1. Introduction

Financial supervision regimes vary significantly from country to country. A review of the supervision architectures[1] indicates a trend toward a gradual concentration of powers. In Europe this trend seems to be rather strong in recent years. In addition to Norway, the first country to establish a single supervisor in 1986, and Iceland (1988), six other European Union member states – Austria (2002), Belgium (2004), Denmark (1988), Germany (2002), Sweden (1991) and the United Kingdom (1997) – have assigned the task of supervising the entire financial system to a single authority different from the central bank. In Ireland (2003) the supervisory responsibilities were concentrated in the hands of the central bank. Also four countries involved in the 2004 EU enlargement process – Estonia (1999), Latvia (1998), Malta (2002) and Hungary (2000) – have reformed their structures, concentrating all the powers in a single authority[2], while, outside Europe, a unified agency was established in Kazakhstan (2004), Korea (1997), Japan (2001), Nicaragua (1999) and, among the small countries, in Bahrain, Bermuda, Cayman Islands, Gibraltar, Maldives, Netherlands Antilles, Singapore and United Arab Emirates.

The single supervisor regime seems to be the "natural" and best answer to the challenges posed by financial market integration. If, in the long run, the expected financial structure is a perfectly integrated and single market, the best design for the supervisory architecture would seem to be the single authority. But the answer is apparently not that simple.

The descriptive evidence[3] seems to correct the idea that, given the blurring process in the financial landscape, there are two possible kinds of supervisory approach: 1) unification under the

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[1] The review is performed in Section three.
[2] De Luna Martinez and Rose (2003) claimed that at least seven other countries were considering the adoption of a form of integrated supervision: Bulgaria, Indonesia, Poland, Slovakia, Slovenia and Ukraine.
[3] Masciandaro (2004).

roof of the central bank; and 2) unification in a different supervisory body[4]. In reality, the unification of supervision seems evident in the case of single financial authority only. In other words, the descriptive analysis signals an interesting result: the national choices on how many agencies must be involve in supervision is strictly linked to the role of the central bank: the degree of supervision unification seems to be inversely correlated with central bank involvement. The trade-off was confirmed exploring the determinants of recent reforms in supervisory regimes[5].

How do we explain this fragmentation effect given by the involvement of the central bank in supervision? The aim of this paper is to shed light on the economics of the central bank fragmentation effect.

The paper is organized as follows. Section two describes the adopted approach, considering the supervisory structure as a path-dependent variable. The financial authorities concentration index (FAC Index) is used in section three to identify this dependent variable. Then we recognize the importance of asking what role the central bank plays in the various national supervisory settings. The central bank as financial authority index (CBFA Index) is used to gauge the central bank's involvement in financial supervision. Using both the FAC Index and the CBFA Index, we confirm that the degree of supervision unification seems to be inversely correlated with central bank involvement in supervision itself (central bank fragmentation effect).

Section four discusses the central bank fragmentation effect. The adopted approach was to consider the supervisory framework with one or more authorities as a rule – driven path dependent variable determined by the policymaker. We claim that the political choice of supervision concentration level will depend on the role the central bank plays in the supervision. The policymaker's choice can be viewed as a sequential process in which the institutional *status quo* counts: the supervision concentration level is decided based on the position of the central bank. If

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[4]Grunbichler and Darlap (2003).
[5]Masciandaro (2005).

the role of the central bank is limited, the supervision concentration level will be high and vice versa. The central bank fragmentation effect is explained through three different channels: the moral hazard effect, the bureaucracy effect, the reputation endowment effect.

If a low central bank involvement is the *status quo*, the policymaker is not likely to increase it, to avoid moral hazard phenomena in the controlled intermediaries (moral hazard effect), or an increase in the bureaucratic powers of the central bank (bureaucracy effect). An increased unification level may be achieved by creating a new single financial authority.

If a high central bank involvement is the *status quo*, the policymaker may not wish to unify the supervision in the hands of the central bank for the same reasons (moral hazard and bureaucracy effects). At the same time, the policymaker may not be in a position to establish a new single financial authority, reducing the central bank involvement in supervision, if the central bank reputation is high (reputation endowment effect).

The overall effect is the inverse relationship between the supervision unification and the central bank involvement.

In order to assess the central bank fragmentation effect, in section five we estimate a model of the probability of different regime decisions as a function of this variable, checking for other structural economic and institutional variables. The empirical analysis - performed with ordered logit and probit functions with a dataset of 89 countries – confirmed that the level of supervision unification inversely depends on the central bank involvement in supervision. Section six advances some conclusions.

2. Policymaking and the Unification of Financial Supervision

Our starting point is the blurring effect that is taking place in the banking and financial industry[6]. There has been increasing integration of the banking, securities and insurance markets, as well as their respective products and instruments. The blurring effect causes two interdependent phenomena: 1) the emergence of *financial conglomerates*[7], which is likely to produce important changes in the nature and dimensions of the individual intermediaries, as well as in the degree of unification of the banking and financial industry; and 2) growing *securitisation* of the traditional forms of banking activity and the proliferation of sophisticated ways of bundling, repackaging and trading risks, which weaken the classic distinction between equity, debt and loans[8], bringing changes in the nature and dimensions of the financial markets.

