Institutional structures of financial sector supervision, their drivers and emerging benchmark models

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INSTITUTIONAL STRUCTURES OF FINANCIAL SECTOR SUPERVISION, THEIR DRIVERS AND EMERGING BENCHMARK MODELS*

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Abstract

This paper studies the development of institutional structures for prudential and business conduct supervision of financial services over the past decade for 98 high and middle income countries. It identifies possible drivers of changes in these supervisory structures using a panel ordered probit analysis. The results show that (i) countries advancing to a higher stage of economic development tend to integrate their financial sector supervisory structure. Similarly, improvements in overall public governance drive countries to adopting more integrated supervisory arrangements. (ii) Greater independence of the central bank could entail less integration of prudential supervision, but not necessarily of business conduct. (iii) Small open economies opt for more integrated structures of financial sector supervision, especially on the prudential side. (iv) Financial deepening makes countries integrate supervision progressively more, however, greater development of the non-bank financial system including capital markets and the insurance industry makes countries opt for less integrated prudential supervision but not business conduct supervision structures. (v) The lobbying power of concentrated and highly profitable banking sectors acts as a significant negative force against business conduct integration. (vi) Countries with banking sectors that have been more exposed to aggregate liquidity risk, due to their high share of external funding, tend to integrate more their prudential supervision. Finally, (vii) a country that has experienced past financial crises is more likely to integrate its supervisory structure for financial services.

Keywords: Integrated Supervision, Prudential and Business Conduct Supervision, Financial Services, International Experience, Panel Data Analysis, Ordered Probit.

JEL Classification: G2, G18, E5,

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* The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

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1. Introduction

Why supervisory structures for the financial sector differ so much across United States, Germany, Japan and other developed countries concerning the degree of integration in microprudential supervision and its proximity to macroprudential supervision as well as the pursuit and modalities of business conduct supervision? What models have the emerging market economies and developing countries chosen to follow and why? And, is there a prevailing trend toward certain benchmark models that countries can follow going forward according to their financial system typology? Several potential drivers behind the choice of a supervisory structure for a particular country's financial system, such as the size, depth and complexity of the financial system, the size of financial subsectors and operation of financial groups in the country, financial sector lobbying power and other political economy factors, the overall quality and independence of public institutions, and experience of past financial crises, among others, come to mind. The importance of the drivers varies across developed countries, as do the tendencies of developing countries to follow the diverging examples of supervisory structures in more advanced, role model economies. 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 reforms. At the same time, the ongoing debates suggest a tendency towards the adoption of more unified and harmonized designs for the institutional structure of financial sector supervision, going forward.

The literature discusses extensively the different models for prudential supervision, the pros and cons of a unified supervisor, and the role of central bank in the supervision and eventual unification (Masciandaro and Quintyn, 2007; Di Giorgio and Di Noia, 2007; Herring and Carmassi, 2008). Several studies attempt to establish a relationship between the performance of supervisors and their degree of unification across financial sectors (Arnone and Gambini, 2006; and Cihak and Podpiera, 2006). Other studies analyze the relevance of country characteristics for the type of the chosen supervision structure (Shen, 2006, Masciandaro, 2006, 2007 and 2009). To our knowledge, all existing empirical studies are based on cross-sectional data sets, and thus analyze the supervisory frameworks at a certain point in time. In addition, the reviews of supervisory regimes and related empirical studies focus primarily on microprudential supervision. These studies pay only marginal attention to the proximity of microprudential and macroprudential supervision, and to business conduct supervision and its complementary function to prudential supervision.

This paper studies the historical development of prudential as well as business conduct supervisory structures for financial services over the past decade for 98 high and middle income countries, and identifies possible drivers of changes in the supervisory structures using an ordered probit panel analysis. It employs a new, unique dataset that enables to study changes and differences in supervisory structures over time as well as across

countries. The dimensions of the supervisory structures considered in this study include fragmentation versus integration of supervision across individual financial sub-sectors, placement of the integrated supervisor within a central bank or under a separate authority – and thus the proximity of microprudential and macroprudential supervision, and the separation between prudential supervision and business conduct supervision[1] in the context of the overall supervisory structure for financial services. Based on the results of the analysis, the paper contemplates possible benchmark models according to the country typology.

Possible determinants of supervisory structures considered in our study can be divided into four sets of indicators: (i) countries' general and economic development indicators; (ii) political and governance indicators, such as the quality of governance and the autonomy of the central bank; (iii) financial sector development indicators, such as the depth and complexity of the financial system, including banking sector characteristics such as concentration, efficiency, profitability, and liquidity, and (iv) the number of past financial crises experienced by a country. In addition to the baseline ordered probit, we employ the binomial probit and multinomial logit models, and the pooled regression analysis to ensure robustness of our baseline estimates. Building on the identified significant determinants of changes in supervisory structures over time and across countries, the paper draws preliminary conclusions about possible country benchmark models going forward. This forward-looking perspective is enabled by the time-series dimension of our panel dataset.

We find that, as countries advance to a higher stage of economic development, they tend to integrate more their financial sector supervisory structures. Also improvements in overall public governance drive countries to adopting more integrated supervisory arrangements. Greater independence of the central bank, which is often involved in supervision of banks, could entail less integration of prudential supervision, but not necessarily business conduct. In this regard, our results provide some qualifications to those obtained by Masciandaro (2006, 2007 and 2009). Further, small open economies tend to opt for more integrated structures for financial sector supervision, especially on the prudential side, although a progressively higher degree of openness could coincide with less integration of business conduct supervision. The experience of past crises gears the country choices toward more integrated supervisory structures. Increased financial deepening makes countries integrate supervision progressively more. In contrast, strong development of the non-bank financial sectors including capital markets and the insurance industry makes countries opt for a less integrated prudential supervision structure but not the business conduct supervision structure. The lobbying power of the banking sector, associated with more concentrated banking systems, characterized by higher monopolistic pricing powers and chronic inefficiencies, appears to act as a significant negative force against business conduct. Finally, countries with banking sectors that have been more exposed to aggregate

[1] The business conduct supervision here includes financial consumer protection and market integrity supervision, and we will use this term as an integrating concept for these slightly distinct areas throughout the paper.

liquidity risk, due to their high share of external funding, tend to integrate more their prudential supervision.

The rest of the paper is organized as follows. Section 2 describes the new panel data set and discusses the developments in prudential and business conduct supervision in our sample of 98 countries over the past decade. Section 3 describes the estimation methodology. Section 4 presents and discusses the empirical results. Section 5 concludes and presents some policy implications.

2. Panel Data

Our statistics to illustrate the changes from sectoral (institutional) to integrated (functional) supervisory structures, with an emphasis on the role of the central banks in the supervision, are based on a dataset of 98 countries during the period 1999-2010. Institutional regulations envisage different rules and different supervisors for each type of intermediary (banks, insurance or capital market)[2] while functional regulation model has common rules for similar financial activities regardless of which intermediary carries them out. We compile two datasets of financial sector supervisory structures, one for prudential supervision and the other for business conduct supervision, covering 98 countries over the 1999-2010 period. The review of supervisory regimes behind the constructed dataset is based on the 1999-2010 editions of "How countries supervise their banking, insurers and securities markets" and on-line official information from country authorities related to the supervisory institutions. Among the 98 countries, there are 40 high-income, 34 upper-middle income, and 24 lower-middle income economies. For illustrative purposes, we divide these countries into two subgroups according to their financial depth.

