Global trends in financial sector supervisory architectures

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Abstract: Products and services offered by banks, insurance companies, and securities firms have substantially blurred in order to maximize profits through business expansion and financial innovation. Today financial institutions include new sophisticated products and activities which contain characteristics of all the listed institutions. Changes and transformations in the financial sector were followed by certain changes of supervisory bodies. In this paper we investigate the changes in the regulatory and supervisory models using data over the period 1999-2014 from 69 countries around the world. We find empirical evidence on some trends in changes of financial sector supervision architecture. These trends indicate that: (i) the sectoral architecture which was dominant in the past is largely replaced with integrated and hybrid models, (ii) central bank fragmentation effect is less present in countries that have been affected by the crisis, if they perform the changes to existing supervisory models. Finally, our research highlights hybrid model as insufficiently recognized one in earlier researches.

Key-Words: Financial Supervision, Crisis, Supervisory Model Changes, Central Bank, Prudential Supervision, Business Conduct Supervision

1 Introduction

End of the last and the beginning of this century represent a period of great changes and transformations in the financial sector supervision. Financial market has gone through many changes: from financial institutions which were specialized in banking, insurance or securities to integrated financial conglomerates which offer a wide range of financial products all over the world and in many financial sectors. Products and services offered by banks, insurance companies, and securities firms have substantially blurred, as each has sought to maximize profits through business expansion and financial innovation. The days when banks primarily took deposits and made loans, investment banking firms engaged in a narrow range of securities businesses such as underwriting, brokerage and trading, and advisory work, and insurance companies only issued property and casualty or life policies are long past [35]. Today these institutions include new sophisticated products and activities which contain characteristics of all the listed institutions. But growth of financial sector because of technology, which allowed virtual business without boundaries, is also visible. One should note that financial globalization coupled with the revolution in IT including the internet and other means of telecommunication, amongst a number of other factors, have led financial markets to become increasingly global in nature [31]. All these changes increased the financial sector profitability through time, but unfortunately, today is visible that these changes were not adequately followed by supervisory bodies. In many countries, the financial sector was faced with the crisis. State governments and international organizations have become involved to rescue the situation and prevent even bigger consequences of the crisis [32]. Supervisory architectures are under serious revision, especially in economies faced with financial crisis.

Today wide range of financial sector supervisory architectures are present. Architectures and institutions included in supervision as well as official supervisory powers significantly affect the supervision outcome [6], [22]. A number of studies have pointed to weaknesses in the regulation and supervision as one of the factors leading to the crisis [9]. Due to the significance of the supervision, the subject is worthy of investigation. The evidence is in many recently conducted researches [16], [28],

[30], [35], among others, on this topic. The crisis raised important questions on the appropriateness of the regulatory and supervisory models pursued in the run-up to the crisis, prompting regulators to consider changes in regulation and supervision. Despite the interest in the topic, there is a surprising lack of up-to-date information on the regulatory and supervisory models employed in countries around the world on the eve of the crisis and the changes brought about by this significant event up to these days [9].

The empirical analysis in this paper is based on data 1999-2014 from 69 high income and upper-middle-income economies. The paper analyzes global trends in financial sector supervision, considering both: institutions included in regulation and supervision as well as resulting architectures, usually named models. Analyzing state and conditions in individual countries and models presented in literature, we do find some new trends and hybrid supervisory architecture as one of the leading models of supervision.

The remaining sections of this paper are organized as follows. In section 2 three financial supervision architectures and arguments for and against them are presented; in section 3 the main questions which emerged during revision of supervisory architecture are described; in section 4 the trends in financial sector supervision transformation are analyzed and hybrid supervisory architecture with central bank is emphasized. Section 5 concludes this paper and gives some guidelines for future work.

2 A literature review of financial supervisory architectures

Regulatory and supervisory architecture of the financial system can go between two extremes: at the one end there is a highly fragmented structure with many specialized institutions, while at the other end there is only one supervisory institution in charge of all the financial institutions. But countries do not have to go to extremes because there are financial supervisory models between them. Most of the authors [5], [10], [30] differ 3 models, while some authors [13], [14], [35] use function model. In this paper, function model will not be considered because as Taylor emphasized „its very limited history use“ [27].

Because of financial supervisory architectures diversity which exists today, it is obvious that there is no one unique model as an optimal institutional structure. Significant differences are in literature (and reality) in the definition and classification of regulatory and supervisory models and techniques [14]. But three main models of institutional supervisory architectures in the literature are: integrated model (one supervisor), sectoral (institutional) model and twin peaks model. All of them regulate three main types of financial business: banking, insurance, securities, and today increasingly present financial conglomerates, but of course in different ways. There are advantages and disadvantages of all forms of institutional structure [25]. The merits of one model are always the demerits of another, and vice versa. The following are the characteristics, main arguments for and against every of the three basic models in current literature as well as examples of countries which use these structures.

