

# “Determinants of the Financial Supervision System: Global Evidence”

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# DETERMINANTS OF THE FINANCIAL SUPERVISION SYSTEM: GLOBAL EVIDENCE

Chung-Hua Shen

## Abstract

Not until the present study has there been an attempt to investigate the determinants of a country's choice vis-a-vis the type of financial supervisory system: sectoral, partial and unified. Sectoral supervision is in place when a country's banking, securities and insurance sectors are supervised by three different supervisors, while unified supervision prevails when all three sectors are supervised by one entity. Partial supervision falls between these two systems. From a sample of 101 countries, it is found that a "reverse central bank effect" exists, where countries whose central bank also supervises their banks tend to adopt sectoral supervision. Also, there is evidence for a "scale effect": where countries with a higher population prefer sectoral to partial supervision. The "poor country effect" is rejected since poor countries tend to adopt sectoral supervision. Developed countries seemingly opt for unified supervision, whereas less developed countries generally take on partial but not unified supervision. With their preference for sectoral rather than unified supervision, central and eastern European countries experience the "CEE effect". Of particular interest, it is determined that the "reverse blurring of distinction effect" holds true as countries whose banks cannot engage in securities and insurance activities tend to adopt partial or unified supervisions. Finally, "the good governance effect" is confirmed in that countries with good governance evidently opt for unified supervision. On the weight of the evidence here, this research lays the groundwork for further systematic studies of the determinants of financial supervisory systems.

**Key words:** financial supervision, unified supervision, sectoral supervision.

**JEL classification:** G18, G21, G28.

## 1. Introduction

For much of the past decade, the once clear-cut distinctions among financial intermediaries in the banking, securities and insurance sectors (hereafter the three sectors) become, in a word, increasingly blurred in many countries. In this regard, on November 12, 1999, the U.S. Congress, for example, enacted the Financial Modernization Act<sup>2</sup> authorizing bank holding companies to become to financial holding companies (FHC) under certain conditions. These new financial conglomerates allow banking, securities and insurance operations to be carried out under the same roof, a policy which until then had, in essence, been largely restricted. The cornerstone of new financial architecture has not merely been confined to developed countries since what we have been witnessing is that more and more developing countries have also gradually been permitting their banks to engage in previously restricted non-banking activities. To cite one example, the Taiwan authority passed the Financial Holding Company Law in August 2000, giving an FHC the right to simultaneously hold more than 25% of the shares of the three sectors. The fact that such a "blurring of distinction" has been going among financial products should certainly come as no surprise. Many new financial products do share the features of deposits, annuities and securities simultaneously. Take the Netherlands as another example where a mortgage combined with a unit-life insurance policy embodies the components of the three financial sectors (Van der Zwet, 2003). Back in Taiwan, security-linked deposits and insurance-linked deposits are typical products which combine deposits with securities and insurance. Simply put, any distinctions among financial intermediaries

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<sup>1</sup> The first draft of this paper was written while the author was a visiting scholar at the De Nederlandsche Bank in February 2004. The author is most appreciative of the constructive comments from Dr. Henriette Prast, Dr. Robert P. Sparling as well as the participants at the seminar. The views expressed here are those of the author and do not necessarily reflect the official positions of the De Nederlandsche Bank.

<sup>2</sup> The Gramm-Leach-Bliley Act.

in the three different sectors have now become obscured to the extent that the exception seems to have been the rule.

To put it plainly, giving the green light to a financial conglomerate to engage either in the above three activities or in existing financial institutions with a view to issuing hybrid products unquestionably challenges existing supervisory systems which have typically been organized sector-by-sector<sup>1</sup>. Under such “sectoral supervisory” system, it is more difficult to supervise new financial conglomerates and products on account of what has come to be known as the “blurring of responsibility”. For example, some ambiguity with regard to responsibility is bound to arise when a bank is in distress because of its engagement in, say, securities operations. The “blurring of responsibility” argument subscribes to the view that none of the supervisors can be held accountable for cross-sector behaviour, a view which endanges the whole financial sector. And beyond this, when one financial sector is in distress, sooner or later, any ensuing market turbulence may very well spill over into another sector, especially if the supervisors or regulators do not actively co-operate with one another. At stake, here is threat that this “spillover effect” may intensify as a consequence of global financial integration. The recent Asian financial crisis and many other banking failures wound the world are thought to roughly mirror this phenomenon. Hence, on what grounds to decide the optimal financial supervisory system has become a major issue of concern.

The aim of this paper is to investigate and increase an understanding of the determinants that affect the choice of supervisory structure that is in place. Courtis (2002) has compiled data on the supervisory bodies of the three sectors for 101 countries. We classify those countries by type of supervision: sectoral, partial and unified supervisions. As for sectoral supervision, it denotes that a country’s supervision is overseen on a sector-by-sector basis. That is, there are three supervisors, one for each of the three sectors. Partial supervision means that any two of the three sectors are supervised by one entity, while unified supervision signifies that one supervisor oversees all three. We provide a detailed discussion of the three groups in the next section.

Once we have classified all 101 countries into the three groups, we investigate whether there are certain shared feature among the countries in each group. One pertinent, two-part, question we ask is “Why do some countries choose to adopt sectoral, while others move to unified supervisions, and vice-versa?” and “Are there any systematic patterns in such decisions?” Furthermore, anecdotal evidence has it that poor countries tend to adopt unified supervision in the hope of reducing costs. As true as this may be in some cases, the rich countries of Norway, Sweden, the U.K., Japan and Germany, which have all started to adopt unified supervision in recent years, obviously provide counter-example against this argument. Hence, the first puzzle we wish to solve in this paper is whether the “poor country effect” exists or not.

As concerns the second issue, it stems from Taylor and Fleming’s (1999) claim that a small developing country or one in transition should likely adopt an integrated agency in an effort to alleviate bureaucratic red-tape. Although this could explain why small countries, like Malta, the Netherlands Antilles, Uruguay and Singapore, adopt the unified system, in no way does it provide an explanation as to why other small countries, like Hong Kong, Albania, Oman, Jamaica and Ghana among others, have adopted the sectoral supervision. Hence, we wonder whether scale (i.e., population) is or is not a crucial factor in a country’s choice of supervisory system? This might be referred to as the “scale effect”.

The determinants of the choice of a financial supervisory structure might also be related to a country’s level of development of a country; therefore, we also consider each country’s stage of development by dividing the sample into developed (DC) and less developed countries (LDC). We also take into account the trend with regard to the type of supervisory system that central and eastern European (CEE) countries adopt.

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<sup>1</sup> The majority of countries in the world have adopted sectoral supervision. This issue will be discussed shortly.

We consider other institutional factors as well. Based on the argument for the blurring of distinction, one might expect a country which allows its banks to engage in securities, insurance and real-estate related businesses should adopt the unified supervisory system, and not the others. In this regard, mixed evidence is found again in the real world. For example, banks in the U.K. and the U.S. are gradually allowed to carry out securities and insurance activities but the former country adopts the unified-type, while the latter adopts the sectoral-type of supervisions. Hence, we look for evidence, if any, of the “blurring of distinction effect”.

Also, because the elements of the unified supervision that make it successful include strong cooperation and coordination, it might be expected that countries that adopt the unified supervision have good governance. Anecdotal evidence, such as that often-cited for those countries with good governance, like Norway, Denmark, Sweden, Singapore, Germany and the U.K., seems to lend credence to this argument. Yet, the picture would be incomplete without recognizing the counter-evidence, such as that for Canada, Finland, France and the U.S. which have good governance but adopt either the sectoral or partial supervisions. Hence, we must allow the facts to speak for themselves and establish whether good governance, such as the rule of law, investor and credit protection, is a useful factor in deciding upon the choice of supervisory system. In this context, therefore, is there a “good governance effect”?

Furthermore, we are concerned whether a government’s ability to supervise is related to the choice of supervisory system. This can be measured by official supervisory power and private monitoring abilities, two indices provided by Barth et al. (2004) in their survey of 89 countries. None of the above unresolved questions have been explored before, and thus, the intent of this paper is to fill this gap.