The blurring process proposes different questions in the debate on financial supervision architecture, but the most important one is the alternative between the single authority model and the financial multi - authority model[9]. Identifying the optimal supervisory regime between the two alternatives is an interesting problem.

It has been correctly claimed that no "superior" model of supervision exists[10]. The quest for the optimal supervision architecture cannot be pursued through a simple traditional analysis of the costs and benefits expected from the possible alternative structures. If, in fact, one proposes to compare the two models, he realizes that each of them offers expected benefits but also expected risks[11]. So a theoretical analysis of the *potential effects* of alternative supervisory structures does not take us very far.

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[6]See Dale (1997) and White (1997).
[7]See European Commission (2002) and de Luna Martinez and Rose (2003).
[8]De Luna Martinez and Rose (2003).
[9]See Masciandaro (2004).
[10]Briault (2002), Schoenmaker (2003).
[11]For a survey see Masciandaro and Porta (2004).

Actually, gains and losses of a supervisory model are *expected* variables, calculated by the policymakers that maintain or reform the supervisory regime. But the expectations of policymakers, given their own specific goals, are likely to be influenced by structural economic and institutional variables, which may vary from country to country. Therefore the supervisory regime is *not* deterministic, nor, on the other side, completely accidental.

On the contrary, given the national economic and institutional endowment, these variables can determine, *ceteris paribus*, the policymakers' expected gains or losses of a specific supervisory regime. The supervisory regime can become the dependent variable, in a *path dependence* framework. Furthermore, the economic agents have not information on the true preferences of the policymaker: his optimal degree of financial supervision unification is a *hidden variable*.

In the economic literature there are not yet theoretical studies that consider the policymaker objective function for the financial supervisory design[12]. The crucial issue is the identification of the policymaker preferences.

The first approach to identify the policymaker's function could be the so called *narrative approach*[13], in which official documents are interpreted to gauge the policymaker choices. This approach has the drawback that there is substantial room for differences between the policymaker announcements and his true preferences.

The second approach - which we intend to follow here - is to consider the policymaker actual choices in determining the level of financial supervision unification (*factual approach*). In each random point of time, we observe the policymaker decision to maintain or reform the

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[12]The problem could be analysed as a model of political delegation, trying to apply in the financial supervisory field the general framework proposed in Alesina and Tabellini (2003). The delegation approach has been recently used to debate financial supervisory issues in Bjerre- Nielsen (2004) and in Eisenbeis (2004). There are two theoretical model on the banking supervision architecture – Repullo (2000) and Kahn and Santos (2004) - but without any explicit identification and discussion of the policymaker (lawmaker) objective function.

[13]The narrative approach has been extensively used in the monetary policy literature: see Potts and Luckett (1978), Wallace and Warner (1985), Hakes (1988) and (1990), Romer and Romer (1989).

financial supervision architecture, choosing the level of unification. In other words we consider policymakers faced with discrete choices.

Building in a cross country perspective an empirical analysis consistent with this discrete choice process involves claiming the existence of unobservable policymaker utilities Uij, where each Uij is the utility received by the *ith* national policymaker from the *jth* level of financial unification. Since the utility Uij is unobservable, we represent it as a random quantity, assuming that is composed of a systematic part U and a random error term ε. Furthermore, we claim that the utilities Uij are function of the attributes of the alternative institutional level of financial unification and of the structural characteristics of the policymaker country.

Combining the two hypotheses, we have a random utility framework for the unobservable financial unification variable. As usual, we assume that the errors εij are independent for each national policymaker and institutional alternative, normally distributed. The independence assumption implies that the utility derived by one national policymaker is not related to the utility derived by any other national policymaker, and that the utility that a policymaker derives from the choice of a given level of financial unification is not related to the utility provided by the other alternative[14].

In the factual approach the first crucial issue is the measurement of the policymaker choices, that is the definition of the dependent variable[15].

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[14]See Maddala (1983), Greene (1997) and Wooldrige (2002) for in-depth discussion on the random utility models that generate discrete dependent variables.

[15]The factual approach has the drawback that there is subjectivity in the institutional measurements. However the subjectivity in the interpretation is also present in the narrative approach.

3. Defining the Degree of Unification in Financial Supervision

If we wish to consider financial supervision unification as a dependent variable, the first problem is to construct this variable. How to measure the degree of unification of financial supervision? To this end we use the financial authorities consolidation index (FAC Index) (Table 1).

The creation of the index is based on an analysis of which and how many authorities in 89 countries are empowered to supervise the three traditional sectors of financial activity: banking, securities markets, insurance (Table 1)[16]. The country sample depends on the availability of institutional data[17]

To transform the qualitative information into quantitative indicators, we assigned a numerical value to each type of regime, in order to highlight the number of the agencies involved. The rationale with which we assigned the values considers simply the concept of unification of supervisory powers: the greater the unification, the higher the index value.

The index is built on the following scale: 7 = Single authority for all three sectors (total number of supervisors=1); 5 = Single authority for the banking sector and securities markets (total number of supervisors=2); 3 = Single authority for the insurance sector and the securities markets, or for the insurance sector and the banking sector (total number of supervisors=2); 1 = Specialized authority for each sector (total number of supervisors=3).