2.1 Sectoral (institutional) model

Sectoral approach, as the first of three main financial supervisory forms, follows the traditional segmentation of the financial system on three main sectors (banking, securities, insurance) and it is based on the strict division of competences, i.e., the institutions in one segment are supervised separately from the ones in different sectors irrespectively of the matter under control [5]. In other words, this is an approach based on the company legal status (i.e., a company registered as a bank, insurance or securities). This approach actually determines which regulator is in charge for monitoring individual company types and it is applicable on prudential and business conduct regulation. This legal status also determines the company scope in business performance. It is also called the vertical model or the silos model of financial regulation. The classic silos model worked (and probably works) well in a structure of the financial industry with a relatively clear demarcation between the operations of banking, security markets and insurance companies [27]. Because of that, this model was the most common in history.

Today, because of the advantages it possesses, this model is applied in: China (The People's Bank of China, China Banking Regulatory Commission, China's Securities Regulatory Commission, China Insurance Regulatory Commission), Greece (Bank of Greece, Hellenic Capital Market Commission, Ministry of Development Directorate of Insurance Enterprises and Actuaries), India (Securities and Exchange Board of India, Reserve Bank of India, Insurance Regulatory and Development Authority), United States (Securities and Exchange Commission, Federal Reserve System, Financial

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System Regulatory Authority, Consumer Financial Protection Bureau, Commodity Futures Trading Commission) and many other countries.
Institutional model advantages arise because of the clear delineations between three main financial sectors. In such an environment, regulators are specializing in only one supervisory area thereby increasing the supervision efficiency. This model of supervision also enables better regulation of the specific financial system parts [36]. Furthermore, a little power off and individual regulator for the big decisions in financial system lowers the possibility of noneconomic decisions which can badly influence on the entire financial system.

But as the first and most important institutional model disadvantage it can be stated the absence of the financial supervisor which has the overview of the entire financial system. Another disadvantage is the potential inconsistency in the application of the rules and regulations [7]. Consequently, problems arise like: overlapping jurisdictions, bigger unnecessary bureaucracy which is followed by insufficient communication and coordination of activities between different agencies, which are the reasons why countries change this financial supervisory model [11].

2.2 Integrated model

In the integrated model there is one universal regulator and supervisor which conducts both prudential and business-to-conduct regulation and supervision of all financial service industry sectors. This model is accepted by: Austria (Austrian Financial Market Authority), Denmark (Finanstilsynet), Estonia (Estonian Financial Supervision Authority), Finland (Finanssivalvonta), Germany (The Federal Financial Supervisory Authority BaFin), Hungary (Hungarian Financial Supervisory Authority HFSA), Swiss (Swiss Financial Market Supervisory Authority FINMA) and many other countries. The most important arguments for unified supervision are related to efficiency, effectiveness, and issues stemming from the creation of financial conglomerates [8]. This supervisor can be the central bank of the country or specifically established institution.

Trend towards this kind of supervision was set out from the United Kingdom in 1997. For the first time a large industrialized country, as well as one of the main international financial centers, had decided to assign the main task of supervising the entire financial system to a single authority, other than the central bank [27]. According to the research of J. de Luna Martinez and T.A. Rose [11], the most important reasons for which countries adopted an integrated model are: the need for better supervision of the financial system which is moving towards universal banking (93%), maximization of economies of scale and scope (80%), the need for solving problems which result with bad communication and lack of cooperation between current supervisory agencies (27%), minimization of gaps in regulation and supervision of financial intermediaries (20%) etc.

Furthermore, cooperation in closing regulatory gaps and eliminating regulatory overlaps can be more easily effected [1]. A single agency should, in principle, avoid the problems of competitive inequality, inconsistencies, duplication, overlap, and gaps which can arise with a regime based upon several agencies [25].

But the source of diseconomies of scale is the tendency for unified agencies to be assigned an ever-increasing range of functions, sometimes called the "Christmas tree effect". This may arise because the formation of a unified agency may tempt politicians and policymakers to require it to perform tasks that are tangentially connected to its core functions [2]. Also, very large organizations are likely to become bureaucratic and inflexible, compared to smaller sectoral supervisors [7].

2.3 Twin peaks model (regulation by objective)

Twin peaks model of financial supervision is an alternative approach to regulation and supervision which was proposed by Taylor [34] and Goodhart [20]. Such supervision means creating two separate integrated bodies. The twin peaks model is a framework where one supervisory agency is in charge of all prudential supervision in the three main sectors, and another one is responsible for market conduct, consumer protection, and corporate governance [7]. This approach was taken by: Netherlands (The Dutch Central Bank, The Netherlands Authority for the Financial Markets AFM), Australia (Australian Prudential Regulation Authority APRA, Australian Securities and Investments Commission ASIC), United Kingdom (Financial Conduct Authority, Prudential Regulation Authority) etc. Lately, as we can see in the section of the analysis of global trends, this model is not gaining greater prevalence. Although OECD estimation from 2009 was that this is a solid supervisory model with the emphasis on the Australian model.