And above all, we simultaneously focus our attention on the role of the central bank as a banking supervisor. Taylor and Fleming (1999) argue that a small country tends to allow the central bank to supervise all sectors. Singapore is a classical example of this. Against this, nonetheless, the Cayman, Costa Rica, El Salvador, Gibraltar, Guatemala, Panama, Venezuela and Peru are commonly thought to be small, yet their central bank neither supervises nor adopts unified supervision. Previously related studies have mainly focused on how a central bank’s supervisory role might affect the country’s monetary policy, or the so-called “dual-role effect”. As a case in point, Peek, Rosengren and Tootell (1999) use confidential bank rating data for the U.S. and find that information obtained by supervising banks helps the central bank to conduct monetary policy more effectively. Also, see Goodhart and Schoenmaker (1995), Di Noia and Di Giorgio (1999) and Ioannidou (2002) for discussions on cases where banking supervision and monetary policy are designated to the same agency. These studies, however, do not investigate the role of central bank in affecting the choice of supervisory system. This paper investigates the role of the central bank in choosing the type of supervisory system.

Our cross-country study has the same methodological limitations as other cross-country studies. Needless to say, supervisory change is a dynamic process, and we can only study it at one point in time (see Barth et al., 2002, for the same argument). Also, the information data on supervision that we employ only cover up to 2001. This means that we do not take into account any country’s change with respect to supervisory system since then. This includes China’s new sectoral supervisory system in place since 2002, Germany’s unified supervision since May 1, 2002 (Sanio, 2003), the Netherlands’ integration of banking and insurance from April 1, 2004 (Mooij and Prast, 2003) and Taiwan’s single new agency to supervise the three sectors since July 1, 2004 (Shen, 2003).

The remainder of this paper is organized as follows. Section 2 provides some background information on supervision. Section 3 introduces the methodology we use in this paper. Sections 4 describes the data, and the basic statistics, while Section 5 discusses the empirical findings. Finally, Section 6 summarizes the conclusions we draw.

## 2. Background of Financial Supervision

### 2.1. Three Supervisory Systems

The above mentioned issues pertaining to the blurring of distinction when it comes to financial activities raise the question as to choice of the supervisory system. Four distinct theories have been put forth to explain the blurring of distinction (Van der Zwet, 2003), namely enhancing co-operation among sectors (e.g. the Netherlands before 2002)<sup>1</sup>, adopting functional supervision (e.g., Australia and recent Netherlands), asking the central bank to take charge of the three activities (e.g., Singapore) and creating a single regulatory entity (e.g., the U.K. and Taiwan).

The most persuasive argument against the first approach, i.e., enhancing cooperation among sectors is the “blurring of responsibility” discussed earlier. Taylor and Fleming (1999) take the view that for the simple reason that when the banking, securities and insurance businesses are regulated and supervised by different authorities, co-ordination is difficult, costly and inefficient, at best, thus creating a need to unify them into a single agency to reduce potential financial instability. Hence, the first approach has not gained wide acceptance, and this is particularly true in Asia since 1997 Asian financial crises.

The second approach, i.e., adopting functional supervision, has also not been widely adopted probably because it is not easy to clearly define the prerequisite in terms of responsibilities and objectives. This is something that is often lacking in developing countries.

The recent tide of restructuring financial supervision seems to have already started to lead to the dismiss of the third approach, i.e., putting the central bank in charge of these activities, as more and more countries have recently taken the role of banking supervision. Hence, while Llewellyn (1999) advances the notion that the single most common model is currently one where the central bank is responsible for banking supervision, it is expected that the number of countries that are doing this is now, or soon will be, on the decrease. Likewise, Tuya and Zamalloa (1994), in fact, show that in 167 countries, “banking supervision is conducted by the central bank in over 60 per cent and that the Western Hemisphere is the only region where the percentage declined to 50 per cent. Nevertheless, in over 80 per cent of Asian, African and Middle Eastern countries, banking supervision is a function of the central bank”<sup>2</sup>. Whether or not the central bank should be given the power of supervision has been a long-standing issue. While the main task of the central bank is to conduct monetary policy, the “optional task” of banking supervision may, in some cases, become the focus of policy debates (Di Noia and Di Giorgio, 1999). The main objection to allowing a central bank to supervise banks is that it may give rise to a “conflict of interest” between monetary policy and banking supervision. On the other hand, the synergy of information derived from banking supervision coupled with monetary policy-making is considered strong grounds to support the policy.

Among the four approaches, the last one, i.e., creating a single regulatory agency, has attracted the most attention partly because, for example, the UK announced plans in 1997 to consolidate financial supervision into a new separate, regulatory body. Taylor and Fleming (1999) hold the view that by integrating existing distinct regulators and supervisors, unified supervision can minimize conflict resolution and improve accountability. They refer to such a unified supervisory agency as the “integrated supervisor(s)” to differentiate it from the conventional “sectoral supervisors”. Other than the U.K., countries which have changed from other supervisory systems to this unified supervision, include Japan, South Korea (hereafter Korea), Taiwan and Germany.

Based on the discussion above, we classify countries into three supervisory classifications, and the role of the central bank is taken into account independently. The first two are “sectoral supervisory system” and the “unified supervision system” mentioned above. The third one is the “partial

<sup>1</sup> Note that the Netherlands merged bank and insurance supervision on April 1, 2004 (Mooijand Prast (2003)) in line with the supervisory practice in Australia. Hence, the Netherlands adopted functional supervision in April 1, 2004.

<sup>2</sup> The number, however, needs to be interpreted cautiously as it includes many very small states; see Di Noia and Di Giorgio (1999) for their comments on this.

supervision", which is a system somewhere between the two, is more complicated than explained in Section 1. It could be a functional supervision system, with two supervisory agents: one for prudential supervision and the other for conduct-of-business supervision. The Netherlands and Australia seem to be the only two countries that have clearly announced the adoption of such a functional supervisory system<sup>1</sup>. The partial supervisory system could alternatively consist of just two supervisory agents, where one supervises two sectors, while the other supervises the remaining one. Because we have only two observations of the first type of functional supervisory system, we do not make a distinction between these two types of partial supervision.

## ***2.2. Advantage sand Disadvantages of Each Supervisory System***

On a broad scale, the objectives of any type of financial supervision chosen, as presented in the literature, are threefold: systemic stability, financial soundness of individual institutions and consumer protection (Bikker and Van Lelyveld, 2003; Schoenmaker and Wiers, 2002)<sup>2</sup>.

Though there appears to be a "trend" toward adopting the unified-type of supervisory system<sup>3</sup>, a clear and overall consensus has not been reached. Academic discussions on the advantages and disadvantages of each type of supervisory system still abound. Enthusiastic advocates of integration emphasize four main advantages of adopting a single agency (Briault, 1999). These are that integration creates economies of scale and scope, has more efficient resource allocation, reduces conflict resolutions and establishes better accountability. Dismissing these views, opponents of integration argue that a single regulator is not necessarily under any obligation to deliver these four advantages. Goodhart et al. (1998), for instance, advocate that specialized divisions may well exist even within a single agency, thus creating potential problems with regard to communications, information-sharing, co-ordination and consistency. Above and beyond this, Goodhart et al. (1998) and Taylor (1995) make the point that divergent objectives are better resolved by those at a political level than by a single regulator.

It is difficult to conduct empirical studies aimed at investigating the success of achieving the three objectives since it is not easy to identify the operational definitions of the objectives in the literature. However, Barth, Caprio and Levine's (2002) work can be regarded as being in line with the second objective of securing the financial soundness of individual institutions.

## ***2.3. Is Therea Trend?***

The choice as to the type of financial supervision has sparked a flurry of discussions, particularly, since the U.K. established a single statutory body, the Financial Services Authority (FSA), in 1997. Then, the prospect of the EU establishing a single European monetary authority as the central financial supervisor further intensified the issue (Di Noia and Giorgio, 1999). The tremendous amount of attention the U.K. case has drawn from both the international financial press and policymakers, notwithstanding, the U.K. was not the first country to create an independent supervisory agency. Three Nordic countries, Norway, Sweden and Denmark had been moving toward the integration of the different supervisory functions into a single agency since the early 1990s, in the hope of increasing the soundness of their financial sector.

With the reemergence of the financial turbulence, individual bank failures and systematic crises in Latin America, Asia and eastern Europe as well as bank failures and near-failures in developed countries, the issue soon become a global one. It has been argued that one of the reasons for all of this financial turmoil was probably that sectoral supervisors were not used to co-operating. The

<sup>1</sup> Those countries which adopt the unified approach may also adopt functional supervision. We, however, skip this issue.