We assign a value of 3 to the single supervisor for the banking sector and securities markets because of the predominant importance of banking intermediation and securities markets over insurance in every national financial industry. It also interesting to note that, in the group of

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[16]Sources: for all the countries, official documents and web sites of the central banks and the other financial authorities. The information are updated to the 2004. Tables are available on request.

[17]We do not include the eight very small countries and territories (Bahrain, Bermuda, Cayman Islands, Gibraltar, Maldives, Netherlands Antilles, Singapore and United Arab Emirates) that introduce the single financial authorities to avoid an evident bias in the empirical analysis.

integrated supervisory agencies countries, it seems to be a higher degree of integration between banking and securities supervision than between banking and insurance supervision[18]; therefore, the degree of concentration of powers is, *ceteris paribus*, greater.

These observations do not, however, weigh another qualitative characteristic that emerges from Table 1: There are countries in which one sector is supervised by more than one authority. It is likely that the degree of concentration rises when two authorities exist in a given sector, and one of which has other powers in a second sector. On the other hand, the degree of concentration falls when there are two authorities in a given sector, neither of which has other powers in a second sector.

It would therefore seem advisable to include these aspects in evaluating the various national supervisory structures by modifying the index as follows: adding 1 if in the country there is at least one sector with two authorities, and one of these authorities is also responsible for at least one other sector; subtracting 1 if in the country there is at least one sector with two authorities assigned to supervision, but none of these authorities has responsibility for another sector; 0 elsewhere.

Finally, there are three qualitative characteristics of supervision regimes that we decided not to consider in constructing this index. Firstly, we do not consider the legal nature – public or private – of the supervisory agencies, nor their relationships with the political system (degree of independence, level of accountability[19]). Secondly, at least in each industrial country, there is an authority to protect competition and the market, with duties that impinge on the financial sectors. But, since it is a factor common to all the structures, we decided not to take the antitrust powers

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[18]De Luna Martinez and Rose (2003). Furthermore, Abrams and Taylor (2002) claimed that the case for consolidating the supervision of banking and securities firms may be stronger that for including insurance firms, given that for bank and securities firms risks tend to arise on the assets side of the balance sheet, whereas for insurance firms the main risks occurs on the liabilities side.

[19]On these issues see Quintyn and Taylor (2002).

into account in constructing the index[20]. Finally, the financial authorities can perform different functions in the regulatory as well as in the supervisory area[21].

However, at this first stage of the institutional analysis, we prefer to consider just the number of the agencies involved in the supervisory activities.

But we should also consider the nature of the institutions involved in supervisory responsibilities. In particular, any supervisory regime will have to provide a link between supervision and the central bank, given the potential relationships between monetary stability and financial stability[22]. It has been correctly pointed out[23] that, irrespective of the role, the central bank is the ultimate authority for the systemic stability of the payment system. Thus among the authorities that can have supervisory responsibility, the central bank has a special nature, as the institution responsible for monetary policy. Furthermore, the special characteristics of the role played by the central bank have placed it in a central position with respect to the political system, the intermediaries, and the other control authorities[24].

The debate on the characteristics of this link is particularly important in the European Union, where monetary policy is separated from financial supervision[25]. Therefore we must ask what role the central bank plays in the various national supervisory regimes[26]. We propose the index of the central bank's involvement in financial supervision: the Central Bank as Financial Authority Index

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[20]The relationship between competition policies and stability are examined in Carletti and Hartmann (2002).

[21]Llewellyn (2001) noted that the basic functions performed by regulatory and supervisory agencies cover ten main areas. For our purposes, in order to separate supervision – i.e. monitoring rules compliance – from regulation – i.e. rules setting with managerial discretion - it is possible to distinguish five supervision functions (prudential supervision of financial institutions; conduct of business supervision; administration of deposit insurance; market integrity; financial institutions crisis procedures) from four regulation functions: management of the payment system; prudential regulation, conduct of business regulation, liquidity management. However, in different cases it's non easy to do a clear cut between supervision and regulation; on this point of view it is paradigmatic the overlapping between liquidity management and crisis procedures.

[22]See Garcia Herrero and Del Rio (2003). On the role of central bank in banking supervision see Masciandaro (1993), Tuya and Zamalloa (1994), Goodhart and Schoenmaker (1992) and (1995), Haubrich (1996), Di Giorgio and Di Noia (1999), Peek, Rosengren and Tootle (1999), Abrams and Taylor (2002), Bruni (2001).

23 Llewellyn (2001).

24 On the evolution of the central bank role see, among others, Toniolo (1988).

25See Lannoo (2000). Schoenmaker (2003), Padoa Schioppa (2003), Goodhart and Schoenmaker (1995), Eijffinger (2001), Vives (2001), Goodhart, Schoenmaker and Dasgupta (2002), Schueler (2003).

26 See Oosterloo and de Haan (2003).

(CBFA) (Table 1)[27]. For each country, and given the three traditional financial sectors (banking, securities and insurance) the CBFA index is equal to: 1 = the central bank has not the main responsibility in banking supervision; 2 = the central bank has the responsibility in banking supervision; 3 = the central bank has responsibility in two sectors; 4 = the central bank has responsibility in all three sectors (Table 1).