The two datasets on prudential and business conduct supervision consist of discrete variables, where the values of the variables represent a distinct type of a supervisory structure. The *prudential supervision dataset* distinguishes among the following structures:

1. Sectoral (institutional) supervision with the banking supervision in an agency other than the central bank;
2. Sectoral (institutional) supervision with the banking supervision in the central bank;
3. Partial integration, where two financial sectors are supervised by the same institution, either the central bank or an agency outside of the central bank;
4. Integration of the main financial subsectors' supervisions in a Financial Supervisory Authority (FSA)[3];
5. Integration of the main financial subsectors' supervisions into the central bank[4].

[2] We thus abstract from other possibly relevant subsectors that could have separate supervisors such as pension funds, non-bank credit institutions or other non-bank financial institutions.

[3] FSA also stands for Financial Supervision Authority, Financial Services Authority, or Financial Services Agency.

Compilation of the business conduct supervision dataset required a more judgmental approach. Although many countries have in place the legislative framework concerning transparency of operations and consumer protection, some of them lack the enforcement mechanism, especially in regards to financial consumer protection. Pursuing transparency and disclosure is on the agenda of many prudential supervisors. The Codes of Banking Practices often set the standards for financial consumer protection. However, the investigation, resolution, and arbitration of customer complaints (in particular banking customers) are pursued only in some countries. We include in the group of countries which pursue business conduct supervision, all those that have in place, in addition to directives on the pursuit of transparency and consumer protection, also an enforcement mechanism for financial consumer regulation and dispute resolution. When considering these criteria, we account for (i) countries that have specialized agencies looking after all aspects of the business conduct across financial subsectors (i.e. the "twin peak" model, or prudential supervisors that are assigned also business conduct supervision), as well as for (ii) countries where there are no institutions with statutory responsibility for overall business conduct supervision of the banking sector, but they have set important steps towards an adequate consumer protection in all financial subsectors and established institutions, such as a Financial Consumer Protection (FCP) Agency, Financial Ombudsman, or special departments for consumer finance within the Consumer Protection Agency.

Following the outlined approach, we classify the following *business conduct supervisory structures*:

1. No business conduct supervision – not all financial sectors have assigned business conduct supervision. Typically, the prudential supervisors of the insurance sector and capital markets are mandated to oversee business conduct in the respective sectors. Hence, in our data set, in most cases, no business conduct is assigned due to the lack of business conduct supervision for the banking sector.[5]
2. Separate institution(s) for financial consumer protection – this category comprises those countries in which there is no agency with statutory responsibility for business conduct supervision of the banking sector. However there exist institutions or specialized departments in the national consumer protection agency that oversee the protection of the financial consumers, including banking product consumers. Typically, these agencies look after the FCP in one or two financial subsectors. More specifically, this category includes those countries in which the prudential supervisors do not have statutory responsibility for FCP but there exist either a FCP Agency (e.g., Canada or Mexico), or specialized complaint boards within an economy-wide consumer agency (e.g., Denmark), or a Financial Ombudsman Bureau (e.g. Greece).

[4] The main financial subsectors that we consider are: the banking sector, the insurance sector and the capital markets sector.

[5] In this way, we stress the importance of business conduct in the banking sector, given the predominance of the banking sectors in the financial sectors of most countries.

3. Sectoral supervision – where each financial sector's prudential supervisor is assigned with the business conduct supervision in addition to the prudential supervision;
4. The business conduct supervision is assigned either to the central bank or to the FSA, which act as an integrated supervisor;
5. The "twin peak" model – where there exists an institution exclusively supervising business conduct in provision of all financial services.

Table A1 in the Appendix provides a detail summary of the regimes for prudential and business conduct supervisions as of end-2010 for each country in our sample. In addition, Figure A1 and Table A2 in Appendix illustrate the changes in prudential supervision structures during 1999-2010 and, Figure A2 and Table A3 in Appendix show the trends in business conduct supervision.

The first column of plots in Figure A1 depict the proportion of countries that had particular supervisory structures, i.e., institutional type of supervisory structures and functional type of supervision (partial integration, FSA integration and Central Bank integration) for each year during the 1999-2010, for all countries as well as separately for high financial depth and low financial depth economies. The second column of plots in Figure A1 add information about the changes in central banks' role in supervision, i.e., the proportion of countries with partial integration within and outside of the central bank, as well as the proportion of countries with an institutional prudential supervision, where banking supervision is within the central bank or in an agency outside the central bank, respectively.

During the past decade, there has been a certain tendency to unify the prudential supervision. The overall proportion of countries that preserved the traditional (conservative) model of institutional regulation decreased from 62 percent in 1999 to 44 percent in 2010 while the overall proportion of countries that adopted a FSA or integrated the supervision under the central bank increased substantially: from 11 percent in 1999 to 25 percent in 2010 for FSA, and from three percent in 1999 to 8 percent in 2010 for central bank integration. The proportion of countries that chose to integrate in a FSA outpaced those that integrated in the central bank, both in high and low financial depth economies.

The prevalence of central banks in the prudential banking supervision has diminished. Among economies with high financial depth, the central banks were responsible for banking supervision in 58 percent of countries in 2010, down from 66 percent in 1999, and in economies with a lower financial depth, it has decreased from 70 percent to 67 percent. However, the proportion of countries with partial integration in the central bank did not change significantly. At the same time, the proportion of countries with partial integration outside of the central bank decreased because some of them chose to unify all sectors' supervision in a FSA.

Tables A2 in Appendix, constructed as a transition matrix, provide more detailed information about the changes in the supervisory structures during 1999-2010. It reports the number of countries with specific prudential supervisory regimes at the beginning and at the end of the time span as well as the number of countries that changed from a specific regime to another regime. Column (1) reports the number of countries having a certain supervisory regime as of 1999 (e.g., in 1999, 48 economies had sectoral prudential supervision, with the banking supervision within the central bank, seven economies had sectoral prudential supervision, with the banking supervision in an agency outside the central bank, etc). The top of the columns (2) - (7) report the number of countries with particular supervisory regime as of 2010 (e.g., among all countries in the data set, in 2010, 36 had sectoral prudential supervision). Cells of the tables state the number of countries that transited from a specific supervisory regime to another (e.g., out of the 48 countries that in 1999 had a sectoral prudential supervision with the banking supervision within the central bank, 32 countries maintained this regime, one country adopted a sectoral regime, in which the banking supervision is outside of the central bank, three countries adopted a partial integration in the central bank, four countries adopted a partial integration outside the central bank – one of these countries changed further to another regime – three countries changed to an FSA, and five countries chose to integrated the prudential supervision in the central bank).

The decrease in the number of economies with institutional supervision and integrations in a FSA had the most occurrences among the changes in prudential supervision. The number of countries with a FSA as integrated supervisor increased from 10 in 1999 to 24 in 2010. These changes took place in equal number among economies with high and low financial depth. Overall, half of the economies that adopted a FSA during this period had initially a partial integration of prudential supervision outside of the central bank. The number of countries that chose to integrate the prudential supervision in the central bank increased from three in 1999 to eight in 2010. Four of these changes took place in economies with lower financial depth. Typically, central bank integration occurred in economies that had initially a sectoral supervision regime with the central bank overlooking the banking sector. The number of partial integrations outside of central banks decreased overall – as seven countries with this type of supervision chose to integrate in a FSA –, while the number of partial integrations within the central bank slightly increased due to three changes from sectoral supervision regime.

In terms of patterns observed in integrating into FSA or central bank, economies that had initially sectoral supervision with the banking supervision outside of the central bank and those with partial integration outside of the central bank typically tend to either maintain their supervisory regime or integrate in a FSA. Also, 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. Another pattern emerging from the transition matrix of integration, illustrated in Table A2, is that among the high-financial-

depth countries, the majority of changes towards integration occurred from an initial state of partial integration, while among countries with lower financial depth, the full integration took place mainly from the initial sectoral supervision.