Prudential regulation is focused on the safety and soundness of the individual financial institutions while business conduct regulation if focused on the company's business with its clients. Business

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conduct regulation is designed to establish rules and guidelines about appropriate behavior and business practices in dealing with customers [21].

Prudential peak can be positioned inside or outside the central bank. Netherlands has chosen the twin peaks model with the central bank in charge of macro and micro prudential regulation, while Australia has chosen different twin peaks model in which the prudential supervisor, Australian Prudential Regulation Authority APRA, is located outside the central bank, and another independent body, Australian Securities and Investments Commission ASIC, is in charge of business conduct regulation [23]. A key issue in the Twin peaks model is whether or not the central bank is to be the prudential agency [25].

The twin peaks model possesses the advantages of the integrated model, and corrects some disadvantages of the previous. It has two institutions which are two autonomous bodies, which means that they have clear goals that they are fully committed to and the responsibility is clearly defined. Another advantage is the lack of danger that one type of regulation and goals will overpower the other one.

But as the first two models, the twin peaks model meets the potential dangers. The problem is that both institutions monitor the same subjects but they have very different requirements. Some critics of this model also cite externalization of the conflict as the bad side. They emphasize that this model actually does not eliminate the conflicts between different supervisors, but only externalizes them.

From the literature review is visible that authors mostly investigate 3 supervisory models: integrated, institutional and the twin peaks. The emphasis is on the purity of the models with clearly highlighted advantages and disadvantages of the each model. However, in order to establish the effective regulatory and supervisory architecture, an increasing number of countries are establishing the models which do not strictly belong to any of the described models. They establish the hybrid regulatory and supervisory architectures which best match their financial, economic, cultural, political, historical, expert, technical and others systems and capacities. Below is presented the basic questions for financial supervision structure and analysis of global trends in financial sector supervision.

3 Basic questions for financial supervision structure

When a new institutional structure of financial supervision is considered or when arguments for and against current structure are considered, the starting point should be at the basic questions.

The first question is the adequate number of regulatory agencies, especially should there be a group of specialized regulators, an agency responsible for more than one sector, or one integrated agency responsible for all the aspects of financial system regulation. The special issue is whether prudential and business conduct regulation should be separated or joined under one institution, and what is the role of the central bank in the regulatory and supervisory process. If a country chooses to have more than one regulator, important questions are about: of appropriate structure of agencies, their functions and institutions under their surveillance, defining aims for every agency and special groups of aims for every regulatory and supervisory agency.

One of the most important questions in a model with more supervisors is the degree of coordination necessary among different agencies and the necessary mechanism for securing the effective coordination, cooperation and information sharing. Besides, it should be decided about degree of political independence of supervisory bodies and about possible consequences of competition among them [25].

As very important raises the question about financing of financial supervisory institutions. In some countries, however, the financial supervisor is partly or totally funded from the government of finance ministry budget. If a supervisor is financed from the government budget, it should be proposed and justified by supervisors respecting objective criteria related to the market events. Supervisors which are financed from fees reduce political interference, but they have more interference from industry and vice versa. Bafin (German financial supervisor) is financed from supervision fees, other fees and contributions since 2011. Similar model has Finland, Denmark, Estonia, and Croatia since 2014.

The decision regarding the change of the financial supervision structure is not easy; it seeks answers to many key questions. However, recent observations suggest that the occurrence and uneven impact of the global financial crisis across countries and regions weakened the rigidity with which countries adhere to their existing supervisory structures, and open a window of opportunity for

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reforms [30]. On the other site, Masciandaro, Quintyn and Taylor in their research quote the importance of bandwagon effect which shows that reforms in some countries are induced by reforms in other countries [29]. Regardless to the reason for a change of the model, model changes affect the efficiency of the financial system.

Gaganis and Pasiouras [16] presented results that the higher unification in supervision is connected with less banking efficiency. Observing 140 countries from 1998 to 2010, Eichengreen and Dincer [15] found that in less developed countries where this integrated supervisor is among the few public institutions with necessary administrative capacities, central banks obtain supervisory function. They also concluded that in countries with high government efficiency and regulatory quality, this function will be obtained by an institution that depends on the government. Furthermore, countries with independent supervisor (which is not the central bank) have less non-performing loans as a % of GDP.

According to this, one of the main questions in shaping financial system's supervision is the role of the central bank in the supervision of the financial system. Because of that, the importance of the central bank in the supervision is described below, with arguments for and against providing such an important function to the central bank.

3.1 The role of the central bank

When currencies were attached to gold, most central bank's monetary policies were aiming low inflation and high employment and thereby first were often sacrificed because of the second. In that time, most of the central banks were in charge of bank supervision. Banking crisis almost did not exist. Deposit insurance was rare. In that world, the biggest responsibility of the central bank was financial stability. Monetary policy, financial stability and bank supervision formed a single composite, whose parts were difficult to disentangle [17].