<sup>2</sup> The four statutory objectives of the U.K.'s supervisory system are to maintain confidence in the financial system, to enhance public understanding of the financial system, to secure the appropriate degree of protection for consumers and to reduce the extent to which it is possible for a financial services firm to be used for a purpose connected with financial crime (see Briault, 2002).

<sup>3</sup> In that only a handful of countries have adopted unified supervision, in the strict sense, it might not be appropriate to label it a "trend".

fact that financial conglomerates were soon after allowed to be established lends support to this view. Accordingly, Japan (in 1998), South Korea (in 1999) and Taiwan (in 2004) one after the other adopted the integrated supervisory system after the 1997 Asian financial crises. Germany, as stated earlier, also took on a similar system by setting up an independent, unified supervisory agency in 2002. Going against the “trend” toward unified supervision, Australia adopted functional supervision in 1997 by combining banking, insurance and securities under the umbrella of “conduct of business”. Banking and insurance supervision in Australia were integrated for the purposes of prudential supervision<sup>1</sup>. Very recently, around 2002, the Netherlands adopted a similar set-up to that of Australia (Mooijand Prast, 2003). Worth noting here is that, in 2002, China, also followed suit to change the supervisory system but reversed the so-called “tide”. It adopted sectoral supervision by removing the supervision of insurers and securities from the control of its central bank. Obviously, different countries seem to have their own reasons for adopting different types of supervision. In fact, what is generally agreed is that no single model of regulatory structure is appropriate for all countries (Abrams and Taylor, 2000; Briault, 2002), and perhaps for this very fact alone, investigating the determinants of the choice of type of financial supervision is crucial.

#### 2.4. *The Role of the Central Bank*

Studies on the “dual role effect” of a central bank are also in tune with research into financial supervision. As a matter of fact, some researchers have focused on the effects of monetary policy when central banks are also responsible for banking supervision. This double role is mostly found to have a less-than satisfactory impact on the effectiveness of monetary policy since the agency that conducts banking supervision must have clear responsibilities and objectives in order for it to be effective. Each such agency must possess operational independence and adequate resources. Di Noia and Di Giorgio (1999) assert that the combination of different responsibilities and objectives in one agency may result in weakened banking supervision, thereby negatively affecting monetary policy. It should not, therefore, be unexpected that Heller (1991), Goodhart and Schoenmaker (1995) and Di Noia and Di Giorgio (1999) advance the notion that countries with a central bank that has supervisory responsibility experience higher inflation rates. They interpret this as convincing evidence in support of the “conflict of interest” argument. (See Ioannidou (2002) and the references therein).

### 3. **Econometric Model**

Studying what determines whether a country adopts a particular type of financial supervisory system is of particular interest. Our principal objective we use a multinomial logit (MNL) model to explore the determinants of financial supervision. The MNL is intended for use when the dependent variable takes on more than two discrete outcomes with no natural ordering; this is the case when the values assigned to the dependent variable are arbitrary. With our types of supervision, we have one multiple choice variable,  $FSI_i = 1, 2, 3$ , where  $i$  is the  $i$ th country; for example, a country takes the value of 1 if it adopts sector supervision ( $FSI_i = 1$ ) and 2 if the supervision includes any two sectors ( $FSI_i = 2$ ), and 3 if it is unified supervision ( $FSI_i = 3$ ). Thus, our determinant equation is:

$$\text{Prob}(FSI_i = j)$$

<sup>1</sup> Whether Australia has really adopted the system of unified supervision is debatable. While Abrams and Taylor's (2000) and Llewellyn's (1999) studies include Australia among the countries to have adopted unified supervision, we find that it is learning toward functional supervision and that the supervisors are not fully integrated.

According to Courtis' (2002) data, securities activities in Australia are supervised by an “old” supervisory body, i.e., the ASIC (Australia Securities and Investment Committee), regardless of which sectors are engaged in the securities business. Stated briefly, functional supervision has been adopted in Australia for securities activities. The banking and insurance sectors, however, are supervised by a new agency, the APRA (Australia Prudential Regulation Authority). The supervisory systems in Australia have virtually not yet been completely integrated.

$$= F\left\{\left[a_{1j} + a_{2j}SCALE_i \left[a_{3j}GDPper_i + a_{4j}DC_i + a_{5j}LDC_i + a_{6j}CEE_i\right] \left[a_{7j} + a_{8j}CB_i\right] + a_{9j}Bank\ Activity\ Restrictions + a_{10j}Governance_i + a_{11j}Supervisory\ Power + a_{12j}Bank\ Share\ Held_i + \varepsilon_{ij}\right\} \quad (1)$$

$$i = 1, 2, \dots, N, j = 1, 2, 3$$

$$= F\left(A_j X_i + \varepsilon_i\right), \quad (2)$$

where  $i$  is the  $i$ th country;  $j$  is the choice of the  $j$ th supervisory system;  $a_{ij}$  is an unknown coefficient of the  $i$ th variable of the  $j$ th choice;  $N$  is the number of countries used;  $\varepsilon_{ij}$  is the error; and  $F$  is the logistic function. We can rewrite equation (1) as (2) to reduce the notational burden, where  $A_j$  is the vector of the coefficients  $a_{ij}$ , and  $X_i$  is the vector of the explanatory variables. For simplicity, we occasionally remove the subscript  $i$  provided that no confusion arises.

We discuss our explanatory variables below.

**Central Bank.** Whether a central bank should be responsible for supervising a bank is somewhat of a controversial issue as far as bank supervision and monetary policy go (Giddy, 1994; Goodhart and Schoenmaker, 1995). This issue may in fact very well lead to a conflict of interest between the central bank's goals. Thus, the term CB is a dummy variable which is equal to 1 if the central bank is in charge of bank supervision, and zero otherwise.

**Scale of the Country.** It is argued that a small country tends to adopt unified supervision in order to have an economies of scope. The scale (SCALE) variable we consider is proxied by the population (POPULA). It might be expected that the smaller the scale of a country is, the greater is the likelihood of it adopting unified supervision.

**Economic Development.** We consider the economic development of a country by using the proxy for a developed country (DC), for a less developed one (LDC) and for a central eastern European countries (CEE) so as to capture the features of the level of development of a country. They are all dummy variables. We exclude all of the least developed countries (LLDC)<sup>1</sup>; thus, the sample does not consist of many very small or any very poor countries, which have very limited financial activity. We also proxy the economic development by GDP per capita (GDP per).

Our model considers the interactions among CB, DC/LDC, GDPper and SCALE. The interaction terms allow us to determine whether, for example, being a small, less developed country increases probability of adopting unified supervision when its central bank is responsible for bank supervision. We express this mathematically as:

$$\frac{\partial^3 FSI}{\partial CB \times \partial LDC \times \partial SCALE} = a_{8j} \times a_{5j} \times a_{2j}.$$

In the estimation, we obtain only one coefficient of SCALE  $\times$  LDC  $\times$  CB. We postulate other interactive variables in a similar way.

**Bank Activity Restriction Variables.** These variables are the restrictions with respect to banking activity in securities, insurance and real estate. As mentioned in the Introduction, one of the arguments in favor of adopting unified supervision is based on the blurring of activities in these three industries. If a country does not allow its banks to engage in these activities, it is evidently less apt to adopt unified supervision. We proxy bank restrictions by three index variables which represent restrictions on banks' activities in securities (BANK-S), insurance (BANK-I) and real estate (BANK-R) activities. They are discrete variables ranging from 1 to 4 and denote unrestricted (1), permitted (2), restricted (3) and prohibited (4) in terms of a bank's right to engage in the above

<sup>1</sup> The United Nations currently designates 49 countries as the least developed countries, and we omit these countries here.



activities, respectively. Barth, Caprio and Levine (2001) survey these bank activity restrictions on the same variables for 66 countries; hence, adding these variables into the model decreases the number of countries we use<sup>1</sup>. Because higher numbers denote tighter restrictions, the “blurring of distinction” effect would suggest negative coefficients, which is indicative of a decreasing probability of adopting unified supervision.