Figure A2 in Appendix shows the proportion of countries that have: (i) some agency responsible for business conduct supervision in all financial subsector, (ii) an integrated agency to supervise the business conduct, and (iii) a "twin peak" supervisory structure. A breakdown by lower and higher financial depth is also provided. Table 3 illustrates the process of adopting supervision of the business conduct between 1999-2010, by providing information about the number of countries within each classification of business conduct supervision in 1999 and 2010 respectively, and the transitions among these classifications.

The raise in awareness of the importance of adequate business conduct in financial sectors is reflected in the increased proportion of countries that look after its enforcement; from 20 percent of the total pool of countries in 1999 to 50 percent in 2010. The percentage of countries supervising business conduct is higher among economies with high financial depth (63 percent versus 41 percent), however also the economies with lower financial depth have been adopting some form of business conduct supervision increasingly.

Table A3 in the Appendix shows that in 15 out of the 33 countries that adopted or integrated the business conduct supervision during 1999-2010, the change was introduced by an integration either in a FSA or central bank, or adoption of a "twin peak" model. The rest of countries introduced business conduct as part of prudential supervision or founded outside agencies to foster financial consumer protection. The twin peak type of supervision structures are still very limited, countries that adopted this model typically show the high financial depth economies.

3. Estimation Methodology

We are interested in estimating the main determinants of institutional structures for financial prudential supervision and business conduct supervision using a panel data covering 98 countries during 1999-2010. The aim is to explain the choice of a particular supervisory structure using a country's general, economic, political, and financial sector indicators, and find which of the indicators could be the most important. We use an ordered choice model for this purpose. The general ordered choice model, a latent variable regression, takes the following form:

$$y^* = x'\beta + \varepsilon \tag{1}$$

where y^* is the unobserved variable, x is a vector of explanatory variables, ε is the random disturbance normally distributed across observations, with mean and variance normalized to

one and zero, respectively[6], and β is a vector of parameters to be estimated. What is observed is the dependent variable y that takes the values: $y = 0$ if $y^* \leq 0$; : $y = 1$ if $0 < y^* \leq \mu_1$; $y = 2$ if $\mu_1 < y^* \leq \mu_2$; ... $y = J$ if $\mu_{J-1} < y^*$ (Green, 2003). The estimation method is maximum likelihood.

The choice of a particular supervisory structure thus represents the dependent variable in the model. The supervisory structures are ordered based on the degree of integration. In addition, for prudential supervision, we focus also on the proximity to the central bank (the macroprudential supervisor). [7] The partial integration regimes, in which two financial sectors are supervised by a single agency, were classified as sectoral supervision. This was mainly for the reason that the data could not identify a strong cutoff point between these two regimes in the initial regression analysis. The observed prudential supervisory structures are thus classified into the following categories:

1. Sectoral supervision, with the banking sector supervised by an agency outside of the central bank;
2. Sectoral supervision, with the central bank overseeing the banking sector;
3. Unified supervision in a FSA; and
4. Unified supervision in the central bank.

For the business conduct supervision, the ordering respects the degree of integration and the dominating mandate of business conduct supervision in the integrated institution:

1. No business conduct;
2. An agency for financial consumer protection exists but there is not an integrated business conduct supervisor and prudential supervisors have no responsibility for business conduct;
3. Sectoral business conduct;
4. FSA or central bank as integrated supervisors are also assigned the task of business conduct supervision;
5. "Twin peak" model, i.e., there is a unified authority with a single mandate for business conduct supervision.

We thus order the twin peak structure as the highest given the single mandate assigned to the integrated business conduct supervisor within this structure.

There are four groups of explanatory variables: country general and economic development indicators, political economy indicators, financial sector development indicators, and financial crises experience. The general country characteristics include the population count, GDP per capita, and the degree of openness (total trade as a percentage of GDP). To characterize a country's political environment that is relevant to our investigation, we focus

[6] The normal and logistic distributions generally give similar results in practice (Green, 2003).
[7] In the case of classical sectoral models, we distinguished among the banking supervision in the central bank and banking supervision in a different agency than the central bank.

on the quality of governance and the independence of the central bank. The quality of governance is based on the average of the six governance indicators[8] constructed by Kaufmann et al. (2010). For the central bank independence indicator, we use the central bank autonomy (CBA) index estimated in Arnone et al. (2007), which assesses the CBA at the end of 2003.

The financial sector development indicators that we consider comprise private credit as a percentage of GDP, stock market capitalization as a percentage of GDP, the number of listed companies, and the non-life insurance premium as a percentage of GDP. Further, to characterize specifically a country's banking sector, we focus on banking concentration, efficiency, profitability, liquidity, and performance. The banking concentration is measured by the share of the three largest banks in total banking sector assets. The efficiency is approximated by the cost-to-income ratio. Countries' average net interest margin and the proportion of the non interest income in total income describe banking sector profitability. The liquidity indicator is measured by the ratio of liquid assets over deposits and short-term funding, and the ratio of private credit over deposits. Additional financial soundness indicators for banks that we consider include the non-performing loans ratio (NPL), capital adequacy ratio (CAR), and capital to assets ratio.

Finally, we consider the effect of past financial crises on the choice to integrate. Carmichael et al. (2004) note that in some Nordic or Asian countries the creation of integrated supervisors was prompted by a recent financial sector crisis. On the other hand, Cihak and Podpiera (2006), based on the visual inspection of a cross-section of countries as of 2004, claim that this relationship is far from straightforward. We aim to capture the effect of past financial crises by their cumulative count as of 1996.[9] The cumulative number of financial crises was constructed based on Laeven and Valencia's (2008) financial crisis episodes database, covering the period 1970-2007. The database was updated using the same criteria for the period 2008-2010. Table A4 in the Appendix lists data sources for all explanatory variables employed in our regression analysis.

Formally, the estimated panel regression is specified as:

[8] The six governance indicators are the following: voice and accountability, political stability no violence, government effectiveness, regulatory quality, rule of law, and control of corruption.

[9] We consider also other statistics related to financial crisis experience, namely, zero-one variable indicating simply whether a country has experienced a crisis or not, a measure of whether country experienced a single or repeated crises in last 15 years, and the time from the last crisis (in years). Only the cumulative number of crises was kept in the baseline regression for its best performance and behavior in the regression.

$$SupervisoryStructure_{it} = Population_{it-1} + GDPperCapita_{it-1} + Trade_{it-1} + Governance_{it-1} + CentralBankAutonomy_{i} + (PrivateCredit/GDP)_{it-1} + MarketCapitalization_{it-1} + + (NonLifeInsurance/GDP)_{t-1} + ListedCompanies_{it-1} + FinancialCrises_{it-1} + BankingConcentration_{it-1} + (Cost/Income)_{it-1} + NetInterestMargin_{it-1} + + (NonInterestIncome/TotalIncome)_{it-1} + (PrivatCredit/Deposits)_{it-1} + + (LiquidAssets/Funding)_{it-1} + NPLR_{it-1} + CAR_{it-1} + (Capital/Assets)_{it-1} + \varepsilon_{it} \quad (2)$$

All variables in equation (2) are lagged by one period in order to avoid possible endogeneity problems, except for the "central bank autonomy" (which is a constant for each country).

4. Estimation Results

Tables 1 and 2 present regression results for specifications, in which the dependent variables are ordered prudential supervision structures and business conduct supervision structures, respectively. The tables present estimation results for each selected subgroup of explanatory variables (columns 1-10), as well as for all explanatory variables (column 11). Column (12) presents results of the parsimonious regressions based on adjusted R-squared maximization. Results for the full specification, presented in column (11), do not account for the effect of bank soundness indicators (NPL, CAR, and the capital to assets ratio), because data for these variables are available only as of 2003. The results are therefore only presented for the subgroup of the financial soundness indicators. As a robustness check for the main regression results, Table 3 reports additional estimation results using alternative model specification and estimation approaches. Namely, the robustness is tested by fitting to the data the pooled ordered probit model, binary choice panel data model, and multinomial panel data model.

