the unification of financial supervisory authorities, considerable debate remains with regard to whether the presence central banks presence is compulsory in conducting the financial sector supervision. To our best knowledge, previous studies have not yet examined whether such trends affect financial stability through the banking stability channel. Given the fact that banking is a major financial sector in both developed and developing countries, assessing financial stability through banking stability becomes relevant.

In order to assess the level of unification of financial supervisory activities and central bank involvement in financial sector supervision, we use a detailed dataset on financial unification index and central bank involvement index established by Masciandaro (2009). Building on Masciandaro (2009), we then examine the impact of financial unification index and central

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bank involvement on banking stability. A closer look is also conducted by examining whether such a link is dependent on the degree of economic development. Some studies on financial stability also distinguishes developing countries and developed countries due to the differences in macroeconomic policies that may in turn affect financial stability (e.g. Uhde and Heimeshoff, 2009; Schaeck et al., 2009).

Finally, the rest of this paper is structured as the following. Section 2 describes our literature review. In Section 3, we present our data, variables and methodology. Section 4 provides our empirical results, while Section 5 concludes.

II. Theory

2.1. Unification Trends Infinancial Supervision

The reform in financial supervision landscape in recent years has indicated a trend toward a unified agency. Abrams and Taylor (2002) and Llewellyn (2006) argue that because of the increasing formation of financial conglomerates as well as the convergence of function among different types of financial institutions, single supervision authority for all financial system is increasingly considered as one the most viable supervision model. The reformation of supervisory authority started by the establishment of financial supervisory authority (FSA) in UK by 1997 and the development of similar institution by Scandinavian countries in the early 1990s. Despite of that, not all countries have decided to follow complete unification of financial supervision (Masciandaro and Quintyn, 2008).

Moreover, Masciandaro (2007, 2009) has attempted to explore the driving factor of recent unification reforms in financial supervision and find that the level of unification in supervision depends on the policy of the central bank and the behavior of policymakers (helping-hand or grabbing-hand type). Moreover, Kremes et al. (2003) and Wymeersch (2006) also documents that there are various different factors affecting the model of supervisory structures, such as: history, financial structure, political system, country and financial sector size.

There are many reasons why countries follows integrated supervision. Gaganis and Pasiouras (2013) argue that unified supervision could: (i) allow synergy among multitude supervisory functions and knowledges, (ii) change and reduce unnecessary controls and regulatory loophole, (iii) create economies of scale in organization, (iv) improve supervisory effort, since the single supervisor allow clearer responsibilities in the system. Moreover, Čihák and Podpiera (2008) mention that the main cause for supervision is related to issue of efficiency and effectiveness. In the new financial landscape, where financial conglomerates are thriving, unified supervision among agencies could potentially get rid of duplicated functions, and create synergy.

On the other hand, there are also some counter argument agains the policy toward intergrated financial supervision. For instance, Demastri and Guerrero (2005) discuss the moral

hazard issues caused by the "Christmas tree effect", in which the single regulator may become alienated from the industry, and therefore may result to regulatory capture. Moreover, Boyer and Ponce (2012) argue that separate supervisory powers among supervisors is susceptible to the capture of supervisors by bankers.

Furthermore, Čihák and Podpiera (2008) also note that some points against unified supervision. First, it is possible that integrated supervision may blur the objectives of financial supervision. Second, synergy may not be achievable when different industries are not well harmonized. Third, Integration can create diseconomies of scale. Last, unified supervisor may even further the moral hazard problems to the system. They also mention that the process of unification may bring other risks. The risks include the following (i) some potilicians may push for integrated supervision despite it may not necessarily be optimal, (ii) the process could reduce the effectiveness of supervision by special interests, (iii) loss of key staff, and (iv) possibility of mismanaged integration process (for instance, "clash of cultures" between integrated agency)

Through empirical study, Barth et al. (2002) show that country with multiple supervision agency usually have low capital adequacy ratio (CAR) and thus greater risk of insolvency. Meanwhile, Barth et al. (2003), find that integrated supervision increase bank performance. Čihák and Podpiera (2008) also argue that higher integration of supervision is related with better quality of insurance and securities supervision and higher consistency of supervision among sectors. Within different form of supervision, model that integrate supervision but separate business conduct and prudential supervision (twin peaks) is more efficient. Moreover, they also argue that central bank involvement does not necessarily improve supervisory quality.