**Governance.** Governance is that of a government (GoodGov), and it includes the rule of law, the efficiency of judicial system, corruption, the risk of expropriation, the risk of contract repudiation and accounting standards, compiled by La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998, LLSV). While the LLSV scores are based on a 1995 survey, academic studies regarding governance still refer to this source probably because a country’s governance structures are relatively stable. The score ranges from 1 to 10, where the higher the score is, the better is the governance.

**Supervisory Power.** The variable SupervisoryPower contains the Official Supervisory Power Index (OSPI) and the Private Monitor Index (PMI), both taken from Barth et al. (2004). The OSPI measures the extent to which official supervisory authorities have the right to take specific actions to prevent and correct problems. It includes three components, i.e., prompt correction action, restructuring power and the power to declare insolvency. The PMI measures the monitoring function of the private-sector and includes four components, i.e., a required certified audit, a rating by an international rating agency, an explicit deposit insurance scheme and bank accounting transparency. We also use these two variables to investigate whether the governance of a country is related to its choice of type of financial supervision<sup>2</sup>. Higher values imply greater supervisory power.

It is worth noting that not all of the coefficients can be estimated in the MNL model. If there are  $N$  choices in the system, only the  $N-1$  choice parameters can be estimated, with the remaining one being selected as the benchmark. Any explanation of the estimated coefficients is relative to this benchmark, which is chosen arbitrarily<sup>3</sup>. We select sectoral supervision ( $FSI_i=1$ ) as the benchmark, and hence, we obtain two sets of coefficients –  $A_2$  for  $FSI_i=2$ , and  $A_3$  for  $FSI_i=3$  – are obtained. Hereafter, we omit the subscripts for simplicity. We estimate the MNL by using the following logistic functions:

$$\Pr(FSI_i = 1) = \frac{1}{1 + \exp(A_2 X_i) + \exp(A_3 X_i)}; \quad (3)$$

$$\Pr(FSI_i = 2) = \frac{\exp(A_2 X_i)}{1 + \exp(A_2 X_i) + \exp(A_3 X_i)}; \text{ and} \quad (4)$$

$$\Pr(FSI_i = 3) = \frac{\exp(A_3 X_i)}{1 + \exp(A_2 X_i) + \exp(A_3 X_i)}. \quad (5)$$

We can rely on the following odds ratios for a better understanding of the coefficient signs and magnitudes. For example, the relative probability of selecting unified supervision rather than sectoral supervision is:

<sup>1</sup> Using cross-country data, Barth et al. (1998) use only 45 countries to examine the degree of restrictions on banking activities and find that banks with more diversified power are less likely to suffer a banking crisis. However, they also report that this result may be sensitive to other components of the regulatory environment which are their omitted variables. It may be that countries that authorize broader powers to a bank may have higher capital requirements. Shen and Chang (2005) use a similar approach and find that the rule of law in La Porta et al. (1998) is crucial in affecting bank performance when banks are restricted with regard to engaging in securities. Also, see Shen and Chih (2005).

<sup>2</sup> While Barth et al. (2004) provide eight banking-related governance indices, we only take the OSPI and PMI because these two measures are the most relevant indices to our study.

<sup>3</sup> It is noted that the possibility of using the estimates in this manner relies on the validity of the independence of the irrelevant alternative (IIA) assumption: the inclusion or exclusion of choices does not affect the odds ratios associated with the remaining choices.

$$\frac{\Pr(FSI_i = 3)}{\Pr(FSI_i = 1)} = \exp(A_3 X_i),$$

which means that we compare different probabilities with regard to the decision that is made regarding the selection of sectoral supervision. We obtain the coefficients of  $A_2$  in a similar fashion.

## 4. Data Description and Basic Statistics

### 4.1. Data Sets of Sample Countries

Table 1 lists the mnemonics of the variables as well as their definitions and sources. Seeing as not all explanatory variables are available for all countries, based on the availability of data, we have four data sets. The first uses the 101 sample countries where the regressors contain such variables as POPULA, SIZE, LDC, DC and INFLATION. These variables are available for all of the sample countries. This important to note that we have only 98 countries when we use GDP per capita because this variable is not available for Bermuda, the Cayman Islands, and the Netherlands Antilles. Even though there are 98 countries when GDP per capita is used, we still refer to this as the “whole sample”. In short, this is our benchmark sample.

Table 1

Definitions and Sources of the Variables

Focused Variables			
Variable	Definition	Contents	Source
FSI	Financial Supervision Index	1: no integration; 2: partial; 3: full	Courtis (2002)
CB	Central bank also supervises banks	0-1; 1 is yes; and 0 is no	Courtis (2002)
Development of a Country			
DC	Developed countries	1: yes; 0: no	United Nations website
LDC	Less Developed countries	1: yes; 0: no	United Nations website
CEE	Central and Eastern European countries	1: yes; 0: no	United Nations website
Scale and Wealth of a Country			
GDPper	GDP per capita		WDI
POPULA	Population		IFS
Bank Restrictions			
BANK-S	Restriction on banks' investment activities	1: unrestricted; 2: permitted; 3: restricted; and 4: prohibited	Barth et al. (2001)
BANK-I	Restriction on banks' insurance activities	same as above	Barth et al. (2001)
BANK-R	Restriction on banks' real estate activities	same as above	Barth et al. (2001)
Institutional Variables			
GoodGov	Good Government Index	0-50, Sum of eff. of judic. system, rule of law, corruption, risk of expropriation risk of contract repudiation	LSV (1998)
OSPI	Official Supervision Power Index	0-16, Sum of prompt corrective action, restructuring power and declaring insolvency power	Barth et al. (2004)
PMI	Private Monitoring Index	0-10, Sum of a required certified audit required, percent of 10 big gest bank rated, no explicit deposit insurance, bank accounting, disclosure of off-sheet, disclosure of risk	Barth et al. (2004)

IFS: International Financial Statistics, 2000, IMF.

WDI: World Development Indicators, 2000, World Bank.

The second data set concerns the bank activity restriction variables, BANK-S, BANK-land BANK-R. These variables, taken from Barth et al.(1998), are available for only 46 countries. Thus, whenever we use these variables, we employ a subset of the full sample of countries. In the third data set, when we use the OSPI and the bank restriction variables simultaneously, the sample size does not change. Finally, when we simultaneously use LLSV's governance and bank restrictions variables, the sample size further diminishes to 41. Tables A1 and A2 report a detailed summary of the subsets of the variables.

#### 4.2. Basic Statistics on Financial Supervision

Table 2 lists the names of the countries categorized on the basis of the three supervisory systems. In each system, we further divide the countries into whether their central bank is responsible for bank supervision or not. The majority of the countries (56) adopt sectoral supervision and in 47 of these, the central bank is responsible for bank supervision. Next, 35 countries adopt partial supervision, and 18 of these have one supervisor for banks and insurance firms<sup>1</sup>, 14 of them have one supervisor for banks and securities and only 3 countries have one supervisor for insurance and securities. Hence, in the partial supervisory system, banks and insurance firms tend to share one supervisor, whereas securities and insurance firms do not. Worth bearing in mind is that though we have three different types of partial supervision, we do not make a distinction among them in the following regression analysis since that would result in a loss in the degree of freedom. The unified supervisory category consists of 10 countries with 4 supervised by the central bank and 6 by a newly-established agency.

Table 2

#### Countries of Financial Integration of Supervision

Sectoral Integration (56)					
CB supervises banks (47)	Albania Bangladesh China <sup>1</sup> Greece Jamaica Nepal Pakistan Russian Rep. Tanzania the U.S.	Algeria Barbados Croatia Hong Kong Jordan the Netherlands <sup>2</sup> Papua New Guin. Slovenia Thailand Zambia	Argentina Botswana the Czech Rep. India Kazakhstan New Zealand the Philippines Spain Trinidad & Tobago	Bahamas Brazil Egypt Israel Lithuania Nigeria Portugal Sri Lanka Tunisia	Bahrain Bulgaria Ghana Italy Mauritius Oman Romania Taiwan <sup>3</sup> Ukraine
CB does not supervise (9)	Costa Rica Panama	France Poland	Germany <sup>4</sup> Venezuela	Indonesia Turkey	Latvia
Partial Integration (35)					
Bank & Insurance (18)					
CB supervises	Colombia Paraguay	Ethiopia Sierra Leone	Gambia Suriname	Honduras	Macao
CB does not supervise	Australia <sup>5</sup> Gibraltar	Austria Guatemala	Canada Iceland	the Cayman Is. Malaysia	El Salvador Peru
Bank & Security (14)					
CB supervises	Bermuda Saudi Arabia Mexico	the Cyprus United Arab Emirates	the Dominican Rep.	Guyana	Ireland
CB does not supervise	Belgium Switzerland	Finland <sup>6</sup>	Hungary	Ireland <sup>7</sup>	Luxembourg

<sup>1</sup> We are unsure about Paraguay since its central bank is responsible for regulations, but it has an independent supervisor for banks.