In evaluating the role of the central bank in banking supervision, we consider the fact that, whatever the supervision regime is, the monetary authority has responsibility in pursuing the macro financial stability[28]. Therefore we choose a rule of thumb the relative role of the central bank: we assign a greater value – 2 instead of 1 – if the central bank is the unique or the main responsible for banking supervision.

The analysis of the degree of financial supervision unification and the level of central bank involvement provide us with a general picture of the supervisory regimes around the world. In fact, each national supervisory regime can be identified with at least two characteristics: the degree of concentration of powers (FAC Index) and the degree of involvement of the central bank in that distribution of powers (CBFA Index). From a theoretical point of view, we can expect a higher or lower degree of supervision concentration, irrespective of the role of the central bank. The comparative picture is quite different[29]. The two most frequent models are polarized: on the one hand, countries with a high unification of powers with low central bank involvement (*Single Financial Authority Regime*); on the other, countries with a low concentration of powers with high central bank involvement (*Central Bank Dominated Multiple Supervisors Regime*). The polarization

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[27] Barth, Nolle, Phumiwasana and Yago (2002) claim that the key issues for banking supervision are 1) whether there should be one or multiple supervisory authorities and 2) whether the central bank should be involved in bank supervision. Here we use the same intuition to build up the two indices of financial authorities' consolidation.

[28] The central bank can be involved in banking supervision tasks in Single Authority regimes too. For example in Germany the Deutsche Bundesbank participates in banking supervision, in subordination to the Bundesanstalt fur Finanzdienstleistungaufsicht (BaFin)'s issues. In Austria, the Oesterreichische Nationalbank co-operates with the Financial Market Authority continuing to conduct on-site inspection. Also in Japan the central bank remains deeply involved in pursuing the overall financial stability. These features were considered in weighting the FAC indexes.

[29] Masciandaro (2004) and (2005) used the indexes to propose a descriptive analysis of the different institutional regimes in the world and its determinants, with a sample of 68 countries.

phenomenon seems more evident in the European Union and in the sample of industrialized countries[30].

4. The Degree of Unification in Financial Supervision and the Role of Central Bank

The descriptive analysis pointed out that the unification of supervision seems more evident in the case of Single Financial Authorities Regimes, while in the case of Central Bank-Dominated Multiple Supervisors Regimes the institutional setting seems more consistent with a "leader-followers" framework. It's a matter of fact that in a multi – authority model the central bank tends to assume the position of "first among peers", at least for historical reasons. Therefore the degree of supervision unification seems to be inversely correlated with central bank involvement in supervision itself (central bank fragmentation effect).

The central bank fragmentation effect can be explained as a special case of *rule-driven path dependence*. Rule-driven path dependence[31] exists when, other conditions being equal, the choice of a given design of rules depends on characteristics already existing or already determined by the rules themselves.

In this case, a given policymaker's choice of supervision unification level will depend on the role the central bank plays in the supervision, or that the policymaker has decided to have the central bank play. In other words, the policymaker's choice can be viewed as a sequential process in which the institutional *status quo* counts: the supervision unification level is decided based on the position of the central bank. We had already noted that, for theoretical and historical reasons, the central bank is the *primus inter pares* among the financial authorities; therefore let us proceed straightforwardly that the policymaker takes decision on the supervision unification, given the

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[30] See Masciandaro (2004) and Masciandaro and Porta (2004).
[31] The concept of rules driven path dependence has been recently used in the corporate governance literature: see among others, Bebchuk and Roe (1999), Clark and Wojcik (2003).

institutional position of the central bank. If the role of the central bank is limited, the supervision concentration level will probably be high and vice versa.

We claim that the supervision unification and the central bank involvement are not determined simultaneously through the political process. Let us assume that the policymaker in a given country must decide whether to establish a unified supervision, due the blurring process in the financial markets. In that country, the central bank's level of supervisory involvement may be low or high.

4.1 Regime with Low Central Bank Involvement

Let us first consider the case where the central bank's involvement is low. The policymaker might raise the supervision unification level by increasing the involvement of the central bank. The supervision unification level and the central bank involvement would thus move in the same direction, but this does not seem to be the case. Why?

First of all, the policymaker may not wish to involve the central bank in supervisory responsibilities, to avoid moral hazard phenomena in the controlled intermediaries[32] (*moral hazard effect*). Or the policymaker may not wish to raise the bureaucratic powers of the central bank, since it is already responsible for monetary policy (*bureaucracy effect*). Thus in the case of a central bank not involved in supervision, the policymaker confirms the actual role of the central bank in terms of supervision responsibilities, and so an increased supervision unification level may be achieved by creating a single financial authority.

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[32] Llewellyn (2001).

4.2 Regime with High Central Bank Involvement

On the other hand, if the central bank is heavily involved in supervision, the policymaker may increase the supervision concentration level in one of two ways: by increasing the powers of the central bank or by unifying them in the hands of a single financial authority.