Since then, many changes happened. Currencies are no more attached to gold. Central banks primary function is preserving price stability, and independence is assigned to them. And later, in many countries, central banks have been deprived of bank supervision. These challenges called into question the validity of the paradigm shaped by the experiences of the nineteenth century and the first half of the twentieth century; a paradigm based on the combination of central banks' lending of last resort role with regulatory and supervisory tasks [17].

The crisis which started in 2007 introduced even more focus on the central bank's optimal role in the financial sector supervision. A key issue in any institutional structure of regulatory agencies is the position and role of the central bank. In the vast majority of countries, the central bank has historically been responsible for both systemic stability and the prudential regulation of banks [25]. A threshold question arises whether the central bank should be a supervisor of financial services or whether that role is best performed by another agency [35]. The Table 3 gives a review about a different selection of some countries considering the role of the central bank in financial sector supervision.

The strongest argument for joining monetary and regulatory function in the central bank is its concern about the stability of the financial system and the protection of the payment system. By conducting bank supervision, the central bank creates information synergy in conducting monetary policy and bank prudential supervision. Information synergy is particularly needed in times of financial crises, when only direct supervision can deliver the essential information on the time. In addition to this, these information about bank solvency and liquidity are necessary, when the central bank is considering the „lender of last resort" function. But the central bank cannot be expected to provide emergency liquidity efficiently without up‐to‐date information on the condition of the banks, and it is unlikely to possess such information unless it is intimately involved in their supervision [15].

Likewise, Peek, Rosengren and Tootell [33] concluded that the central bank can use confidential supervisory information for significant estimation improvement of macroeconomic variables like inflation and unemployment; enabling better monetary policy functioning and minimizing deviations between realized and planned. It is almost impossible to obtain a function of the lender of last resort without having fast and complete access to supervisory information [12]. Furthermore, proponents of that idea think that the central bank can significantly contribute to this function because of its knowledge and expertise. The very important argument is the fact that if the central bank is not responsible for prudential supervision, this means certain duplication of efforts and gathering of information between central bank and supervisory agency. But this question also raises some problems.

From the other side, the biggest argument for separating banking regulation and monetary power is that this separation would prevent a conflict of interest regarding concern for price stability and concern for financial system stability [18]. Di Giorgio and Di Noia [14] concluded that the value of the inflation variation coefficient is higher (13%) in countries where the central bank is in charge of bank supervision, which suggests that these central banks face more problems in lowering inflation trough time. Inflation control can require rapid interest rate increase thereby effecting bank solvency and profitability which cannot transfer the interest rate increase to their assets, as they can to their liabilities. Be that as it may, there have been a number of instances when it is believed that interest rates were held down, in some large part because of concern with the health of (parts of) the financial system, when purely monetary considerations might have led to higher rates [20]. Under such conditions central bank must achieve two goals with only one instrument, creating a trade-off between monetary stability and micro stability of financial intermediaries.

The next objection may be viewed as concentrating excessive power in the hands of an unelected central bank whose accountability may be weak [25]. This problem is especially visible in countries in which financial conglomerates are more present by which central bank would have even more power.

Furthermore, if the central bank is not successful enough in its regulatory goals, this can also compromise its authority in other fields of its activity (reputation risk), which is especially dangerous in the case of bank bankruptcy. Against it is also the argument by which central bank would not develop supervisory methods like it would be done by some other agency which is responsible only for supervision.

The trend towards giving operational independence to central banks has coincided with a trend towards shifting responsibility for (banking) supervision to a separate, specialized supervisory body [19]. The analysis of global trends in the last fifteen years, performed in the next section, is showing some new trends which did not exist at that time.

4 Analysis of global trends in financial sector supervisory architectures

Continuous analysis of financial supervisory architectures is necessary because of the quick and big changes which are happening in financial markets. These changes have shaken some of the traditional assumptions about institutional structures, regulatory and supervisory agencies, and it has led to the new cognition primarily about supervisory shapes. Without the continuous analysis and adaptation, structure of regulatory and supervisory agencies no longer correspond to the market condition because they were made for financial systems in the past and are not aligned with the financial innovations and structural changes in financial systems.

An analysis of the changes in financial sector supervisory architectures over the years 1999-2014 points to the emergence of some trends. Trend of integrated supervisor began in northern Europe, specifically in Scandinavian countries: Norway, Denmark and Sweden. But despite the fact that Scandinavian countries first merged their financial supervisors, often can be found in the literature that this trend gained strong momentum in 1997, in the UK as one of the world biggest financial centers. In 1997 the newly elected Labor Government in the United Kingdom transferred responsibility for the prudential supervision of commercial banks from the Bank of England to a newly established body, the Financial Services Authority-FSA [19]. The FSA took responsibility for prudential and business conduct regulation and supervision of all the financial institutions (banks, insurance, investment funds etc.) and all the financial markets. FSA continued with the work until April 1, 2014 when 2 institutions replaced it: The Financial conduct authority and Prudential regulation authority.