Table 2 (continuous)

Insurance & Security (3)					
CB supervises	South Africa				
CB does not supervise	Bolivia	Chile			
Unified Integration (10)					
CB supervises	Malta <sup>8</sup>	Netherlands Antilles <sup>8</sup>		Singapore	Uruguay <sup>9</sup>
CB does not supervise	Japan <sup>10</sup> U.K.	Denmark	Norway	South Korea <sup>10</sup>	Sweden

1. Sources are mainly from Courtis (2002) and websites and this classification of financial supervision is based on his 2002 and earlier surveys.
2. China moved to sectoral supervision in 1998.
3. The Netherlands adopted functional supervision by merging banking and insurance supervision in April 2004.
4. Taiwan adopted unified supervision club on July 1, 2004.
5. Germany adopted modified unified supervision in May, 2002.
6. Australia adopted functional supervision.
7. See Taylor and Fleming (1999) but Finland's supervision is subject to conflicting reports.
8. The Central Bank of Ireland took charge of the three business activities in April 2002.
9. These are small countries; thus, their central banks are in charge of all types of supervision.
10. Also, see Taylor and Fleming (1999).
11. Japan and Korea adopted unified supervision in 1997 and 1998, respectively.

In all, the countries that adopting sectoral supervision with their central bank supervising their banks out number other cases here. We find similar results to those of Tuya and Zamalloa (1994), but their sample contains many small countries, like Sao Tome, Myanmar, Vanuatu and so forth, thus perhaps subjecting their results to much criticism since they could very well have been biased (see Di Noia and Di Giorgio, 1999). Our study considers developed and less developed countries as well as CEEs, and as a result, our results should be free of such criticism. Overall, banks and insurance companies are often supervised by the same supervisor. With the exception of Taiwan, the recent "trend" toward adopting unified supervision occurs only in some OECD countries<sup>1</sup>.

Panel A in Table 3 further presents an analysis of various features of each of the countries and also shows the number of developed and less developed countries in each system. Among the 66 LDCs, 36 adopt sectoral supervision, 25 adopt partial supervision, and only 5 adopt unified supervision<sup>2</sup>. Regarding the role of the central bank, 50 LDCs give the power of bank supervision to their central bank, but only 8 DCs do so. In other words, unlike DCs, LDCs are more apt to ask their CB to supervise their banks. There are 12 CEEs in our sample, and 11 of them adopt sectoral supervision, with 9 of them having their central bank in charge of bank supervision. None of the CEEs adopt unified supervision.

To sum up, the majority of the LDCs adopt sectoral supervision, and at the same time, their central bank supervises their banks. The DCs are equally spread across the three systems, but it is apparent that they exhibit an increasing tendency to adopt unified supervision. The CEEs are most likely to adopt sectoral supervision, with their central bank supervising banks. No CEE countries have ever adopted unified supervision.

Panel B in Table 3 presents the average of the wealth variable, GDP per capita, and the scale variable, i.e., population. We report the median, average, standard deviation and the number of countries. The median GDP per capita of the countries with sectoral, partial and unified supervisory systems are \$3,139, \$5,120 and \$21,673, respectively. It is evident that rich countries tend to adopt

<sup>1</sup> Important here is that changes in the supervisory systems in the past 5 years have been more drastic than in the past three decades combined. The above classification is based on information available before 2001, but a note is made at the bottom of Table 2 whenever changes occurred after that.

<sup>2</sup> If Korea and Singapore are excluded from the LDCs based on the IMF classifications, then there are only three LDC countries which adopt unified supervision.

unified supervision, which contradicts the notion of the “poor country effect”. Also, the mean population of the countries with each of the three types of supervisory systems is 78.59, 13.92 and 23.68, respectively. This indicates that large countries tend to adopt sectoral supervision, while small ones tend to adopt partial or unified supervision, strongly supporting the “small country effect”. No other patterns can be highlighted because of the large variations across countries. Except for GDP per capita in the case of the unified system, the standard deviations are overwhelmingly larger than the mean. These large heteroscedasticities are also reflected in the significant differences found between the median and the mean.

Table 3

Basic Statistics I: FSI, Basic Features and Scales

FSI and Basic Features of Countries					
		Sectoral Supervision	Partial Supervision	Unified Supervision	Sum
CB Sup.	Number	47	16	4	
CB Not Sup.	Number	9	19	6	101
CD	Number	9	9	5	
LDC	Number	36	25	5	
CEE	Number	11	1	0	101
CB Sup. and is a DC	Number	7	1	0	
CB Sup. and is an LDC	Number	31	15	4	
CB Sup. and is a CEE	Number	9	0	0	101
CB Not and is a DC	Number	2	8	5	
CB Not and is an LDC	Number	5	10	1	
CB Not and is an LDC	Number	2	1	0	101
FSI and Scale of Countries					
GDPper	median	3,139.10	5,120.00	21,673.60	
	mean	6,931.96	12,903.55	21,145.17	
	std. dev.	8,682.64	14,855.26	14,575.37	
	number	56.	33.	9.	98
Population	median	17.01	6.25	6.34	
	mean	78.59	13.92	23.68	
	std. dev.	212.45	20.26	40.19	
	number	56.	35.	10.	100

Note:

1. CB Sup. means that the central bank also supervises banks.
2. CB Not means that the central bank does not supervise banks.
3. DC, LDC and CEE denote developed, less developed and central and eastern European countries, respectively.
4. GDPper is GDP per capita.
5. Population size is in millions.
6. Number is the number of countries in this category.
7. std. dev. is the standard deviation.
8. Sum is not equal to 101 because of unavailable data.

## 5. Empirical Results

Tables 4 to 6 present the estimated results from using the determinant equation. The absolute t-values are in parentheses. Because we use FSI = 1 as the benchmark, the explanations for the estimated results under columns FSI = 2 and FSI = 3 are relative to this benchmark. We also attempt different specifications, denoted as 1A, 1B and 1C, to examine robustness. Because CB, DC, LDC and CEE are our core explanatory variables, we do not remove them when we change specification.

Table 4 presents the estimated results when we take into consideration the full sample of countries. Specification 1A is the simplest model and includes only six explanatory variables, i.e., CB, DC, LDC, CEE, GDPper and POPULA. The coefficient of CB in the FSI =2 and FSI =3 equations is respectively  $-1.954$  and  $-1.973$ , and both are highly significant. This result strongly suggests that if a country's central bank is in charge of bank supervision, it is prone to move away from partial and unified supervision and is more likely to adopt sectoral supervision. Accordingly, this is concrete evidence in favor of the "reverse central bank effect". In short, those countries which adopt sectoral supervision also tend to use the central bank to supervise their banks. The coefficients of the DCs are insignificantly negative regardless of the FSI, indicating that there is no "DC effect" on the choice of supervisory system when we use the whole sample. The coefficients of the LDCs are significantly positive when FSI =2 but insignificantly positive when FSI =3, signifying that an LDC tends to adopt partial but not unified supervision. There is a significantly negative coefficient for a CEE when FSI= 2 but not when FSI= 3 equation which means that a CEE is more inclined to adopt sectoral supervision than partial supervision. The GDP per capita is significantly positive for both FSIs, which implies that richer countries have less tendency to adopt sectoral supervision.