4.1. Prudential Supervision

Table 1 shows the country characteristics that influence the likelihood of integration in prudential supervision: the country size, openness, the level of development, the overall quality of governance, the extent of central bank's autonomy, financial sector development indicators, and the number of past financial crises. Based on the estimates, there is a higher probability of integrating prudential supervision in small economies. The population size has a negative and significant coefficient both when considered in a subgroup regression as well as in the full specification. Typically, a small economy has a small financial sector; hence an integration of the supervisory institutions assigned to the financial subsectors could be more feasible and practical than in the case of an economy with a large financial sector with prominent subsectors. Furthermore, in small economies with relatively small financial sectors, the integration is likely to enhance cost efficiency, especially through supervisory staff reduction, and economizing on the fixed investments (IT infrastructure and systems, training

facilities, etc) that can be consolidated in the case of unified prudential supervision (Erbenova, 2006).

[Table 1 about here]

The degree of a country's openness and its level of development (GDP per capita) positively influence the likelihood of prudential supervision's integration. More developed countries could easier mobilize resources necessary for developing and implementing the strategy for transition from less to more integrated supervisory structure. Also, banking systems of more developed countries are relatively more sophisticated and characterized by the presence of financial conglomerates. Thus, the integration of prudential supervision of main financial subsectors could increase the effectiveness of prudential supervision. Further, a country's openness is positively related to the probability of integrating prudential supervision, as increased capital flows in and out of the country need a holistic monitoring and managing of exposures to capital flow reversals.

Regarding political economy variables, both governance and central bank autonomy play an important role. The quality of governance stays significant in all specifications, underlying the importance of good governance for the decision to integrate (as found also in Masciandaro, 2006 and 2007). The significant and negative coefficient estimate for central bank's autonomy suggests that integration of prudential supervision is a less preferred outcome from the point of view of an independent central bank. This could be because the integration of prudential supervision in the central bank brings about additional responsibilities for the central bank.[10] One may also argue that the integration process itself could jeopardize the previously established independence of the central bank's monetary policy.

Although the evidence from the subgroup regressions shows that several financial development indicators are significant, in the full specification, only the coefficient of stock market capitalization comes out significant. In the subgroup regressions, the credit to GDP ratio impacts positively the probability of integration, while the variables representing the other financial sectors (non-life premium, and stock market capitalization) have negative impacts. A large banking sector is more likely to be interconnected with other financial subsectors. Hence there is a synergy effect that a unified supervision can induce (see De Luna Martinez and Rose, 2003; Cihak and Podpiera, 2006; Herring and Carmassi, 2008). However, if the non-banking financial subsectors are relatively large, a sectoral supervision might be more appropriate as the drawbacks coming from an oversized institution conducting prudential supervision might be higher than the synergetic benefits of integration (see also

[10] Highly autonomous central banks might have preferred to keep their strong independence that primarily came from the mandate of monetary policy implementation. Nevertheless, recent events have shown that integration of prudential outside the central bank (in a FSA) could prohibit the synergies between the conduct of monetary policy and banking supervision.

Cihak and Podpiera, 2006; Herring and Carmassi, 2006). In the full specification, only the coefficient on the stock market capitalization turns out significant, revealing a negative impact of the size of securities market on the probability of integration.[11]

Among the banking sector characteristics, the aggregate liquidity risk exposure (private credit to deposit ratio) appears the most important indicator influencing the likelihood of a change toward integrated prudential supervision as it remains significant in the full specification. The estimated positive effect suggests that an increased exposure to aggregate liquidity risk has prompted changes towards unified prudential supervision in the past. The results from subgroup regressions reveal also a negative significant coefficient on the net interest margin, a proxy for banking sector profitability that could be related to the influence of the banking sector lobby on prudential integration. Namely, the higher the banking sector profitability, the higher is its preference for status quo in prudential supervision, and hence the lower is the probability of integrating prudential supervision.

The cumulative number of financial crises, which a country has experienced, has clearly brought about an increase in the incentives to integrate prudential supervision. This is consistent with the hypothesis that an integrated supervisor, which provides for the close proximity of micro- and macro-prudential supervision, is better prepared to prevent or cope with episodes of system-wide financial distress than sectoral supervisors.

4.2. Business Conduct Supervision

The estimation results in Table 2 reveal which of the considered variables could significantly affect the probability that a country established and integrated business conduct supervision: the income level, degree of openness, financial depth, banking sector concentration, aggregate liquidity exposure (the share of foreign financing), and the number of past financial crises. The income level is a robust explanatory variable, maintaining sign and significance in all regressions. The results thus suggest that as countries develop, more integration of business conduct supervision is desired to presumably ensure holistic and consistent oversight of business conduct in the provision of financial services. The degree of openness is significant in the regression but with a negative sign, suggesting a higher probability of existence and greater integration of business conduct supervision in relatively less open economies. Open economies are subject to high capital inflows and prudential supervisors in conjunction with monetary policy have to be extra vigilant in preventing and managing the volumes and allocation of capital inflows. In the past, this may have directed the open economies' focus to further optimizing of their prudential supervision structure at the expense of the business conduct supervision.

[Table 2 about here]

[11] The loss of significance of the other financial depth variables is probably due to the presence of colinearity as the credit to GDP ratio and the GDP per capita are positively correlated (see the correlation matrix in Appendix).

As for the political characteristics, the quality of a country's governance is an important factor for business conduct integration in the subset regression, but it loses its significance in the full regression, likely due to the significant correlation between the governance and income. The Central Bank Autonomy Index is not significant both in the subset regression and in the parsimonious regression. However when disentangling central bank's political[12] and economic autonomy[13] (column (4)), it appears that the economic independence is inversely related to the degree of integration in business conduct supervision while higher political autonomy is positively associated with it. These two countering effects then cancel out in the aggregated index.

Concerning the financial development indicators, financial deepening (private credit to GDP) is the only variable staying significant and positive in all regressions. The greater the financial inclusion of household and firms in credit provision, the higher is the probability that the country will establish and integrate its business conduct supervision. We can conjecture that a greater development of the banking sector (higher credit to GDP) increases inter-linkages with other financial subsectors, and leads to emergence of financial conglomerates. This could then prompt the decision to integrate business conduct supervision to a greater degree to eliminate possible loopholes in fragmented sectoral supervision.

Banking sector characteristics, such as net interest margins and concentration have persistently significant negative effects on integration of business conduct supervision. The negative effect of net interest margins could stem from the negative influence of greater market monopolistic power, which allows for sustained high profit margins, on the business conduct supervision. Similarly, highly concentrated banking sectors typically show greater lobbying power that could be put to work against the introduction of and a more holistic approach to business conduct supervision. In addition, several other characteristics of the banking sector appear significant in the subset regression but lose their significance in the full regression, likely due to present colinearities. Moreover, the number of financial crises experienced in the recent past positively influenced the choice to implement and integrate business conduct supervision.

4.3. Robustness analysis

We employ different model structures and estimation methods to test the robustness of our baseline estimation results. Namely, we use the ordered probit pooled regression estimation

[12] Political autonomy is defined as the ability of a central bank to select the final objectives of monetary policy. The defining criteria refer to the way the central bank governor and board of directors are appointed, to the government involvement in the monetary policy formulation and whether the monetary policy is one of the primary objectives.

[13] Economic autonomy corresponds with the central bank's operational autonomy, especially in regards to government lending. In addition, another criterion defining this autonomy is that the central bank has no responsibility for overseeing the banking sector or shares responsibilities.

method, the binary choice model, and the multinomial model to test the impact of the chosen functional form, and the classification and ordering of the dependent variables. Table 3 reports the results of these robustness tests.