After the year of 1998, the number of unified supervisory agencies has indeed grown rapidly. Europe has been the center of gravity regarding this trend [27]. Austria and Germany introduced integrated body outside the central bank in 2002, Belgium in 2004, Swiss and Finland between 2008 and 2009. Ireland also introduced one supervisory body - central bank in 2003, while Czech Republic and Slovak Republic joined it in 2006. Some countries outside the Europe which embraced this trend are: Columbia, Kazakhstan, Ruanda, Japan and Korea. But the fact that many other countries have even opposite models of supervision, says that one supervisory body is not the best architecture for all countries and all financial markets.

4.1 Data

In order to perform deeper analysis of supervisory architectures, data about organization of financial sector supervision over the years 1999-2014 are prepared and shown in Table 3. The dataset

illustrates the supervisory architecture changes with an emphasis on the role of the central banks in the supervision. The underlying source of the data is the World Bank and its data about organization of financial sector supervision for the years 1999-2010, and can be reached at <http://siteresources.worldbank.org/EXTGLOBALFINREPORT/Resources/8816096-1346865433023/8827078-1347152290218/Dataset_supervisory_structures.xlsx>.

Additionally, for the years 2011-2014 the dataset is extended with online official information from country authorities related to the supervisory institutions.

The source database contains two sets of data on financial sector supervisory structures, one for prudential supervision and the other for business conduct supervision. Part of this database is given in Table 1 and Table 2, as an example of data on which updates were performed. Performed updates are described in detail below.

These two sets of data are combined into one collection in which some updates were made as follows. Prudential supervision data were upgraded with data for business conduct supervision in one whole. In cases where in both datasets was the same unified supervisor, central bank or another body like financial service authority, integrated model with the central bank or financial service authority was assigned, respectively (for example: Island - Int FSA, Singapore - Int CB). In prudential supervision dataset where there was partial integrations without the central bank involved in supervision and when in business conduct dataset was institution different than the central bank, hybrid model outside the central bank (Hybrid OCB) was termed (for example: Canada, Luxembourg). Further, in countries where there are partial integrations with the central bank involved in prudential supervision, hybrid model with central bank (Hybrid WCB) was termed (for example: Italy, Portugal). Case where there exists an institution exclusively supervising business conduct supervision and another institution in charge of prudential regulation, this is called the twin peaks model (for example: Australia, United Kingdom since 2014). If in prudential supervision dataset Sectoral or SOCB model was set, than sectoral model was assigned (for example: United States, Turkey).

Table 1 Sample of prudential supervision data

PS*	Australia	Netherlands	Finland	Germany	Czech Republic	Malta	Serbia	Luxembourg	Colombia	Chile
‘99	FSA	Sectoral	B+S WCB	SOCB	Sectoral	S+I,BWCB	B+S OCB	B+I OCB	S+I,B OCB	
‘00	FSA	Sectoral	B+S WCB	SOCB	Sectoral	S+I,BWCB	B+S OCB	B+I OCB	S+I,B OCB	
‘01	FSA	Sectoral	B+S WCB	SOCB	Sectoral	S+I,BWCB	B+S OCB	B+I OCB	S+I,B OCB	
‘02	FSA	Sectoral	B+S WCB	SOCB	Sectoral	FSA		B+S OCB	B+I OCB	S+I,B OCB
‘03	FSA	Sectoral	B+S WCB	FSA	Sectoral	FSA		B+S OCB	B+I OCB	S+I,B OCB
‘04	FSA	CB	B+S WCB	FSA	Sectoral	FSA	B+I WCB	B+S OCB	B+I OCB	S+I,B OCB
‘05	FSA	CB	B+S WCB	FSA	Sectoral	FSA	B+I WCB	B+S OCB	FSA	S+I,B OCB
‘06	FSA	CB	B+S WCB	FSA	CB	FSA	B+I WCB	B+S OCB	FSA	S+I,B OCB
‘07	FSA	CB	B+S WCB	FSA	CB	FSA	B+I WCB	B+S OCB	FSA	S+I,B OCB
‘08	FSA	CB	B+S WCB	FSA	CB	FSA	B+I WCB	B+S OCB	FSA	S+I,B OCB
‘09	FSA	CB	FSA	FSA	CB	FSA	B+I WCB	B+S OCB	FSA	S+I,B OCB
‘10	FSA	CB	FSA	FSA	CB	FSA	B+I WCB	B+S OCB	FSA	S+I,B OCB

PS* Prudential Supervision

After these updates on World Bank dataset, data from 2010 until 30 September 2014 were collected from the financial supervisors’ web sites of the given countries. All data were merged into Table 3 as follows.

4.2 Results and discussion

Which supervisory architecture will be chosen in a country depends on many realities, but there is no one universal model which could be applied in all countries. Supervisory architecture and rules that may have worked well under stabile financial conditions may break down during unstable ones. Jurisdictions have to consider reforms aimed at updating their structures to better reflect market realities.