Table 4

## Determinants of Supervision I: the Whole Sample Size

	1A		1B		1C	
	FSI=2	FSI=3	FSI=2	FSI=3	FSI=2	FSI=3
Constant	0.125 (0.48)	-1.355 (0.05)	0.723*** (2.85)	-0.554*** (3.48)	0.424 (1.44)	-0.819 (1.20)
CB	-1.954*** (4.06)	-1.973*** (2.85)	-1.996*** (4.11)	-2.032*** (3.76)	-1.909*** (4.29)	-2.138*** (3.36)
DC	-0.718 (1.13)	-0.275 (0.01)	0.714 (1.44)	1.485*** (2.66)	-0.109 (0.14)	0.545 (0.48)
LDC	0.639** (1.98)	0.279 (0.01)	0.974*** (2.96)	0.957*** (3.59)	0.848*** (2.76)	0.731*** (2.67)
CEE	-1.593** (2.03)	-14.999 (0.03)	-1.661* (1.96)	-17.089*** (3.49)	-1.617* (1.94)	-15.164 (1.08)
GDPper	0.0001** (2.09)	0.0001*** (2.58)			0.000 (1.51)	0.0001** (2.28)
POPULA			-0.031*** (2.90)	-0.001 (0.13)	-0.029*** (3.05)	-0.003 (0.23)
Number	98		101		98	
Log-Likelihood	-72.46		-70.43		-65.51	

absolute t-value is in parentheses

\*, \*\* and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

Using specification 1C in Table 4 means replacing GDP per capita by POPULA, and this shows a significantly negative sign when FSI =2 but an insignificantly negative sign when FSI = 3. This closely resembles the results for CEEs; that is, the greater the population is, the less tendency there is to adopt partial supervision. The results from POPULA partially support the "scale effect" because the coefficients of POPULA are significant only when FSI = 2. In the case of FSI = 3, the coefficients of DC, LDC and CEE all change from insignificant to significant. We find that this can be attributed to additional input provided by POPULA. Specification 1C takes GDPper and POPULA into account and the results do not change.

Judging from the results from the use of the four specifications in Table 4, we note that the CB is overwhelmingly significantly negative, and this evidence does not change even when we use different sample size, as shown in the tables which follow. Thus, there is a strong support for the "reverse central bank effect"; in other words, a country whose central bank supervises its banks, definitely prefers sectoral supervision. This result holds for all specifications. The impact of DC is

elusive since the sign changes with different specifications, only being significant with specification 1C. LDC, by contrast, is a rather robust factor because, except for 1B, its effect is overwhelmingly significant. As opposed to partial supervision with a higher population, this is a preference for sectoral supervision. Briefly stated, the “scale effect” according to which a large country does not adopt sectoral supervision is quasi-supported when FSI = 2.

Table 5 increases the number of explanatory variables by considering five interaction terms, namely, CB×GDPper, CB×DC, CB×LDC, CB×DC×GDPper and CB×LDC×GDPper using the whole sample size<sup>1</sup>. There are three specifications: 2A, 2B and 2C. Because sample size is the same for the three specifications (=98), we perform log likelihood ratio (LR) test. The log-likelihood values of the three specifications are -68.05, -64.18 and -63.96, respectively, and the latter two are nested in the third, making the LRs 8.72 and 0.44, respectively. Consequently, we flatly reject specification 2A, but we cannot reject 2B in a statistical sense. Specification 2B, therefore, is the basis for the discussion which follows below.

Table 5

## Determinants of Supervision II: Whole Sample

	2A		2B		2C	
	FSI=2	FSI=3	FSI=2	FSI=3	FSI=2	FSI=3
Constant	0.495 (0.48)	-0.929 (0.58)	0.612*** (2.70)	-0.893* (1.90)	0.754*** (2.66)	-0.607 (1.38)
CB	-12.487*** (4.47)	-2.447*** (2.52)	-12.878*** (16.53)	-1.929*** (3.08)	-12.920*** (16.04)	-2.147*** (3.34)
DC	1.651 (0.76)	3.194 (1.22)	1.472* (1.89)	2.155*** (2.38)	2.113* (1.79)	3.270*** (3.61)
LDC	0.214 (0.14)	-0.469 (0.24)	0.460 (0.77)	-0.493 (0.55)	0.438 (1.60)	-0.588 (0.86)
CEE	-1.102 (0.72)	-17.047*** (3.64)	-0.954 (0.89)	-13.100*** (9.77)	-1.010 (1.08)	-12.997*** (4.75)
GDPper	-0.0001 (0.43)	-0.000 (0.67)			-0.000 (0.78)	-0.0001** (2.13)
POPULA			-0.021*** (2.42)	-0.008 (0.73)	-0.022** (2.38)	-0.007 (0.66)
CB × GDPper	-0.0001 (0.83)	-0.000 (0.48)	-0.000 (4.09)	-0.000 (1.52)	-0.0001*** (6.29)	-0.000 (1.32)
CB× DC	5.578 (1.52)	-12.088*** (3.76)	5.259 (1.04)	-9.876*** (7.69)	4.516 (1.26)	-11.999*** (4.27)
CB× LDC	10.560*** (4.78)	0.486 (0.58)	11.287*** (46.95)	0.387 (0.49)	11.206*** (11.08)	0.383 (0.52)
CB× DC ×GDPper	0.000 (1.08)	-0.0001*** (3.80)	0.000*** (2.89)	-0.000*** (6.37)	0.0001*** (3.08)	-0.0001*** (4.31)
CB× LDC	0.000 (1.15)	0.0001* (1.82)	0.000*** (4.20)	0.000*** (3.83)	0.0001*** (3.89)	0.0001*** (4.86)
Number	98		98		98	
Log-Likelihood	-68.05		-64.18		-63.96	

Absolute t-value is in parentheses

\*, \*\* and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

<sup>1</sup> One of the two variables in the interaction terms is always CB. The other attempts DC, LDC and GDPper alternatively. As for three variables, we simply report the results of CB, DC/LDC and GDPper since the results do not change significantly.

The coefficients of the CEE countries are overwhelmingly significantly negative when FSI = 3. It follows then that the CEE countries prefer sectoral supervision to unified supervision, which we could dub “the CEEeffect”. The coefficients of DC in specifications 2B and 2C are both significantly positive, which suggests that developed countries are inclined to adopt either partial or unified supervision but not the sectoral type. This is inconsistent with the common notion that rich countries have a larger capacity that one would expect would enable them to adopt sectoral supervision. Hence, the “reverse DC effect” is found. LDC has no effect on the choice of supervisory system. GDP per capita, to our surprise, changes its signs from positive in Table 4 to negative here though it is mostly insignificant. One probable explanation for this change is related to the added interactive terms which mitigate the effect of GDP per capita per se. Population remains strongly negative when FSI = 2, supporting the “scale effect”.

The interactive terms also show particularly interesting results. First of all, the coefficients of CB×DC are significantly negative when FSI = 3. Thus, a developed country with its central bank supervising its banks is strongly opposed to the adoption of unified supervision, but instead, prefers sectoral supervision. On the strength of this evidence together with that from DC alone, what we conclude is that when their central bank does not supervise their banks in developed countries tend to adopt unified supervision; conversely, when their central bank does not supervise banks they tend to adopt sectoral supervision.

Secondly, the coefficients of CB×LDC are significantly positive when FSI =2. This evidence along with the insignificant coefficient of LDC suggests that less developed countries with their central bank supervising their banks prefer partial supervision. If the central bank of an LDC does not supervise that country’s banks, then this evidently has no effect whatsoever on the choice of supervisory system. Thirdly, even for DCs whose central bank supervises their respective banks, the GDP per capita has a negative impact when FSI =3 but for LDCs, it has a positive effect. Thus, increasing GDP per capita decreases the probability of adopting unified supervision in DC×CB but, in sharp contrast, increases the probability in LDC×CB.

Table 6 presents the estimated results from using the subset samples. There are three specifications, 3A, 3B and 3C, in the Table, but the sample size for each specification is different. It should be kept in mind that only 46 countries have useable data when we use the bank activity restriction variables. The sample is further reduced to 41 further when we use both the bank activity restriction variables and the OSPI and the PMI. As stated earlier, we do not conduct any LR tests when the sample sizes are different.