Some literatures also attempt to examine the relationship between level of supervisory unification and their performance (Arnone and Gambini, 2006; Čihák and Podpiera, 2006). Moreover, other researches find that country charactersitics may influence the type of supervisory regime (Masciandaro and Quintyn, 2008; Masciandaro et al., 2008). Recently, Masciandaro et al. (2012) also predict the impact of changes in supervisory architectures in governance toward economic resiliences. According to them, higher supervisory integration and better governance may even adversely related with the resilience of the economy.

2.2. Central Bank Involvement in Financial Supervision

Studies regarding central bank involvement in financial supervision are extensive. The early study went back to Bagehot (1873) which proposes that central banks (CB) play an important role in bailing out illiquid but solvent banks. If the world is frictionless, bank could borrow some amount from the market. However, when banks' financial health is uncertain, this borrowing strategy is difficult to implement. Thus, in most cases, central banks has to step in as lender of last resort (LLR) to provide better financial evaluation about the banks' condition.

Early study, such as Paroush (1988) showed that there are two reason why monetary authorities is important in supervising and regulationing banking industry. The first reason is that, monetary authorities has the capabilities to perform monetary policy, and therefore capable to control money supply by putting limitations toward banking industries. The second reason is that, monetary authorities have the authority to conduction restriction against "irresponsible conduct" of banks and ensure the soundness of financial ecosystem. Two reasons above – monetary and stability policy – become the main arguments why central bank involvement is needed in the banking industry.

Despite of that, Masciandaro and Quintyn (2009) and Eichengreen and Dincer (2011) shows that there is in increasing trend of diminishing central bank involvement in the supervision of financial industry. According to Cukierman (2011), although central bank involvement as systemic regulator may be important to provide necessary liquidity injection when a crisis erupts. However, this injection may negatively compromise the independence of central bank in the long term.

In the literature, there exists pros and cons regarding central bank involvement in the financial supervision. Some studies argues that central banks involvement could provide economies of scale and informational advantages (Blinder, 2010, Lamfalussy, 2011; Papademos, 2010), and better equiped human capital to manage supervisory issues (Lamfalussy, 2011). On the other hand, some studies argue that central bankers may fall captive to the interest of banking industry (Boyer and Ponce, 2011, 2012), and the unification between monetary and supervision function in the central bank may produce complicated bureaucracy (Blinder, 2010; Goodhart, 2010; and Eichengreen and Dincer, 2011)

Other literatures suggest that central bank involvement in supervision may well be avoided because of the empirical results that shows (i) bank profit efficiency tends to decrease as the number of financial sectors monitored by central banks increases (Gaganis, and Pasiouras, 2013), (ii) the performance of financial market is better when supervision is conducted by agency outside central banks (Eichengreen and Dincer, 2011), and (iii) Central bank involvement in supervision does not affect macroeconomic resilience during financial crisis (Masciandaro et al., 2011).

By summarizing the views above, we may conclude that central bank involvement in financial supervision brings trade-off between benefit and cost. Most studies are concerned that central bank involvement in financial supervision may encourage central banks to relax monetary policy standard in order to solve the issues in the financial sector. This relaxation, in turn, could create problem for both monetary and financial stability.

III. Methodology

Our sample consists of 91 countries in 2006 in order to be consistent with the index of financial unification and central bank involvement for 2006 established by Masciandaro (2009)

as the latest literature that discusses the issues of financial supervisory unification and central bank involvement. All financial development data comes from the Global Finance Database established by the World Bank. Meanwhile, the list of variables is defined as follows.

3.1. Financial Stability

Following Uhde and Heimeshoff (2009) that assess financial stability through a measure of bank stability, we employ banks' probability of default as a proxy for financial soundness. Specifically, we employ the Z-score technique (e.g. De Nicolo et al, 2004) which is denoted as follows:

$$ZSCORE = \frac{\mu + k}{\sigma}$$

This indicator is constructed per country by aggregating the banks'consolidated balance sheet and use μ as a symbol to define the return on average assets before taxes (*ROAA*). Moreover, k is defined as the equity-to-total asset ratio and σ as the standard deviation of *ROAA*. Moreover, we argue that value Z-score will improve together with the banks' profitability and capital ratio and decrease during higher return volatility. In this case, the Z-score measures the bank insolvency probability when asset value turns out to be lower than the debt value. The refore, a greater (lower) Z-score implies a lower (greater) default probability.