Data with results of conducted reforms around the world are shown in Table 3 and in Fig. 1. From these data can be seen that many jurisdictions

Table 2 Sample of business conduct data

BC*	Australia	Netherlands	Finland	Germany	Czech Republic	Malta	Serbia	Luxembourg	Colombia	Chile
'99	TP	Sectoral	Sectoral	Sectoral	NBC	NBC		Sectoral	NBC	NBC
'00	TP	Sectoral	Sectoral	Sectoral	NBC	NBC		Sectoral	NBC	NBC
'01	TP	Sectoral	Sectoral	Sectoral	NBC	NBC		Sectoral	NBC	NBC
'02	TP	Sectoral	Sectoral	Sectoral	NBC	FSA		Sectoral	NBC	NBC
'03	TP	TP	Sectoral	FSA	NBC	FSA	NBC	Sectoral	NBC	NBC
'04	TP	TP	Sectoral	FSA	NBC	FSA	NBC	Sectoral	NBC	NBC
'05	TP	TP	Sectoral	FSA	NBC	FSA	NBC	Sectoral	NBC	NBC
'06	TP	TP	Sectoral	FSA	NBC	FSA	NBC	Sectoral	NBC	NBC
'07	TP	TP	Sectoral	FSA	NBC	FSA	Sectoral	Sectoral	NBC	NBC
'08	TP	TP	Sectoral	FSA	CB	FSA	Sectoral	Sectoral	NBC	NBC
'09	TP	TP	TP	FSA	CB	FSA	Sectoral	Sectoral	NBC	NBC
'10	TP	TP	TP	FSA	CB	FSA	Sectoral	Sectoral	FSA	NBC

BC* Business Conduct

Table 3 Data about financial supervisory architectures over the period 1999-2014.

Country	Year															
	1999	2000	01	02	03	04	05	06	07	08	09	10	11	12	13	2014
Australia	TP															
Austria	Hybrid OCB								Int FSA							
Belgium	Hybrid OCB						Int FSA						TP			
Canada	Hybrid OCB															
Croatia	Sectoral						Hybrid WCB									
Cyprus	Sectoral															
Czech Republic	Sectoral								Int CB							
Denmark	Int FSA															
Estonia	Sectoral						Int FSA									
Finland	Hybrid WCB											Int FSA				
France	Sectoral												Hybrid WCB			
Germany	Sectoral						Int FSA									
Greece	Sectoral												Hybrid WCB			
Hong Kong	Sectoral															
Hungary	Sectoral						Int FSA									Int CB
Iceland	Int FSA															
Ireland	Hybrid WCB						Int FSA						Int CB			
Italy	Hybrid WCB															
Israel	Sectoral															
Japan	Int FSA															
Korea, Rep.	Int FSA															
Latvia	Sectoral						Int FSA									
Luxembourg	Hybrid OCB															
Malta	Hybrid WCB						Int FSA									
Netherlands	Sectoral						TP									
New Zealand	Sectoral												Hybrid WCB			
Norway	Int FSA															

Poland	Sectoral		Int FSA	
Portugal	Hybrid WCB			
Saudi Arabia	Hybrid WCB		Hybrid WCB	
Singapore	Int CB			
Slovak Republic	Sectoral	Hybrid WCB	Int CB	
Slovenia	Sectoral			
Spain	Sectoral			
Sweden	Int FSA			
Switzerland	Hybrid OCB		Int FSA	
Trinidad and Tabago	Sectoral		Hybrid WCB	
United Arab Emirates	Int CB		Hybrid WCB	
United Kingdom	Int FSA			TP
United States	Sectoral			
Albania	Sectoral		Hybrid WCB	
Algeria	Sectoral			
Argentina	Sectoral			
Azerbaijan	Sectoral			
Belarus	Sectoral			
Bosnia and Herzegovina		Sectoral		
Botswana	Sectoral		Hybrid WCB	
Bulgaria	Sectoral	Hybrid WCB		
Chile	Hybrid OCB			
Colombia	Hybrid OCB		Int FSA	
Costa Rica	Sectoral			
Dominican Republic	Sectoral			
Jamaica	Sectoral	Hybrid WCB		
Kazakhstan	Hybrid WCB	Int FSA		Int CB
Lithuania	Sectoral			Int CB
Macedonia, FYR	Sectoral			
Malaysia	Hybrid WCB			
Mauritius		Hybrid WCB		
Montenegro			Sectoral	
Namibia		Hybrid WCB		
Panama	Sectoral			
Peru	Hybrid OCB			
Romania	Sectoral			
Russian Federation	Sectoral			Int CB
Serbia		Hybrid WCB		
South Africa	Hybrid WCB			
Turkey	Sectoral			
Uruguay	Int CB			
Venezuela, RB	Sectoral			

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reformed their supervisory structure. Specifically, 45 percent of the observed countries have changed their structure of financial supervision over the years 1999-2014.