Overall, the pooled regressions results support the main panel results. Specifically, the effects of income, openness, population, good governance, central bank autonomy, the number of past crises, and banking concentration, liquidity, and profitability from the baseline estimations hold. The only puzzling estimation result relates to the effect of financial depth. The coefficient of the credit to GDP ratio turns out significant and negative for prudential supervision estimation. Nevertheless, for the same regressions, the coefficient of stock market capitalization and non-life insurance as percentage of GDP are negative and significant, as in the ordered probit regressions. Hence, the interpretation that greater development of financial subsectors other than the banking one, encourages countries to opt for more sectoral rather than integrated supervision, still holds.

The binary choice regressions test the effect of the explanatory variables on less granular classification of the supervisory structures that distinguishes only among unified and non-unified supervision. For prudential supervision, the unified structure includes FSA and unified supervision in the central bank. For business conduct supervision, the unified structure includes those FSA or central banks with statutory responsibilities for business conduct supervision and the twin peak supervisory model. Regarding the prudential supervision regression, the effects of income, stock market capitalization, and banking liquidity hold, and appear crucial for the decision to integrate prudential supervision. It seems that the other significant explanatory variables in the ordered regressions (population, trade, good governance, central bank autonomy, number of cumulative crises) could be more important for describing the type of supervisory structures. In addition, the binary choice regression for the prudential supervision reveals other significant explanatory variables behind the decision to integrate prudential supervision. These are the concentration, the proxy for efficiency (cost to income ratio), and the ratio of non-interest income to total income of the banking sector. All of these variables, which can be related to the lobbing power of the banking sector, are significant and negative. The banking sector lobbying power appears to act as a negative force against the integration of prudential supervision. This is presumably to preserve capital and other profit-driven arbitrage opportunities across financial subsectors and within financial groups. The results of the business conduct binary choice regression support the estimated effects of income, the number of past crises, the stock market capitalization, and concentration from the ordered probit regression. Further, the binary choice regression indicates that the remaining significant variables from the ordered regression (trade and net interest margin) have more relevance for explaining the particular type of business conduct supervision rather than its overall integration.

We also employ the multinomial logit model to test the effect of explanatory variables on the ratio of the probability of choosing one supervisory category over the

probability of choosing a reference supervisory category (this is the first category in our ranking[14]). For the dependent variable characterizing prudential supervision structures, all three sets of results – corresponding to the three ratios of probabilities[15] – are generally supportive of the baseline results. An increase in the income level, the credit to GDP ratio and the private credit to deposit ratio seem to characterize environments in which countries opt for relatively more integrated supervisory structures. The population, CBA index, and the ratio of non-life insurance premium over GDP affect negatively this preference. For other variables, the coefficients turn out significant only when explaining some of the probability ratios. The openness impacts positively only the preference towards unified structures (FSA or central bank unification). In the same manner, the positive effect of the number of past crises and the negative effect of the stock market capitalization appear to influence only the preference toward the central bank unification.

Albeit backing the baseline results in general, the results of the multinomial regressions for business conduct supervision are less uniform across the three reported probability ratios, compared to those for prudential supervision.[16] At the same time, they are conveying interesting information as to which probability ratio is influenced by the changes in explanatory variables, given that the reference supervisory structure is "no business conduct supervision". The effects of the income level, CBA index, and credit over GDP ratio hold for all three probability ratios. Openness negatively influences only probability ratios pertaining to the change from no business conduct to sectoral business conduct and partial business conduct with certain degree of consumer finance protection, but not the change to the unified business conduct supervision. The cumulative number of past crises positively impacts only the probability ratios related to the partial and to the unified business conduct supervision. The banking concentration, on the other hand, affects negatively the latter two probability ratios. The profitability indicators affect negatively the probability ratio of a change to the partial business conduct supervision structure with an enforcement of financial consumer protection.

5. Actual and Model Predicted Supervisory Structures

In this section, we benchmark the existing supervisory structures of the individual countries in our sample against the model predicted degree of integration concerning prudential and business conduct. This is to illustrate whether a country's supervisory structure followed the prevailing global trends based on its typology, and to identify out- and under-performers in

[14] For prudential supervision the first category is "sectoral supervision, with the banking sector supervised by an agency outside of the central bank". For the business conduct the first category is "no business conduct".

[15] 1. Probability of choosing category 2 / Probability of choosing category 1; 2. Probability of choosing category 3 / Probability of choosing category 1; 3. Probability of choosing category 4 / Probability of choosing category 1.

[16] There are three sets of results (corresponding to three probability ratio) because we had to merge the last two ranked supervisory structures: (i) unified in FSA or central bank and (ii) the "twin peaks model" to be able to run the regressions successfully in terms of clear identification from data and satisfactory diagnostics.

this respect. Although each country and its financial system is unique, the combination of indicators used in our study should be able, to a reasonable extent, to capture the country specifics for the purpose of this benchmarking exercise.

5.1. Prudential Supervision

Using the parsimonious estimates of the ordered probit model reported in Table 1 (Column 12), we derive the model's predicted degree of integration for prudential supervisory structure for each country and compare it with the actual degree of integration (ranked 1-4, see Section 4), constructed as the average over 2008-2010. The result of such a comparison is depicted in Figure 1 along with the regression line showing under-performers in the north-west corner and over-performers in the south-east corner.

[Figure 1 about here]

Figure 1 shows that a number of countries under-perform in terms of integration of their prudential supervision predicted by our model which is based on historical cross-country experience. In particular, the notable under-performers are Luxemburg, Panama, Costa Rica, Canada, and Chile, countries that are expected to have implemented prudential supervisory structures characterized by greater integration given the experience of their peers. On the other hand, there are several over-performers including Armenia, Czech Republic, Uruguay, Netherlands, Slovakia and Poland that integrated their prudential supervisory structures more than predicted by their country and financial system characteristics.[17]

5.2. Business Conduct Supervision

Again, using the estimates of our model reported in Table 2 we compare the model's predicted values with the actual values (average over 2008-2010). The result of this comparison is shown in Figure 3 along with the regression line showing under-performers in the north-west corner and over-performers in the south-east corner.

[Figure 2 about here]

Figure 2 implies that the most notable underperformers in terms of implementation and integration of business conduct supervision, including mechanisms for its enforcement, could be the USA, Austria, Cyprus, and New Zealand. In contrast, there are no notable over-performers pointing to the fact that implementation of holistic business conduct supervision and consumer finance protection is relatively new area in focus of the policymakers.

[17] For some of the countries in the over-performing category, a "fashion effect" maybe at work. The literature (see Masciandaro, 2008) refers to the *fashion effect* (or bandwagon effect) if reformers were inspired by the type of changes in governance arrangements introduced by earlier reformers rather than the effectiveness of an integrated supervisory structure based on their economic system and financial sector characteristics.

Nevertheless, some slight outperformers are pointed out by our model, and these include Singapore, Czech Republic, Hungary, Poland, Uruguay, Kazakhstan, and Malta. The latter countries shown greater tendency to address business conduct supervision and consumer finance protection in more holistic way then their experience, and country and financial sector characteristics would suggest.

6. Conclusion

This paper studies a new dataset on the prudential and business conduct supervisory structures and their evolution over 1999-2010 for a panel of 98 countries. We show that the number of integrations of prudential supervision in a FSA outpaced those in a central bank: there were 14 new unifications of prudential supervision in a FSA and five unifications in a central bank since 1999. As for unification patterns, we found that countries that have originally sectoral supervision with the banking supervision outside of the central bank, and countries originally with partial integration outside of the central bank, typically tend to either maintain their prudential supervisory structure or integrate it in a FSA. Countries in which the central supervises the banking sector show a higher probability to integrate under the central bank than under a FSA.