Again, the policymakers could fear that the safety net – the central bank's function of lender of last resort – might be spread to a wider set of institutions than just banks, if the central bank is also involved in supervising insurance and securities trading firms (*moral hazard effect*). Furthermore, the policymakers mighty fear the creation of an overly powerful bureaucratic agency (*bureaucracy effect*). The policymaker may therefore not wish to further increase the involvement of the central bank[33].

At the same time, however, the policymaker may not be in a position to reduce the central bank's level of involvement in supervision, or may not regard it as advisable, especially if the policy of the central bank has been effective (*reputation endowment effect*). Since the policymaker has decided neither to increase nor reduce central bank involvement, he also decides not to increase the level of supervision unification. Therefore, in cases where the central bank is heavily involved in supervision, there is a tendency not to increase the level of supervision unification. On the contrary, if the reputation of the central bank is low, or decreasing, the establishment of a single financial authority could be more likely to occur.

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[33]On this respect, it is possible to explain the Ireland case, where the supervisory responsibilities are actually concentrated in the hands of the central bank. In fact the central bank of Ireland is not an independent and autonomous national monetary authority, as member of the European System of Central Banks (ESCB). The monetary policy of the ESCB is governed by the decision making bodies of the European Central Bank (ECB). The national central banks are an integral part of the ESCB and have to act in accordance with the guidelines and instructions of the ECB. Therefore, the expected risks of moral hazard effect and bureaucracy effect are likely to be smaller in the case of countries which are members of the ESCB. The expected evolution of the Netherlands case seems to be consistent with this interpretation.

In conclusion, the degree of central bank involvement in supervision may condition the policymaker in its decision to change the degree of supervisory concentration. The resulting effect is the noted inverse relationship with central bank fragmentation.

5. Financial Supervision Unification and Central Bank Fragmentation Effect

How do we empirically test the overall robustness of the fragmentation effect due to central bank involvement in supervision? In order to assess this relationship, we can estimate a model of the probability of different regime decisions as a function of this variable, checking for other structural economic and institutional variables.

In fact, supervision regimes can be viewed as resulting from a continuous, unobserved variable: the optimal degree of financial supervision unification, consistent with the policymaker utility. Each regime corresponds to a specific range of the optimal financial supervision unification, with higher discrete FAC Index values corresponding to a higher range of financial unification values. Since the FAC Index is a qualitative ordinal variable, the estimation of a model for such a dependent variable necessitates the use of a specific technique.

Our qualitative dependent variable can be classified into more than two categories, given that the FAC Index is a multinomial variable. But the FAC Index is also an ordinal variable, given that it reflects a ranking. Then the ordered model is an appropriate estimator, given the ordered nature of the policymaker alternative[34].

Let y be the policymaker ordered choices taking on the values (0, 1, 2, ... , 7). The ordered model for y, conditional on a set of K explanatory variables x, can be derived from a latent variable

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[34] See Maddala (1983), Greene (1997) and Wooldrige (2002) for the ordered models. See also Cramer (2003).

model. In order to test this relationship, let us assume that the unobserved continuous variable, the optimal degree of financial supervision unification y^*, is determined by:

$$y^* = \beta' x + \varepsilon \qquad (1)$$

where ε is a random disturbance uncorrelated with the regressors, and β is a 1 x K regressors' vector.

The latent variable y^* is unobserved. What is observed is the choice of each national policymaker to maintain or to reform the financial supervisory architecture: This choice is summarized in the value of the FAC Index, which represents the threshold value. For our dependent variable there are seven threshold values. Estimation proceeds by maximum likelihood, assuming that ε is normally distributed across country observations, and the mean and variance of ε are normalized to zero and one. This model can be estimated with an ordered Logit model or with an ordered Probit model[35].

Which economic model can be tested? Actually, to the best of our knowledge, there is no general theory on the determinants of the policymaker's decision on the degree of supervision unification.

First of all, given our previous descriptive results, the choice of the optimal level of financial supervision unification could depend on the role of the central bank in the supervision architecture. The crucial question is: does the degree of central bank presence (*institutional factor*) in financial supervision matter in defining the level of unification in that supervision? The expected sign of the relationship between central bank involvement and financial supervision consolidation is negative.

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[35] The logit model differs from the probit model only in the cumulative distribution function that is used to define choice probabilities. The maximum likelihood estimations were carried out by a packaged-ordered Probit and ordered Logit commands in STATA. To be complete we present both the Probit and the Logit results, given that, as usual, there is little basis for choosing between probit and logit models.

How to choose the control variables? As it is claimed before, no theory exists on the relationship between policymaking and financial supervision unification. Therefore we shall try to test the more general hypotheses:

a) First, the policymaker chooses to maintain or reform the degree of supervisory unification in response to the structure of the financial system. In the modern debate on financial structure, it is usual to confront the equity dominance model (or *market-based regime*) with the bank dominance model (or *bank-based regime*). Furthermore, recent literature pointed out the close relationship between the financial structure model and the corporate governance model, with particular attention to the political determinants.[36] Therefore, the control variables must capture the following effect: does the financial structure model (*financial factor*) matter in defining the policymaker's choices in the area of supervisory consolidation?