3.2. Explanatory and Control Variables

This paper retrieves two explanatory variables of interest from Masciandaro (2012), such as the financial supervision unification index (*FSU*) and the central bank involvement index (*CBFA*)[2]. *FSU* is defined based on the number of authorities from 91 countries that provides data related to supervisory activities in banking, securities market and insurance. Specifically, higher *FSU* is associated with a greater financial supervisory unification toward a single authority. Moreover, *CBFA* represents the extent to which the central bank has responsibility in supervising three financial sectors (banking, securities or insurance). Higher *CBFA* means that the central bank has a greater involvement in supervising at least one type of financial sectors (banking, securities and insurance).

Several control variables are also incorporated in this study. First, we include the ratio of total loans to total deposits (*LDR*) to control for liquidity risk. Greater *LDR* is also associated with greater intermediation activities. As intermediation activities are a major source of risk, we expect that there might be a relation between bank intermediation (*LDR*) and insolvency risk

2 See Masciandaro (2012) for a detailed discussion to construct *FSU* and *CBFA*.

(*ZSCORE*). Inflation rate (*INF*) is also incorporated as a control variable, since it can also affect bank insolvency risk through an interest rate channel as in Soedarmono et al. (2013). Finally, we also control for the degree of market power in the banking industry (*LERNER*) that may affect bank stability, although the direction of the relationship remains subject to considerable debate until recently[3]. Eventually, it is important to note that we opt to limit the number of control variables in order to maintain the degree of freedoms, since we have an unbalanced sample with limited observations (91 countries).

3.3. Data Estimation

Given that we have a cross-sectional dataset, we thus directly use OLS (ordinary least squares) as an estimation method. In terms of methodology, we run regressions in two stages. First, we run regressions for all countries in the sample in order to see the impact of *FSU* and *CBFA* on financial stability (*ZSCORE*) in general. Second, we divide our sample into two groups consisting of developed countries and developing countries in order to examine whether developed and developing countries have different characteristics that may influence the link between *FSU*, *CBFA* and *ZSCORE*. In defining developed and developing countries, we initially construct the median value of real per capita GDP from all countries. Developed (developing) countries are countries in which their GDP are greater (lower) than the median value of GDP from all countries, which is equal to USD 5,476.96. Specifically, we create a dummy variable where developing countries are equal to 1 and developing countries are equal to 0.

In order to ensure that OLS estimators to be the best available estimator, the major classical assumptions must be met. These include: (1) no multicollinearity amongst independent variables; (2) errors term has zero mean; (3) no heterocedasticity in error terms; (4) no autocorrelation amongst errors; and (5) no correlation between independent variables and error terms. In running regressions, we also check whether the regression equations obtained fulfill such classical assumptions.

Robustness checks are also conducted. First, we include control variables one by one, in order to ensure that the impact of *FSU* and *CBFA* on *ZSCORE* is not altered due to the presence or absence of other control variables. Second, we transform the functional form of independent and dependent variables using a logarithm transformation and hence, the interpretation regarding the impact of *FSU* and *CBFA* on *ZSCORE* remains similar with the previous models in which we use variables in level.

3 See Soedarmono et al. (2013) for a comprehensive review on the link between market power in the banking industry and financial stability.

IV. Result and Analysis

4.1. All Countries

Table 1 intially presents the descriptive statistics of all variables used in this study. It can be shown that the values of all variables are economically plausible and hence, no outliers might be expected.

Table 1
Descriptive statistics of all variables

	ZSCORE	*FSU*	*CBFA*	*LDR*	*INF*	*LERNER*
Mean	19.333	2.868	1.784	114.817	17.239	25.984
Median	17.892	2.000	2.000	98.834	3.751	24.092
Maximum	54.986	7.000	4.000	520.220	1096.680	67.444
Minimum	3.419	0.000	1.000	25.244	0.241	11.466
Std. Dev.	11.170	2.377	0.765	71.722	115.772	9.457
Observations	91	91	88	91	89	85

Given that the multicollinearity issues between independent variables are crucial in OLS estimations, we present a correlation matrix of all variables in Table 2. From Table 2, it is less likely that our OLS models suffer from multicollinearity issues, since the correlation coefficients amongst independent variables are relatively small (less than 0.5). Only *FSU* and *CBFA* exhibit relatively higher correlation coefficient than other pairs (0.32). Hence, no multicolliearity assumption in OLS estimations is not violated.

Table 2
Correlation structure

	ZSCORE	*FSU*	*CBFA*	*LDR*	*INF*	*LERNER*
ZSCORE	1					
FSU	-0.138192	1				
CBFA	0.076581	-0.328894	1			
LDR	-0.140422	0.191438	-0.115368	1		
INF	-0.149957	-0.096227	0.038963	-0.115959	1	
LERNER	0.066807	-0.006929	-0.009292	0.095622	-0.02629	1

In the next turn, we run regressions in order to examine the impact of *FSU* and *CBFA* on *ZSCORE* in general. Table 3 presents our empirical results.