In order to better handle the new business conditions, lots of different changes in supervisory architecture were made. The most changes are made from sectoral to hybrid WCB (30 percent) and from sectoral to integrated supervisory model (27 percent). According to these, there are substantial growth of the integrated model and the hybrid model with the central bank as supervisor. The overall proportion of countries, covered by research, that preserved the traditional model of institutional regulation and supervision, in the observed period 1999-2014, decreased from 56 percent to 28 percent, while at the same time the overall proportion of countries that adopted an integrated model increased from 16 percent to 33 percent. Masciandaro and Quintyn [27] and Melecky and Podpiera [30] observed similar trends in their dataset. In addition, hybrid models make up a significant proportion. They represent 24.6 percent in 1999 and almost one third (32 percent) in 2014, what left less prominent in previous researches.

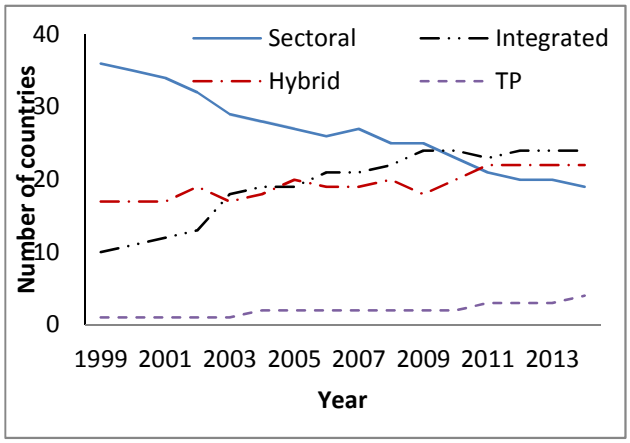

Fig. 1 Transition diagram for financial supervisory architectures over the period 1999 - 2014, according to data in Table 3.

History has shown that financial market disruptions have often been followed by regulatory reforms. In the recent financial crisis lessons learned from history are confirmed. In this crisis many defects of financial regulatory models have emerged which lead to rethinking the analytical approach and politics about financial stability. The literature review section has demonstrated that there are not strong theoretical arguments in favour of any particular architecture of financial supervision, given that it is possible to provide advantages and disadvantages of each model. However, market changes drive the restructuring wave of the supervisory architecture toward more integrated models. As can be seen from Fig. 1, while in the past sectoral model was extremely dominant, three models are now almost equally frequent. The year 2011 was the first time when integrated model and hybrid model of supervision overcame the sectoral model. The explanation lays in the fact that the sectoral model is based on a business model that, to a large extent, no longer exists.

Firstly, the crisis has determined a greater focus on systemic risks, the inclusion of the financial sectors in macroeconomic models, and the shift away from the micro prudential to the macro prudential approach in regulation and supervision [4]. According to data presented in Table 3, the integrated model and the hybrid model have greater potential in macro prudential supervision than the sectoral model.

Secondly, in some countries central banks become more involved in supervision because functions regarding monetary policy are not completely in their hands. As stressed by Masciandaro, Pansini and Quintyn, this is particularly visible in EMU countries [28]. Most emblematic examples are: Belgium, Germany, Ireland, Netherlands, Czech Republic and Slovak Republic. As we can see; the financial market has changed, the focus of supervision has changed and supervisory structure aligns with it.

A closer look at hybrid model, shown in Fig. 2, reveals that hybrid WCB dominates over the hybrid OCB, all the time but even more recently.

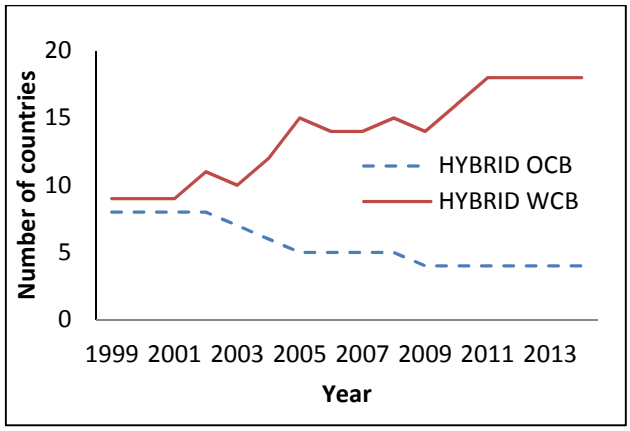

Fig. 2 Domination of Hybrid WCB over the Hybrid OCB, over the period 1999-2014.

In terms of patterns observed in integrating into FSA or central bank, economies that had initially sectoral supervision with the banking supervision outside the central bank and those with partial

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integration outside the central bank typically tend to either maintain their supervisory regime or integrate in a FSA [30]. The same authors infer that among economies that have a sectoral supervision with the central bank supervising the banking sector, there is a higher probability to integrate into the central bank than into a FSA.