The expected sign of the relationship between the degree of supervision unification and the financial factor is undetermined (i.e. it can be either positive or negative). In section two we stressed the importance of the blurring process for banking and financial markets worldwide. The blurring process means potential changes in the nature and dimensions of intermediaries (*the financial conglomerates effect*). In a bank-based regime, if we think that the policymakers' choices depend on the features of their own regime, we can suppose a positive relationship between the kind of regime and the degree of financial supervision unification, exactly in face of the financial conglomerates effect. The rationale for the creation of a single financial supervisory authority is the blurring of confines between banks, insurers and financial service providers. The increasing importance of financial conglomerates requires the unification of supervisory functions.

At the same time, however, the blurring effect also means potential changes in the nature and dimensions of the financial markets (*the securitisation effect*). Therefore, in a market-based regime

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[36] Pagano and Volpin (2000), Perotti and Von Thadden (2003).

we can also expect a positive relationship between the kind of regime and the degree of financial supervision consolidation, this time in the face of the securitisation effect. Therefore the relationship between the financial factor and the degree of supervision concentration remains an empirical question.

b) Second, the political and institutional environment can determine the ability of the policymakers to implement their choices. Furthermore, we pointed out in a) that the financial structure itself could be influenced by political factors. Then the control variables must capture a possible second relevant effect: does the quality of public governance (*political factor*) matter in defining the policymaker's choices on the level of supervisory unification? The expected sign of the relationship between the degree of supervision unification and the political factor is also undetermined. In section two we noted that, whatever the financial regime of his country, a policymaker may choose a higher degree of supervision in order to improve the capacity to face the challenges of the blurring process. Then we can suppose a positive relationship between good governance indicators and supervision unification.

But a policymaker may prefer a single authority in order to increase the probability of capturing the financial supervisory structure. Therefore, at the same time we might expect a positive relationship between bad governance indicators and supervision unification. Again, the relationship between the political factor and the degree of supervision unification remains an empirical question.

c) But we must note that the relationship between the degree of supervision unification and the characteristics of the banking and financial markets, pointed out in a), might "obscure" the importance of other variables, which are themselves determinants in explaining the characteristics of the banking and financial markets[37]. Recently, the structure of the financial markets was

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[37]For example, in Demirguc-Kunt, Laeven and Levine (2003) regulation become insignificant in explaining banking performance when checking for institutional indicators.

explained with three different institutional approaches (*legal factors*)[38]: the legal-financial view, in the static and dynamic versions; the political-financial view; and the endowment view. Then we have to insert control variables related to the legal-financial view and the endowment view, while the political-financial view was already represented by the indicator of governance.

d) Then we asked ourselves whether the choices of policymakers to increase the degree of unification of supervisory powers might depend on the dimension in their respective countries (*economic size factor*).

e) Furthermore, as the above descriptive analyses pointed out, the concentration of powers seems more peculiar of developed countries, particularly in the European context. The *geographical factor* might also be important, in terms of location in Europe.

f) Finally, we could expect a positive relationship the OECD membership, as proxy of the levels of economic growth, on one hand, and financial supervision unification, on the other (*development factor*).

The general specification is represented by equation (2):

$$
\begin{aligned}
(FAC)_i = {} & \beta_0 + \beta_1(CBFA)_i + \beta_2(MvB)_i \\
& + \beta_3(mcap)_i + \beta_4(goodgov)_i + \beta_5(gdp) + \beta_6(OECD) \\
& + \beta_7(Europe) + \beta_8(CommonL) + \beta_9(CivilL) + \beta_{10}(Latitude) + \varepsilon_t
\end{aligned}
\tag{2}
$$

with country[39] $i = 1\ldots89$.

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[38] Different approaches have been proposed to explain the country choice between a bank-based model and a market-based model: the "legal approach" - La Porta, Lopez –de-Silanes, Shleifer and Vishny (1997) and (1998) - the "economic approach" - Rajan and Zingales (2000) - the "political economy approach" - Pagano and Volpin (2000) and Verdier (2001) Rosenbluth and Schaap (2001) Carney (2002) Perotti and von Thadden (2003).

[39] The country sample depends on the availability of institutional data. Given the 267 world countries (UN members are 180), our 89 countries represent 60 percent of world GDP and 82 percent of the world population.

Where the independent variables are the following[40]:

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1. CBFA Index is the index of involvement of the central bank in supervision, defined in section four;

2. MvB Index = Market vs Bank Index: binary variable for the private governance factor. It is a dummy that expresses the financial system of a given country, market-based versus bank-based [41];

3. mcap = Market capitalization/GDP: quantitative variable for the private governance factor. It shows a measure of the securities market size, relative to GDP[42];

4. goodgov = Good Governance: quantitative variable for the public governance factor. It shows the structural capacity of the government to formulate and implement sound policies. Furthermore the index can represent the control variable for the politics and finance view[43];

5. gdp = Gross Domestic Product: quantitative variable for the economic size factor[44];

6. OECD = binary variable for the economic factor. It is a dummy that signals whether a given country is a member of the OECD or not;

7. Europe = binary variable for the geographical factor. It is a dummy that signals whether a given country is European or not;

8-9. CommonL, CivilL = binary variables for the law factor. They are dummies that indicate the legal root of a given country, representing the control variables for the law and finance view[45];

10. **Latitude** = quantitative variable for the endowment view. The variable is calculated as the absolute value of the latitude of the country, scaled to take values between 0 and 1[46].