Table 3 The impact of financial supervisory unification (FSU) and central bank involvement (CBFA) on financial stability (ZSCORE) in all countries

Independent variables	*ZSCORE*			
FSU	-0.8505* (0.531)	-0.7848* (0.539)	-0.9157** (0.552)	-1.3889*** (0.596)
CBFA	0.1674 (1.631)	0.1051 (1.637)	-0.1373 (1.662)	-0.1198 (1.664)
LDR		-0.0126 (0.016)	-0.0103 (0.017)	-0.0099 (0.018)
INF			-0.0163*** (0.010)	-0.7827** (0.393)
LERNER				-0.0198 (13.482)
Observations	87	87	84	77
R-squared	0.035	0.042	0.070	0.104
Durbin-Watson stat	2.18	2.19	2.27	2.34
White heterocedasticity correction	Yes	Yes	Yes	Yes
Zero mean of errors	Yes	Yes	Yes	Yes
Correlation between errors and independent variables	No	No	No	No

From Table 3, it is shown that higher *FSU* index representing the extent to which financial supervisory authorities becomes integrated outside the central bank tends to deteriorate financial stability as *ZSCORE* declines. Meanwhile, the central bank involvement in financial sector supervision (*CBFA*) has no impact at all on financial stability. These results are robust to the presence or absence of other control variables as in Table 3.

All regression models presented in Table 3 are also valid, since they do not violate the classsical assumptions of OLS estimations. Durbin-Watson statistics range around 2, thereby autocorrelations amongst residuals are less likely to occur. In order to control for the presence of heterocedasticity in residuals, we have used Huber-White robust estimates of the standard errors.

4.2. Developed vs. developing countries

The result in this section distinguishes our sample into developed and developing countries[4]. Table 4 and 5 summarizes the impact of financial supervisory unification (*FSU*) and central bank involvement (*CBFA*) on financial stability (*ZSORE*) in developed and developing countries, respectively. The *R-square* of most developed countries models are better than the *R-square* of full sample and developing countries model. This shows that our model can

4 Using the mean equality test between *FSU* and *CBFA* index based on the group of countries (i.e. developed and developing countries), we show significant mean difference between the two categories supporting our approach to examine the issue based on developed and developing countries sub-sample. The result is not shown in this paper, but it is available upon request.

explained the variation of *ZSCORE* in the developed countries better than in the developing countries or full sample (global) model.

Table 4 The impact of financial supervisory unification (FSU) and central bank involvement (CBFA) on financial stability (ZSCORE) in developed countries

Independent variables	*ZSCORE*			
FSU	-1.6572*** (0.516)	-1.7795*** (0.535)	-1.7647*** (0.535)	-1.9501*** (0.515)
CBFA	-0.8654 (1.923)	-0.8945 (1.869)	-0.0435 (1.898)	-0.6876 (1.942)
LDR		0.0137 (0.025)	0.0175 (0.019)	0.0370* (0.021)
INF			-1.8082*** (0.464)	-1.3352** (0.530)
LERNER				-26.4219 (22.227)
Observations	43	43	42	40
R-squared	0.136	0.141	0.243	0.264
Durbin-Watson stat	2.31	2.33	2.18	2.02
White heterocedascity correction	Yes	Yes	Yes	Yes
Zero mean of errors	Yes	Yes	Yes	Yes
Correlation between errors and independent variables	No	No	No	No

Tabel 4 shows that the impact of financial supervisory unification (*FSU*) is significant and negative in developed countries. The coefficient estimates for *FSU* range from -1.65 to -1.95 with 1% significance level. This means that an increase a unit change in the FSU index is associated with a 1.65-1.95 unit increase of the insolvency risk. In other words, the more integrated financial supervision in a country, the less stable the financial/banking system (*ZSCORE*) in the country.

Table 4 also suggests that inflation rate has statistically significant and economically large impact toward financial stability in developed countries. The coefficient estimates for INF ranges between -1.8 and -1.33, meaning that one-percentage point increase in inflation is associated with a 1.8 to 1.33 percentage point decrease in financial stability. Previous studies supported this result, for example Boyd et al. (2001) find that an increase in the rate of inflation interferes financial sector ability to allocate resource effectively. They find that once the mean of inflation rate exceeds 15 percent per year, financial sector performance decreases significantly. Moreover, Soedarmono (2011) also find similar results by investigating 12 countries in Asia.