Our empirical evidences additionally reveal, as shown in Fig. 3, that jurisdictions after the financial crisis are more prone to the introduction of the integrated model of supervision with the central bank as supervisor. Jurisdictions affected by the crisis are leading this trend. Their leading position is described below.

Following Laeven and Valencia [24], countries in a sample affected by the systemic banking crisis between 2007 and 2011 are: Austria, Belgium, Denmark, Germany, Greece, Iceland, Ireland, Kazakhstan, Latvia, Luxembourg, Netherlands, Spain, United Kingdom and United States. And countries that experienced a borderline systemic crisis in the same period are: France, Hungary, Italy, Portugal, the Russian Federation, Slovenia, Sweden and Switzerland. All the other countries (47) in our sample are treated as countries which did not experience financial crisis. Crisis-affected countries make 32 percents of our entire sample but they participate in the sample of the integrated model of supervision with the central bank as supervisor with 44 percents. More importantly, from all the countries that accepted the integrated model with central bank from 2010- September 2014, 80 percent belong to crisis-affected countries.

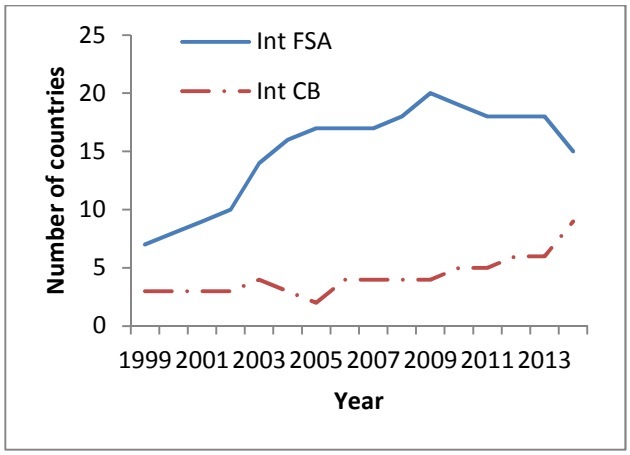

Fig. 3 Number of countries in both integrated models, over the period 1999-2014.

Generally, as the strongest argument for joining monetary and supervisory function in the central bank is concern about the stability of the financial system and the protection of the payment system. Obviously, countries affected by the crisis have considered this argument strong enough for their decisions, in spite of the risks associated with. But, Masciandaro, Pansini and Quintyn [28] contradict what was the generally accepted view before the crisis. They conclude that central bank involvement in supervision did not have any significant impact to bank resilience. From the other side, the central bank involvement in supervision can be risky because of following effects –moral hazard effect, conflict of interest effect and bureaucracy effect [26]. According to their findings and our empirical evidences, the introduction of the integrated model of supervision with the central bank as supervisor can be justified only by previously unspecified some new reasons.

The recent financial crisis has demonstrated that financial institutions around the world are highly inter-connected and that vulnerabilities in one market can easily spread to other markets outside of national boundaries [3]. But the same trends have also led to greater linkages across financial institutions as well as an increase in exposure of these institutions to common sources of risk. Good supervisory architecture requires, amongst other factors, much closer collaboration between national governments and regulators and relevant international institutions [31]. There is no question that the recent global financial crisis has contributed to the new steps and encouraged policy makers, regulators and other participants to increase their interaction and information sharing. Tighter integration on the national level can be seen as one step towards better interaction and information sharing in the international level. The first wave of these changes is most noticeable in countries that were affected by the recent crisis. For their jurisdictions the accompanying risks were of secondary importance.

5 Conclusions

Lately, supervision of financial institutions is gaining even more significance. Many researches, academic articles and changes in financial supervision witness about that. In order to enhance the stability of the financial system, regulators implement different financial system supervisory bodies. Because of the inherent diversity of financial systems, the optimal institutional architectures to control these financial systems do not belong to the only one type of supervisory model. Rather than this, different types of the models take place.

The financial supervision model depends on global trends in financial markets, country history, economic characteristics, social trends, political

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factors, administrative and technical capacities. Because of that, it can be stated that no country has exactly the same shape of financial supervision as others. But changes show some trends. Firstly, these trends indicate that the sectoral architecture which was dominant in the past is largely replaced with an integrated or hybrid models.

Secondly, certain deviations are observed in the countries affected by the financial crisis. These countries are more prone to the introduction of the integrated model of supervision with the central bank. We attribute this to the fact that they, as a consequence of the crisis, more respect the information synergy and informative gains than risks associated with this decision as are; the classic moral hazard risks, transparency risk (conflict of interests effect) and bureaucratic powers of the central bank. Finally, we highlight hybrid model as promising model and insufficiently recognized in earlier researches.

In the end we can point out some limitations of the research. For a number of countries we have not been able to find information about their financial sector supervisory architectures for the years 2010-2014. This issue remains as a challenge for future research.

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