As regards the business conduct supervision, we observed an important increase in the proportion of countries that introduced its enforcement over 1999-2010. Almost fifty percent of the countries that did not have business conduct supervision in 1999, have adopted it during the past decade. In half of the cases, the change was accomplished by integration either in a FSA or central bank, or by adoption of the "twin peak" model. The rest of countries introduced business conduct supervision within the mandate of sectoral supervisors or founded a separate agency to foster financial consumer protection.

We analyzed our panel dataset on supervisory structures using ordered probit regressions to identify possible drivers behind the integration of prudential and business conduct supervisory structures. We found that a country's level of development positively influences the probability of integrating both prudential and business conduct supervision. The size of a country and its degree of openness are important for the integration of supervision, albeit in a different manner. Regarding the prudential supervision integration, small open economies are more likely to integrate their prudential supervisory structures. Integration of business conduct supervision does not seem to be influenced by the size of a country, and trade openness shows a negative impact on such integration. Good governance and central bank's autonomy are important drives of prudential supervision integration. For business conduct supervision, these variables loose significance once the level of development is controlled for.

Financial deepening is an important determinant for integrating financial services supervision. The size of the banking sector influences positively the integration of both prudential and business conduct structures. However, development of financial subsectors, other than the banking one, affects negatively the tendency to integrate prudential supervision. In other words, the larger and more developed the non-banking financial sectors, the less beneficial or more difficult it is to introduce supervisory integration. Concerning banking sector characteristics, past high aggregate liquidity exposures seem to increase the likelihood that a county will implement integrated prudential supervision. For business conduct supervision, the lobbying power of the banking sector, approximated by banking sector concentration and profitability, negatively affects the probability of greater integration it. Finally, the number of past financial crises strongly increases the probability that a county will opt for integration of both prudential and business conduct supervisory structures. There seems to be a perception that supervisors are more equipped to effectively deal with episodes of systemic financial distress under integrated supervisory structures.

Using the model predicted degree of supervisory integration against the actual supervisory structure in individual countries we identified under-performers in prudential supervision integration, as Luxemburg, Panama, Costa Rica, Canada, and Chile, and the over-performers to include Armenia, Czech Republic, Uruguay, Netherlands, Slovakia and Poland. The identified under-performers in business conduct supervision introduction and integration are the USA, Austria, Cyprus, and New Zealand, and the outperformers include Singapore, Czech Republic, Hungary, Poland, Uruguay, Kazakhstan, and Malta.

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Main text tables and figures

Table 1. Determinants of prudential supervision

Explanatory vbs:	**Dependent variable: Prudential Supervision**											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L1. GDP per capita at constant 2000 prices	0.014*** (0.0038)										0.0595*** (0.0092)	0.0545*** (0.00927)
L1. Population		-0.0036*** (0.00031)									-0.0021*** (0.00036)	-0.0019*** (0.000288)
L1. Trade to GDP		0.00643*** (0.00115)									0.0104*** (0.00153)	0.00965*** (0.00136)
L1. Governance			0.0399*** (0.00268)								0.0150** (0.00587)	0.0096* (0.0054)
L1. Central Bank Autonomy index			-0.831** (0.381)								-3.861*** (0.425)	-3.978*** (0.418)
L1. Central Bank Autonomy index_political				0.133 (0.145)								
L1. Central Bank Autonomy index_economic				0.271 (0.297)								
L1. Crisis cumulative					1.653*** (0.152)						0.673*** (0.144)	0.652*** (0.134)
L1. Credit to GDP ratio						0.00368** (0.00145)					-0.0017 (0.0023)	
L1. Non life premium						-0.280*** (0.0889)					-0.188 (0.119)	
L1. Stock market capitalization						-0.005*** (0.0012)					-0.0088*** (0.00133)	-0.0091*** (0.0012)
L1. Number of listed companies						-0.0071 (0.0052)					0.00409 (0.00683)	
L1. Concentration							0.00202 (0.00232)				0.00126 (0.00400)	
L1. Cost to income ratio							0.000345 (0.00263)				-0.00301 (0.00395)	
L1. Net interest margin								-0.0320* (0.0176)			0.0424 (0.0363)	
L1. Non interest income								-0.00343 (0.00314)			-0.00335 (0.00489)	
L1. Private credit to deposit ratio									0.00239* (0.0014)		0.0102*** (0.00217)	0.00981*** (0.00195)
L1. Liquid assets to funding ratio									0.00144 (0.00243)		-0.00336 (0.00364)	
L1. Non perf. loans ratio										-0.0065 (0.0137)		
L1. CAR										0.0129 (0.0219)		

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; L1 stands for variable's first lag.

Table 2. Determinants of the business conduct supervision

Explanatory vbs:	**Dependent variable: Business Conduct Supervision**											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L1. GDP per capita at constant 2000 prices	0.0942*** (0.0061)										0.056*** (0.009)	0.074*** (0.009)
L1. Population		-0.0005 (0.0003)									0.0015*** (0.0005)	3.07e-07 (0.00057)
L1. Trade to GDP ratio		-0.005*** (0.001)									-0.0057*** (0.0014)	-0.0073*** (0.0013)
L1. Governance			0.023*** (0.0028)								0.0045 (0.0057)	
L1. Central Bank Autonomy index			0.112 (0.3)								-2.027*** (0.423)	-0.302 (0.383)
L1. Central Bank Autonomy index_political				5.216*** (0.351)								
L1. Central Bank Autonomy index_economic				-0.697* (0.403)								
L1. Crisis cumulative					0.735*** (0.138)						0.996*** (0.175)	0.272* (0.149)
L1. Credit to GDP ratio						0.0116*** (0.00164)					0.0083*** (0.0026)	0.00594*** (0.0018)
L1. Non life premium						0.0410 (0.0949)					0.04 (0.128)	
L1. Stock market capitalization						-0.0012 (0.0013)					0.00247* (0.0013)	0.0007 (0.0013)
L1. Number of listed companies						-0.0049 (0.00546)					-0.0224** (0.00935)	-0.0117 (0.0096)
L1. Concentration							-0.01*** (0.003)				-0.0082** (0.00385)	-0.0069* (0.0039)
L1. Cost to income ratio							0.005 (0.0047)				0.00401 (0.00495)	
L1. Net interest margin								-0.121*** (0.0229)			-0.122*** (0.0354)	-0.094*** (0.033)
L1. Non interest income								0.0122** (0.00502)			-0.006 (0.006	
L1. Private credit to deposit ratio									0.0201*** (0.00210)		0.0004 (0.0027)	
L1. Liquid assets to funding ratio									0.0142*** (0.00342)		0.0037 (0.0044)	
L1. Non perf. loans ratio										-0.0163 (0.0164)		
L1. CAR										-0.0157 (0.0302)		
L1.Capital over assets										-0.0260 (0.0336)		