Table 6

Determinants of Supervision VI: Small Sample

	3A		3B		3C	
	FSI=2	FSI=3	FSI=2	FSI=3	FSI=2	FSI=3
Constant	-0.062 (0.02)	-6.049** (1.94)	-8.873 (1.57)	-22.459*** (2.45)	-1.583 (0.61)	-1.423 (1.05)
CB	-3.761*** (3.17)	-2.770** (1.95)	-7.583*** (2.65)	-10.965*** (2.48)	-13.414*** (13.44)	-3.091*** (3.21)
DC	0.336 (0.10)	-6.339* (1.79)	-8.295 (1.41)	-24.635*** (2.40)	-0.691 (0.40)	-1.905 (0.90)
LDC	-0.426 (0.16)	-5.742 (2.04)	-9.528* (1.69)	-19.913*** (2.42)	-1.055 (0.99)	-1.344 (0.88)
CEE					-2.017 (1.35)	15.300*** (8.89)
GDPper			-0.0001 (0.73)	-0.0001 (1.16)	-0.0001 (0.98)	-0.0001 (0.94)



Table 6 (continuous)

	3A		3B		3C	
	FSI=2	FSI=3	FSI=2	FSI=3	FSI=2	FSI=3
Population	-0.050*** (2.46)	-0.043* (1.80)				
CB × GDPper					-0.0001*** (4.72)	-0.00001 (0.16)
CB× DC					5.509*** (2.254)	-9.270*** (5.49)
CB× LDC					10.444*** (7.49)	-1.058 (0.87)
CB× DC ×GDPper					0.0004*** (4.31)	-0.0003*** (5.10)
CB× LDC					0.0004*** (5.66)	0.0003*** (2.86)
BANK-S	2.338* (2.16)	3.908*** (2.83)	2.519* (1.71)	5.463** (2.22)		
BANK-I	1.261** (2.15)	1.069* (1.65)	2.895 (2.20)	4.396*** (2.35)		
BANK-R	-1.862*** (2.92)	*2.175*** (2.84)	-3.421** (2.21)	-6.567** (2.28)		
OSPI			-0.132 (0.55)	-0.257 (0.80)	-0.009 (0.09)	-0.179 (1.09)
PMI			1.913** (2.24)	1.991** (2.04)	0.382* (1.68)	0.553* (1.70)
GOODCOV	0.005 (0.05)	0.226** (2.02)	0.169 (0.68)	0.796** (2.12)		
Number	46	46	41	41	69	69
Log-Likelihood	-25.99		-1.21		-42.79	

absolute t-value is in parentheses

\*, \*\* and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

To complete Table 6, we add the OSPI, the PMI and GOODGOV into the model which also contains the three specifications 4A, 4B and 4C. Because the sample sizes are not the same, we do not conduct any LR tests. None of the coefficients of OSPI is insignificant, suggesting that whether official supervisory authorities have the authority to take specific actions to prevent and correct problems is not related to the choice of the type of financial supervisory system. The coefficients of the PMI are significantly positive regardless of the specification. Because the PMI is more related to the concept of market discipline and self-correction, a country with better private market discipline is more inclined to adopt the partial-or unified-type rather than the sectoral-type of supervisory systems. The coefficients of GOODGOV are significant when FSI = 3 regardless of the specification. This is not unexpected because countries which adopt unified supervision, such as Denmark, Norway, Sweden and the U.K. have very good governance, and albeit to a lesser degree, so do Japan and Korea<sup>1</sup>. Thus, this is evidence of the “a good governance effect”; countries with good governance are inclined to adopt unified supervision.

Also, when we use the small sample size of only 41 countries, the bank restriction variables become significant. For both FSI = 2 and 3, BANK-R is overwhelmingly significantly negative, whereas BANK-S and BANK-I are overwhelmingly significantly positive. Accordingly, a country which allows its banks to engage in real estate tends to adopt sectoral supervision. At the other end of the scale, because of the positive coefficients of BANK-S and BANK-I, a country which pro-

<sup>1</sup> Taiwan has not yet been included in this group because it did not join the unified supervision group until 2004.

hibits its banks from engaging in securities and insurance is more apt to adopt partial or unified supervision. This contradicts the “blurring of the distinction effect” but supports the alternative. That is to say, most countries which allow their banks to engage in securities and insurance activities adopt sectoral supervision. Germany, for example, which allows banks to engage in these two non-banking activities, adopts only the partial supervisory system. Therefore, it is unambiguous that whether a country adopts a unified supervisory system clearly depends on many factors, and this is not completely linked to the above-mentioned “blurring effect”.

## **6. Conclusions**

We classify our sample of 101 countries on the basis of sectoral, partial and unified types of supervisory systems. The main findings of our study are reviewed in the following.

First, the most striking result from our study is that we obtain solid evidence that contradicts our earlier expectation. That is, those countries which allow banks to engage in securities and insurance should be among the first urgent to adopt unified supervision. The empirical results here provide little, if any, support for this claim. That is, the “reverse central bank effect” has been fully supported. Countries whose central bank also supervises their banks tend to adopt the sectoral supervision. This result is robust regardless of the sample size and the specification.

Second, the “scale effect” is only semi-supported because the coefficients for population are significant only when  $FSI = 2$ . Countries with a higher population evidently prefer sectoral to partial supervision.

Third, the “poor country effect” is rejected outright because it is the rich countries, not the poorer ones, that prefer unified supervision. The fact is that poor countries are more prone to adopt sectoral supervision.

Fourth, turning to the “DC effect”, developed countries tend not to adopt sectoral supervision; to the contrary, they tend to prefer unified supervision. Less developed countries, on the other hand, tend to adopt partial but not unified supervision.

Fifth, on the question of central and eastern European countries, they seemingly prefer sectoral to unified supervision, which confirms our “CEE effect”.

On the level of the sixth determinant, a less developed country with its central bank (LDC×CB) serving as supervisor is inclined to adopt partial supervision. In the case of an LDC which does not have its central bank supervising its banks, this has no effect on the choice of supervisory system.

Concerning the seventh determinant, in light of this evidence together with the above evidence from DCs alone, what we conclude is that when their central bank does not supervise its banks developed countries tend to adopt unified supervision; conversely, when their central bank does not supervise banks they tend to adopt sectoral supervision.

We find the “reverse blurring of distinction effect” holds true if banks are restricted when it comes to engaging in the securities business. That is, a country whose banks are not allowed to engage in securities and insurance activities tends to adopt partial or unified supervisions. On the other side of coin, when banks in a country are not allowed to engage in real estate activities, the country tends to adopt the sectoral supervisory system.

Ninth, with regard to the OSPI and the PMI, the former has no effect, whereas the latter has a significantly positive effect for FSIs 1 and 2. A country with good private market discipline tends to adopt partial and unified supervision.

Finally, the “good governance effect” has indeed been substantially supported. A country with good governance tends to adopt unified supervision because when there is full cooperation and coordination, then a unified type of supervision is possible.

The present research represents but the first step systematically studies the determinants of the choice of a financial supervisory system. Future studies are encouraged to investigate the performance of banks in different financial systems.