As we can see in Table 4, bank competition (*LERNER*) does not have significant impact toward financial stability (*ZSCORE*), a result which is somehow inconsistence with previous study on the "competition-stability" hypothesis or the franchise-value hypothesis. The possible

explanation is that our study does not take into account time differences and thus, we cannot control for time-fixed effects that may determine the significance of the link between *LERNER* and *ZSCORE*. Nevertheless, given that our focus is not to study the link between *LERNER* and financial stability, the absence or presence of *LERNER* in the models does not alter the impact of *FSU* and *CBFA* on *ZSCORE* in particular.

Further, Table 5 shows that both financial supervisory unification (*FSU*) and central bank involvement (*CBFA*) is not significant in explaining financial stability (*ZSCORE*) in developing countries. Other papers, such as Beck et al. (2012) also show that bank stability varies across income groups and even more over time. Ariss (2010) also documents that some factors may have significant impact on financial stability in developed countries, but yield no significant effect in developing countries.

Table 5 The The impact of financial supervisory unification (FSU) and central bank involvement (CBFA) on financial stability (ZSCORE) in developing countries

Independent variables	*ZSCORE*			
FSU	1.0108 (0.953)	0.8488 (0.962)	0.5426 (0.959)	0.0658 (1.926)
CBFA	0.8919 (2.934)	0.6699 (2.857)	0.1688 (3.124)	0.4659 (3.336)
LDR		-0.0180 (0.013)	-0.0190 (0.014)	-0.0251 (0.017)
INF			-0.0149*** (0.003)	-0.4209 (0.520)
LERNER				10.1614 (13.351)
Observations	44	44	42	37
R-squared	0.015	0.034	0.073	0.063
Durbin-Watson stat	2.65	2.78	2.85	2.94
White heterocedascity correction	Yes	Yes	Yes	Yes
Zero mean of errors	Yes	Yes	Yes	Yes
Correlation between errors and independent variables	No	No	No	No

In order to ensure that our empirical results are robust, Table 6 – 8 provide robustness checks on the link between financial supervisory unification (*LOG_FSU*), central bank involvement (*LOG_CBFA*) and financial stability (*ZSCORE*). Specifically, we now change all independent and dependent variables using a logarithm function transformation. The results in table 6 shows consistent result with Table 4, where *LOG_FSU* significantly impact the financial stability after controlling for *LOG_INF* and *LOG_LERNER*. Meanwhile, central bank involvement (*LOG_CBFA*) has no significant impact at all on financial stability (*LOG_ZSCORE*)

As well, Table 7 shows similar results with Table 4. It shows that for developed countries, *LOG_FSU* and *LOG_ZSCORE* are negatively related but no significant impact of *LOG_CBFA* on

LOG_ZSCORE. Finally, Table 8 also indicates similar results with Table 5 where both financial supervisory unification (*LOG_FSU*) and central bank involvement (*CBFA*) have no significant impact at all on financial stability (*LOG_ZSCORE*).

Table 6 The impact of financial supervisory unification (LOG_FSU) and central bank involvement (LOG_CBFA) on financial stability (LOG_ZSCORE) in all countries

Independent variables	*LOG_ZSCORE*			
LOG_FSU	-0.1294 (0.106)	-0.1220 (0.105)	-0.2004* (0.105)	-0.2274** (0.110)
LOG_CBFA	-0.1328 (0.196)	-0.1430 (0.196)	-0.1202 (0.184)	-0.1320 (0.186)
LOG_LDR		-0.0851 (0.145)	-0.1002 (0.133)	-0.1221 (0.137)
LOG_INF			-0.2303*** (0.061)	-0.2224** (0.097)
LOG_LERNER				0.0009 (0.216)
Observations	83	83	81	74
R-squared	0.020	0.024	0.124	0.102
Durbin-Watson stat	2.20	2.18	2.32	2.35
White heterocedascity correction	Yes	Yes	Yes	Yes
Zero mean of errors	Yes	Yes	Yes	Yes
Correlation between errors and independent variables	No	No	No	No

Table 7 The impact of financial supervisory unification (LOG_FSU) and central bank involvement (LOG_CBFA) on financial stability (LOG_ZSCORE) in developed countries