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[40] The correlation matrix for the variables is in Table 2.

[41] The index is calculated using different banking and financial variables: see Demigüç-Kunt and Levine (1999). For each variables we calculate the mean of four time values: 1996,1998, 2000, 2002.

[42] World Bank, 2003, *World Development Indicators*, Stock Markets 5.3. For each variable we calculate the mean of four time values: 1996, 1998, 2000, 2002. Note that the correlation index between the financial regime variable (MvB) and the market capitalization variable (mcap) is high, but their influence on the dependent variable is very low.

[43] The index is built using all the indicators proposed by Kaufmann et al. (2003). They define (public) governance as the exercise of authority through formal and informal traditions and institutions for the common good, thus encompassing: 1) the process of selecting, monitoring and replacing governments; 2) the capacity to formulate and implement sound policies and deliver public services; 3) the respect of citizens and the state for the institutions that govern economic and social interactions among them. Furthermore, for measurement and analysis purposes, these three dimensions of governance can be further unbundled to comprise two measurable concepts per each of the dimensions above for a total of six components: 1) voice and external accountability; 2) political stability and lack of violence; 3) government effectiveness; 4) lack of regulatory burden; 5) rule of law; 6) control of corruption. The authors present a set of estimates of these six dimensions of governance for four time periods: 1996,1998,2000,2002. For every country, therefore, we first calculate the mean of the four time values for each dimension of governance; then we build up an index of global good governance in the period 1996-2002, calculating the mean of the six different dimensions

[44] World Bank, 2003, *World Development Indicators*. For each variable we calculate the mean of four time values: 1996, 1998, 2000, 2002.

[45] Beck, Demirguc-Kunt and Levine (2001). The legal roots are five: Anglo-Saxon Law (=Common Law), French, German and Scandinavian Laws (=Civil Laws), Socialist Law (Others); we skip one root – choosing the Socialist Laws, as the least significant from an economic point of view – to avoid multicollinearity problems.

[46] La Porta, Lopez de Silanes, Schleifer, Vishny (1999). On the endowment view, also see Beck, Demirguc-Kunt and Levine (2001).

Tables 3 and 4 show the Logit and Probit estimates of Equation (1). In the multinomial ordered models the impact of a change in an explanatory variable on the estimated probabilities of the highest and lowest of the order classifications—in our case the Single Authority model and the "pure" Multi-supervisory model—is unequivocal: If β_j is positive, for example, an increase in the value of x_j increases the probability of having the Single Authority model, while it decreases the probability of having the "pure" Multi-supervisory model.

The results of the estimates show the robustness of the role of central bank involvement in explaining the degree of supervision unification. In fact, the probability of a single financial authority is always inversely and significantly related to the involvement of the central bank.[47]

Looking at the control variables, the probability that a country will move toward a Single Authority model is higher: 1) the smaller the overall size of the economy[48]; 2) when the jurisdiction adopts the Civil Law, particularly if the legal framework is characterized by German and Scandinavian roots[49]. Without considering the law features, the probability that a policymaker will establish a unified agency is higher the higher the goodness of public governance

To test the robustness of the results, we modify the dependent variable, eliminating the weights attributed to the banking and financial markets respect to the insurance sector[50]. Tables 5 and 6 report the Logit and Probit estimates. The central bank fragmentation effect is much stronger.

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[47]We contrast the qualitative statement of Nolle (2003), who claimed that there is no systematic pattern to the division between single and multiple supervisory regimes.

[48]If we consider the sample of the countries (14) with a Single Supervisor only, the UK seems to be the classic case of "outlier", i.e. the exception in the inverse relationship between the degree of financial supervision consolidation and the financial market dimension. In fact, if the same regressions are performed without the UK all the results are confirmed.

[49]We contrast the empirical results of Masciandaro (2005), who claimed that - given a smaller sample countries 68 – also the financial factor and the political factor are significant. Therefore the financial and political factors seem to be sample sensitive explanatory variables.

[50]We use an index (FAC Two) according to the following scale: 5 = Single authority for all three sectors (total number of supervisors = 1); 3 = Single authority for two sectors (total number of supervisors = 2); 1 = Independent specialized authority for each sector (total number of supervisors = 3).

Secondly we tested a more radical hyphotesis. We assumed that the policymaker does not select the supervision unification level but more simply decides between the two extreme models of supervision: single authority versus "pure" multi-supervisory authorities. The dependant variable becomes a binary variable[51], to be estimated with simple Logit and Probit. Tables 7 and 8 report the Logit and Probit estimates. The results confirm the robustness of the central bank fragmentation effect.