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## Appendix

Table A1

## Supervision, CB and Scale of Countries: Whole Set of Countries

no		FSI	CB	DC	LDC	CEE	POPULA TION	GDPper
1	Albania	1	yes	0	1	0	3128450	913.20
2	Algeria	1	yes	0	1	0	29944400	1578.80
3	Argentina	1	yes	0	1	0	36579400	8034.00
4	Australia	2*	no	1	0	0	18963804	31912.00
5	Austria	2	no	1	0	0	8097024	23109.00
6	Bahamas	1	yes	0	1	0	299468	13312.75
7	Bahrain	1	yes	0	1	0	641596	10627.40
8	Bangladesh	1	yes	0	1	0	128833570	360.20
9	Barbados	1	yes	0	1	0	266262	8125.40
10	Belgium	2	no	1	0	0	10229600	29940.0
11	Bermuda	2	yes	0	1	0	61500	NA
12	Bolivia	2	no	0	1	0	8139784	954.0
13	Botswana	1	yes	0	1	0	1641746	3738.6
14	Brazil	1	yes	0	1	0	168047910	4562.6
15	Bulgaria	1	yes	0	0	1	8163014	1476.4
16	Canada	2	no	1	0	0	30517180	21996.2
17	The Cayman Islands	2	no	0	1	0	35000	NA
18	Chile	2	no	0	1	0	15015040	5251.0
19	China	1	yes	0	1	0	1252032000	775.2
20	Colombia	2	yes	0	1	0	41543894	2335.0
21	Costa Rica	1	no	0	1	0	3728562	3788.8
22	Croatia	1	yes	0	0	1	4395694	5043.2
23	Cyprus	2	yes	0	1	0	752930	13509.0
24	The Czech. Rep.	1	yes	0	0	1	10275860	5314.6
25	Denmark	3	no	1	0	0	8237522	1930.2
26	The Dominican Rep.	2	yes	0	1	0	5320644	37495.2
e7	Ecuador	2	no	0	1	0	12409800	1493.2
28	Egypt	1	yes	0	1	0	62783836	1172.0
29	El Salvador	2	no	0	1	0	6155148	1741.2
30	Ethiopia	2	yes	0	1	0	62782410	113.6
31	Finland	2	no	1	0	0	5163568	30292.6
32	France	1	no	1	0	0	58661920	29108.4
33	Gambia	2	yes	0	1	0	1263310	362.0
34	Germany	1	no	1	0	0	82149600	31815.6
35	Ghana	1	yes	0	1	0	18875954	406.2
36	Gibraltar	2	no	0	1	0	28756	5120.0
37	Greece	1	yes	1	0	0	10540174	12726.0
38	Guatemala	2	no	0	1	0	11094540	1538.6
39	Guyana	2	yes	0	1	0	757016	942.2
40	Honduras	2	yes	0	1	0	6256368	714.0
41	Hong Kong	1	no	0	1	0	6606000	23475.2
42	Hungary	2	no	0	0	1	10129200	5123.6
43	Iceland	3	no	1	0	0	277100	30118.6
44	India	1	yes	0	1	0	998980830	446.0
45	Indonesia	1	yes	0	1	0	203569018	1032.6
46	Ireland	2	yes	1	0	0	3753400	25581.2
47	Israel	1	yes	1	0	0	6100032	16588.4
48	Italy	1	yes	1	0	0	57679000	20398.2
49	Jamaica	1	yes	0	1	0	2554852	2168.2
50	Japan	3	no	1	0	0	126611176	44173.2
51	Jordan	1	yes	0	1	0	4742790	1615.2
52	Kazakhstan	1	yes	0	0	1	15303596	1426.0
53	Korea	3	no	0	1	0	22141004	12600.0
54	Latvia	1	no	0	0	1	2396200	2491.4
55	Lithuania	1	yes	0	0	1	3530800	2141.2
56	Luxembourg	2	no	1	0	0	431820	52943.4

CB: 'yes' means the central bank is in charge of bank supervision; 'no' means it does not.

LDC: 1 means developed countries; 2 denotes less developed countries; and 3 denotes center and eastern Europe.

Table A2

## Supervisions, Restrictions: Subset of Countries

no		FSI	BANK-S	BANK-I	BANK-R	Gov Bank	For Bank	OSPI	PMI	GoodGov
1	Albania	1								
2	Algeria	1								
3	Argentina	1	3	2	2	30	49	12	8	28.19
4	Australia	2*	1	2	3	0	17	12	10	46.5
5	Austria	2	1	2	1	4	5	14	6	47.36
6	Bahamas	1								
7	Bahrain	1	1	3	4	4	28	15	8	
8	Bangladesh	1	1	4	4	70	6	11	3	
9	Barbados	1	3	4	3					
10	Belgium	2	2	2	3			13	6	47.43
11	Bermuda	2								
12	Bolivia	2	2	2	4	0	42	11	7	
13	Botswana	1	2	4	4	2	98	14	8	
14	Brazil	1	2	2	3	52	17	15	8	32.31
15	Bulgaria	1								
16	Canada	2	2	2	2	0		7	7	47.88
17	The Cayman Islands	2	1	3	1	0	98	8	7	
18	Chile	2	3	2	3	12	32	11	8	33.87
19	China	1	4	3	4			10	7	
20	Colombia	2	2	2	2					28.3
21	Costa Rica	1								
22	Croatia	1	2	2	2	37	7	12	7	
23	Cyprus	2	2	2	4	3	11	15	5	
24	The Czech. Rep.	1	1	2	2	19	26	13	5	
25	Denmark	3	1	2	2	0		9	7	48.98
26	The Dominican Rep.	2								
27	Ecuador	2	2	4	4					29.85
28	Egypt	1	2	2	3	67	4	13	8	26.89
29	El Salvador	2	2	2	4					
30	Ethiopia	2								
31	Finland	2	1	3	2	22	8	9	9	48.82
32	France	1	2	2	2	0		8	6	44.87
33	Gambia	2	2	4	2	0	76	12	6	
34	Germany	1	1	3	2	42	4	11	5	46.83
35	Ghana	1	2	1	4	19	16	11		
36	Gibraltar	2	2	3	3	0	100	15	7	
37	Greece	1	2	3	3	13	5	10	6	34.19
38	Guatemala	2	4	4	4	8	5	8	5	
39	Guyana	2	1	3	3	19	16	10	8	
40	Honduras	2								
41	Hong Kong	1	1	2	2	1	2	13	7	43.85
42	Hungary	2	2	2	4	3	62	16	6	
43	Iceland	3	2	2	4	64	0		5	
44	India	1	2	4	4	80	0	9	6	30.61
45	Indonesia	1	2	4	4	44	7	14	8	21.88
46	Ireland	2	1	4	1			11	6	43.7
47	Israel	1	1	1	1			8	9	38.94
48	Italy	1	1	2	3	17	5	6	6	39.73
49	Jamaica	1	3	3	3	56	44	14	6	
50	Japan	3	3	4	3	1	6	13	8	46.86
51	Jordan	1	2	4	3	0	68	8	7	29.42
52	Kazakhstan	1								
53	Korea	3	2	2	2	30	0	10	6	33.55

Table A2 (continuous)

no		FSI	BANK-S	BANK-I	BANK-R	Gov Bank	For Bank	OSPI	PMI	GoodGov
54	Latvia	1	1	2	3			6	4	
55	Lithuania	1	2	2	3	44	48	9		
56	Luxembourg	2	1	3	1	5	95	14		
57	Macau	2	1	1	4	1	12	11	7	
58	Malaysia	2	2	2	3	0	18	11	9	38.54
59	Malta	3	1	3	3	0	49	12	9	
60	Mauritius	1	3	4	4	0	26	9	7	
61	Mexico	2	3	4	3	25	20	10	6	29.96
62	Nepal	1	1	4	2	20	35	7	3	
63	The Netherlands	1	1	2	2	6		8	6	49.33
64	Netherlands Ant	3								
65	New Zealand	1	1	1	1	0	99	9	7	48.98
66	Nigeria	1	1	2	2	13	0	13	6	22.7
67	Norway	3	2	2	2					49.59
68	Oman	1	2	4	4	0	11	15	8	
69	Pakistan	1	2	4	3					21.5
70	Panama	1	1	2	3	12	38	13	8	
71	Papua New G.	1	2							
72	Paraguay	2								
73	Peru	2	2	2	2	3	40	14	8	24.17
74	The Philippines	1	1	2	2	12	13	12	8	20.42
75	Poland	1	2	3	3	44	26	12	7	
76	Portugal	1	1	2	3	21	12	13	8	39.03
77	Romania	1	2	4	4	70	8	9	6	
78	The Russian Rep.	1	1	4	1	68	9	8	5	
79	Saudi Arabia	2	2	2	4	0		15	10	
80	Sierra Leone	2								
81	Singapore	3	2	2	2	0	50	3	9	44.95
82	Slovenia	1	2	2	2	40	5	16	6	
83	South Africa	2	2	2	1	0	5	4	8	33.49
84	Spain	1	1	2	3	0	11	10	8	39.35
85	Sri Lanka	1	2	2	2	55		11	9	25.2
86	Suriname	2	1	1	1					
87	Sweden	3	4	2	3	0	2	6	6	48.98
88	Switzerland	2	1	1	1	15	9	13	8	49.96
89	Taiwan	1*								
90	Tanzania	1	2	3	4					
91	Thailand	1	2	2	2	31	7	11	6	29.67
92	Trinidad & Tobago	1	3	2	2	15	8	7	6	
93	Tunisia	1								
94	Turkey	1	3	2	4	35	66	11	6	27.31
95	The UK	3	1	2	1	0		12	8	47.01
96	Ukraine	1								
97	The United Arab Emir.	2								
98	Uruguay	3	3	2	3					30.37
99	The U.S.A.	1	3	3	3	0	5	14	8	47.61
100	Venezuela	1	2	2	3	5	34	14	6	30.76
101	Zambia	1	1	4	4	23	64	12	8	