Independent variables	*LOG_ZSCORE*			
LOG_FSU	-0.3389** (0.135)	-0.3405** (0.135)	-0.3367** (0.125)	-0.3990*** (0.109)
LOG_CBFA	-0.2748 (0.238)	-0.2751 (0.241)	-0.1390 (0.227)	-0.2432 (0.220)
LOG_LDR		0.0116 (0.215)	0.0789 (0.182)	0.2688 (0.190)
LOG_INF			-0.3977** (0.147)	-0.3199** (0.127)
LOG_LERNER				-0.4716 (0.313)
Observations	42	42	41	39
R-squared	0.124	0.124	0.259	0.303
Durbin-Watson stat	2.90	2.90	3.04	2.62
White heterocedascity correction	Yes	Yes	Yes	Yes
Zero mean of errors	Yes	Yes	Yes	Yes
Correlation between errors and independent variables	No	No	No	No

Table 8 The impact of financial supervisory unification (LOG_FSU) and central bank involvement (LOG_CBFA) on financial stability (LOG_ZSCORE) in developing countries

Independent variables	*LOG_ZSCORE*			
LOG_FSU	0.2368 (0.172)	0.2291 (0.176)	0.1548 (0.175)	0.1227 (0.249)
LOG_CBFA	-0.1709 (0.261)	-0.2011 (0.264)	-0.1846 (0.266)	-0.2158 (0.295)
LOG_LDR		-0.1262 (0.219)	-0.1692 (0.231)	-0.3081 (0.263)
LOG_INF			-0.1987** (0.094)	-0.0861 (0.225)
LOG_LERNER				0.2264 (0.300)
Observations	41	41	40	35
R-squared	0.057	0.067	0.149	0.114
Durbin-Watson stat	2.60	2.69	2.40	2.73
White heterocedascity correction	Yes	Yes	Yes	Yes
Zero mean of errors	Yes	Yes	Yes	Yes
Correlation between errors and independent variables	No	No	No	No

V. Conclusion

Using 91 country-level data in 2006, this paper generally strengthens the case in favor of no need to establish an integrated financial supervisory authority for three different sectors (banking, securities, and insurance) to improve financial stability. Specifically, our study provides empirical evidence that financial supervisory unification has a negative impact on financial stability as measured by the *Z-score* technique while controlling for macroeconomic factors. Our findings in general are somehow consistent with Gaganis and Pasiouras (2013) that shows banks operating in countries with greater unification of supervisory authorities are less profit efficient. Nevertheless, the negative link between financial supervisory unification and financial stability only holds for developed countries, but dissapears for developing countries. Hence, financial stability in developing countries seems to be less affected by the regulatory issues due to the integration of financial supervisory authorities.

With regards to the central bank involvement (*CBFA*) in supervisory processs, we additionally find that the presence or absence of the central bank in financial sector supervision does not hinder financial stability in both developed and developing countries. This finding is consistent with Masciandaro et al. (2011) which shows that the level of involvement of the central bank in financial supervision does not significantly affect the resilience of the economy. The effect the supervisory regimes toward resilience is, however, largely influenced with the level of financial liberalization and regulation quality in public sector.

Eventually, our present paper provides several policy implications. First, we emphasizes that the importance of integrating financial supervision agency is not evident when an economy

experiences the growing number of financial conglomerate, such as in the case of advanced countries. With this in mind, the conclusions in this paper suggest that once a country becomes developed country, separated supervisory authorities may be associated with a better supervisory consistency and quality, since it is very hard to achieve regulatory harmonization across banks, insurance companies, and securities. Following Uhde et al. (2009), we further suggest that improving cross-country cooperation between regulators and supervisors to clearly define responsibilities for financial sector supervision is necessary. Moreover, our empirical results do not against the unification of financial supervisory authorities in developing countries, since it does not affect financial stability. However, policy makers in developing countries should be more concerned with the potential problems of financial supervisory unification, once their countries move toward a developed country status accompanied by greater financial development such as the emergence of financial conglomerates and universal banking activities.

Second, although the central bank has a central role in the setting of monetary policies to target inflation and safeguard macroeconomic stability in terms of the movement of interest rate, exchange rate and so on; our results show that the presence or absence of the central bank in financial sector supervision does not necessarily hinder financial stability. However, given the role of the central bank as a lender of last resort in times of crisis, understanding several macro-level indicators of financial stability becomes the keys for the central bank. In other words, incorporating the central bank in financial sector supervision remains essential in order to enhance the role of the central bank to establish an early warning system of crises using financial indicators at the aggregate level. The role of the central bank as a lender of last resort should be therefore accompanied by the ability of the central bank to conduct macroprudential supervision on financial system as a whole.

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