We then tested the robustness of the hypothesis that the institutional factor – i.e. the central bank fragmentation effect - could be considered an independent variable. We had to reject the hypothesis that central bank involvement is endogenous, i.e. that the policymaker jointly determines the financial supervision level and the central bank involvement, based on the same explicative model. We considered central bank involvement as a dependant variable. Tables 9 and 10 report the Logit and Probit estimates. Our conclusion is that the variables that could explain the degree of central bank involvement in financial supervision do not coincide with those that we use to analyse the degree of unification. In fact, if you perform Logit and Probit regressions using CBFA as a dependent variable and the same vector of independent variables, the results are inconsistent with the previous ones.

To test further the robustness of the institutional factor, we tried changing the index of central bank involvement, making it perfectly symmetrical with the index of financial supervision level[52]. Tables 11 and 12 report the Logit and Probit estimates. As expected, all the results are confirmed.

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[51]We use an index (FAC Binary) according to the following scale: 1 = Single authority for all three sectors; 0 = Otherwise.

[52]The different levels of central bank involvement can be measured using the identical scale of the FAU Index (labelled CBFA Two Index): 1= the central bank has responsibility in no sector; 3 = the central bank has responsibility in one sector; 5 = the central bank has responsibility in two sectors; 7 = the central bank has responsibility in all three sectors.

How should the results be interpreted? First of all, the analysis confirms the rule-driven path dependence hypothesis. The prior choice of the policymaker regarding "whom" to delegate supervisory policy seems to have consequences on the choice of "how many" institutions to delegate, according to an inverse relationship. The central bank fragmentation effect holds true: The more the central bank is involved in financial supervisory powers, the lower the degree of concentration of those powers is likely to be. The econometric analysis confirms the descriptive trade-off between supervision unification and central bank involvement. The institutional factor matters.

Secondly, the choice of the degree of supervisory unification is influenced by the dimension of the economic systems. More specifically, the lower the overall economic size, the more likely it seems that the probability of consolidation will increase, confirming the hypothesis of policymakers conditioned by the "small country" situation[53]. We confirm the size effect, using the population variable instead of the gross domestic product variable (Table 13). The small country effect captures the fact that with relatively few people the expertise in financial supervision is likely to be in short supply, and then this expertise might be more effectively utilized if it is concentrated with a single financial agency. The economic size factor matters.

Thirdly, the legal factor matters. This law effect is puzzling. The law and finance literature claims the existence of a strong relationship between market oriented financial systems and the British law jurisdictions. Here, we do not find that financial supervision unification is directly correlated with a market-based regime, while a link exist with the Civil Law root, in particular with the German and Scandinavian legal systems. This suggests a sort of "legal neighbour" effect. In order to test further the robustness of the legal neighbour effect, we use another country law

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[53]It has been noted that the small country effect holds, notwithstanding we do not include in our sample the eight very small countries (see note 17) that introduce the unified financial authorities.

classification[54] , with different German and Scandinavian law jurisdictions[55] (Table 14). The legal effect still holds.

Finally, the choice of policymakers to establish the concentration of supervisory powers could be facilitated by an institutional environment characterized by good governance. The relationship between good governance and the supervision concentration process could be explained, if we suppose that a policymaker who cares about soundness and efficiency would prefer the single financial authority as the optimal one in the face of the blurring challenges.

6. Conclusions

The objective of this paper was to analyse the role of central bank institutional position in influencing the recent tendency to unify the powers of financial supervision, highlighting the robustness of the central bank fragmentation effect.

The results seem particularly interesting for future research developments. It will be important to go in depth in the analysis of the determinants of the central bank fragmentation effect. In this paper the central bank fragmentation effect is an independent variable in explaining the supervision unification level.

The next step forward will be to consider the degree of central bank involvement as a dependent variable, in order to identify consistent proxies of the potential different causes (blurring

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[54]Pistor (2000) instead of La Porta et al. (1998).
[55]In La Porta et al (1999) the German and Scandinavian jurisdictions are: Austria, Denmark, Finland, Germany, Iceland, Japan, Korea, Norway, and Sweden. For historical reasons Pistor (2000) also includes: Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic.

hazard effect, bureaucracy effect, reputation endowment effect) that could explain the decision of the policymaker to maintain or reform the supervision responsibility of the monetary authority[56].

Finally, from the theoretical point of view, the future effort will be to model the policymaker decision framework, in order to better highlight the features of the institutional and political process that leads a supervisory regime to assume given characteristics. Using the principal agent approach for addressing the architecture of financial supervision seems a very promising avenue.

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[56]Completely and satisfactorily identifying what the consistent proxies could be is not a simple problem: first because the policymaker preferences or beliefs on the pros and cons of reforming the central bank involvement in supervision are not easily captured in concrete indicators. Examples are the political perceptions of the blurring hazard risks, the central bank reputation endowment or the bureaucratic power. The point is that generally these kinds of variables are not available for a large cross countries sample. To do an example, the author looking for proxies for the central bank power, in order to capture the bureaucracy effect and/or the reputation endowment effect. Regarding the central bank power, a central bank independence index (Cukierman Index, sample = 56 countries) has been proved as proxy, but the variable was not significant. Furthermore the author proved also as a power proxy the central bank age (sample= 89 countries) but the variable was not significant. Finally the power of central banks could be measured in number of employees, relative to overall financial authorities' employees (sample= 42 countries), or to the financial industry size (sample= 44 countries), but again the variable was not significant. The tables are available on request.

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