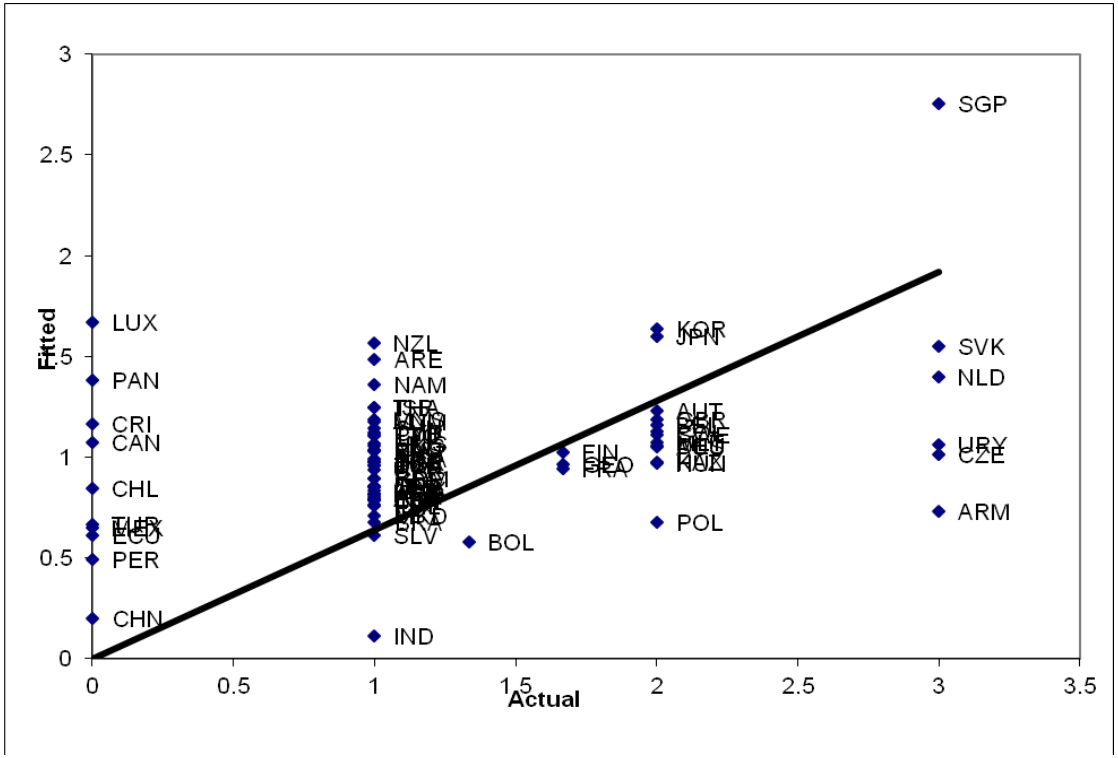
Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; L1 stands for variable's first lag.

Table 3. Robustness analysis

	Ordered probit pooled regression		Binary choice panel regression		Multinomial logit panel regressions					
					Prudential Supervision			Business Conduct Supervision		
Explanatory variables:	Prudential Supervision	Business Conduct Supervision	Prudential Supervision	Business Conduct Supervision	Prob 2 / Prob 1‡	Prob 3 / Prob 1‡	Prob 4 / Prob 1‡	Prob 2 / Prob 1‡	Prob 3 / Prob 1‡	Prob 4 / Prob 1‡
L1. GDP per capita at 2000 prices	0.0194***	0.0228***	0.330***	0.307***	1.021***	1.207***	1.228***	0.147**	0.221***	0.210***
	(0.00622)	(0.00656)	(0.0770)	(0.0636)	(0.302)	(0.303)	(0.304)	(0.0588)	(0.0495)	(0.0473)
L1. Population	-0.00092***	-0.00048	-0.0141	-0.00204	-0.033***	-0.059***	-0.059***	-0.0171***	-0.0023	-0.010***
	(0.00027)	(0.00035)	(0.0265)	(0.00605)	(0.008)	(0.01)	(0.021)	(0.0061)	(0.0018)	(0.0034)
L1. Trade to	0.00351***	-0.00113	0.011	0.0151	0.0265	0.0342**	0.0564***	-0.0620***	-0.0292***	-0.00922
	(0.00085)	(0.000864)	(0.008)	(0.0109)	(0.0173)	(0.0173)	(0.0181)	(0.0102)	(0.00695)	(0.00678)
L1. Governance	0.0146***	0.0212***	0.0110	0.0188	-0.688***	-0.653***	-0.536***	-0.0217	-0.0962***	-0.0336
	(0.0035)	(0.00410)	(0.0281)	(0.0402)	(0.176)	(0.176)	(0.179)	(0.0244)	(0.0228)	(0.0232)
L1. CBA Index	-1.368***	-0.502*	1.241	-2.336	-54.43***	-52.45***	-56.93***	-8.319***	-4.773***	-7.661***
	(0.260)	(0.287)	(3.100)	(3.938)	(13.63)	(13.65)	(13.72)	(1.850)	(1.808)	(1.736)
L1. Crisis cumulative	0.586***	0.411***	1.479	1.959**	-0.618	0.875	3.088*	-2.248**	1.836***	2.976***
	(0.0980)	(0.111)	(1.076)	(0.958)	(1.752)	(1.758)	(1.865)	(0.969)	(0.597)	(0.591)
L1. Credit to GDP ratio	-0.0059***	0.00019	-0.0134	0.0295**	0.0975***	0.0905***	0.0953***	0.0810***	0.0667***	0.0567***
	(0.00148)	(0.00154)	(0.0124)	(0.0129)	(0.0338)	(0.0339)	(0.0353)	(0.0145)	(0.0110)	(0.0105)
L1. Non life premium	-0.219***	-0.143*	-0.115	-0.564	-4.799**	-5.176**	-7.824***	-2.333***	0.575	0.295
	(0.0771)	(0.086)	(0.623)	(0.585)	(2.298)	(2.300)	(2.411)	(0.898)	(0.680)	(0.652)
L1. Stock market capitalization	-0.0052***	0.00137	-0.0155***	-0.0236*	-0.00314	-0.0180	-0.0309**	0.0444***	0.0441***	0.0194**
	(0.0009)	(0.00091)	(0.00559)	(0.0137)	(0.0129)	(0.0130)	(0.0149)	(0.0087)	(0.0076)	(0.0077)
L1. Number of listed companies	0.0220***	0.000167	-0.109	-0.0439	0.0422	0.0926	-0.235	0.127***	-0.0423	0.121***
	(0.00463)	(0.00529)	(0.117)	(0.0769)	(0.121)	(0.122)	(0.209)	(0.0355)	(0.0361)	(0.0329)
L1. Concentration	0.00735***	-0.00571**	-0.0357**	-0.0516**	0.268***	0.240***	0.193***	0.0211	-0.0732***	-0.055***
	(0.00246)	(0.00277)	(0.0159)	(0.0206)	(0.0661)	(0.0664)	(0.0680)	(0.0178)	(0.0176)	(0.0174)
L1. Cost to income ratio	-0.00960***	-0.00260	-0.0306**	-0.00177	0.00882	0.0118	0.0162	0.0319	-0.0226	0.0117
	(0.00292)	(0.00327)	(0.0149)	(0.0156)	(0.0225)	(0.0217)	(0.0258)	(0.0253)	(0.0190)	(0.0163)
L1. Net interest margin	-0.0922***	0.0127	-0.122	-0.195	-0.701	-0.610	-0.0681	0.0880	-0.190**	-0.0715
	(0.0223)	(0.0252)	(0.129)	(0.206)	(0.488)	(0.494)	(0.506)	(0.129)	(0.0919)	(0.0941)
L1. Non interest income	-0.000922	-0.00239	-0.0326**	-0.0307	-0.0668	-0.0301	-0.0554	0.0395	-0.00375	0.0139
	(0.00338)	(0.00392)	(0.0164)	(0.0223)	(0.0485)	(0.0489)	(0.0529)	(0.0250)	(0.0208)	(0.0202)
L1. Private credit to deposit ratio	0.00938***	0.00507***	0.0217***	0.0124	0.0665***	0.0881***	0.0869***	-0.0665***	0.000418	0.0206**
	(0.00146)	(0.00162)	(0.00822)	(0.00960)	(0.0236)	(0.0239)	(0.0255)	(0.0156)	(0.00884)	(0.00902)
L1. Liquid assets to funding ratio	0.00940***	0.00130	-0.00520	-0.00824	0.0262	-0.00883	0.0418	0.0440**	0.0445**	0.0423**
	(0.00255)	(0.00297)	(0.0138)	(0.0162)	(0.0240)	(0.0244)	(0.0285)	(0.0186)	(0.0179)	(0.0172)

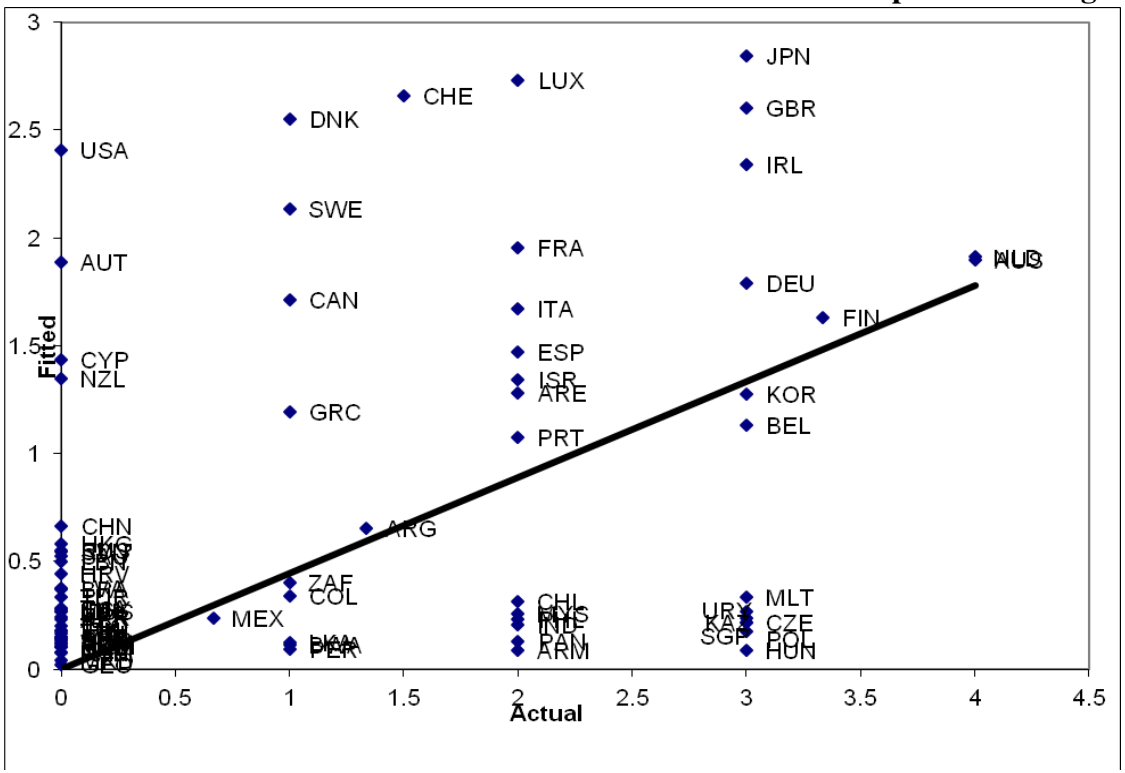
Note: ‡ probability of choosing one supervisory category over the probability of choosing the first ranked supervisory category; Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Figure 1: Actual and Model Predicted Values of Prudential Supervision Integration



Source: Authors‘ Calculation

Figure 2: Actual and Model Predicted Values of Business Conduct Supervision Integration



Source: Authors‘ Calculation

Appendix

Table A1. Prudential and business conduct supervisory structures in 98 countries as of end-2010

Country	Prudential Supervision	Business Conduct Supervision
Albania	Sectoral, BSBCB	NBC
Algeria	Sectoral, BSBCB	NBC
Argentina	Sectoral, BSBCB	Sectoral
Armenia	CB	CB
Australia	FSA	TP
Austria	FSA	NBC
Azerbaijan	Sectoral, BSBCB	Sectoral
Belarus	Sectoral, BSBCB	NBC
Belgium	FSA	FSA*
Bolivia	FSA	NBC
Bosnia and Herzegovina	Sectoral, BSOCB	NBC
Botswana	Sectoral, BSBCB	The Office of the Banking Adjudicator
Brazil	Sectoral, BSBCB	NBC
Bulgaria	PI: IS+SS, BSBCB	NBC
Canada	PI: BS+IS OCB	Financial Consumer Protection Agency in charge with the supervision of the business conduct of federally regulated institutions (banks and insurances)
Chile	PI: IS+SS, BSOCB	Sectoral
China	Sectoral, BSOCB	NBC
Columbia	FSA	FSA
Costa Rica	Sectoral, BSOCB	NBC
Croatia	PI: IS+SS, BSBCB	NBC
Cuba	Sectoral, BSBCB	NBC
Cyprus	Sectoral, BSBCB	NBC
Czech Republic	CB	CB
Denmark	FSA	Danish Complaint Boards for Banking Services, Insurance and Securities
Dominican Republic	Sectoral, BSOCB	Sectoral
Ecuador	PI: BS+IS OCB	Sectoral
Egypt	PI: IS+SS, BSBCB	NBC
El Salvador	PI: BS+IS OCB	NBC
Estonia	FSA	NBC
Finland	FSA	The Finnish Financial Ombudsman Bureau
France	PI:BS+IS BCB	Sectoral
Georgia	CB	NBC
Germany	FSA	FSA
Greece	Sectoral, BSBCB	Banking and Investment Ombudsman
Guatemala	FSA	NBC
Honduras	FSA	FSA
Hong Kong	Sectoral, BSBCB	NBC
Hungary	FSA	FSA
Iceland	FSA	FSA
India	Sectoral, BSBCB	Sectoral
Indonesia	Sectoral, BSBCB	NBC
Iran, Islamic Rep.	Sectoral, BSBCB	NBC
Ireland	CB	CB

Israel	Sectoral, BSBCB	Sectoral
Italy	PI: BS+SS BCB	Sectoral
Jamaica	PI: IS+SS, BSBCB	NBC
Japan	FSA	FSA
Jordan	Sectoral, BSBCB	NBC
Kazakhstan	FSA	FSA
Korea, Rep.	FSA	FSA
Latvia	FSA	NBC
Lebanon	PI: BS+SS BCB	NBC
Lithuania	Sectoral, BSBCB	NBC
Luxembourg	PI:BS+SS OCB	Sectoral
Macedonia, FYR	Sectoral, BSBCB	NBC
Malaysia	PI:BS+IS, BCB	Sectoral
Malta	FSA	FSA
Mauritius	PI: IS+SS, BSBCB	NBC
Mexico	PI: BS+SS, OCB	National Commission for the Protection and Defense of Financial Services Consumers
Moldova	Sectoral, BSBCB	NBC
Montenegro	Sectoral, BSBCB	Sectoral
Morocco	Sectoral, BSBCB	NBC
Namibia	PI: IS+SS, BSBCB	NBC
Netherlands	CB	TP
New Zealand	PI: BS+IS BCB	NBC
Nicaragua	FSA	FSA
Nigeria	Sectoral, BSBCB	NBC
Norway	FSA	NBC
Pakistan	S+I, B WCB	NBC
Panama	Sectoral, BSOCB	Sectoral
Peru	PI: BS+IS OCB	Ombudsman for Consumer Financial Services
Philippines	Sectoral, BSBCB	Sectoral
Poland	FSA	FSA
Portugal	PI: BS+SS BCB	Sectoral
Romania	Sectoral, BSBCB	NBC
Russian Federation	Sectoral, BSBCB	NBC
Saudi Arabia	PI: BS+IS BCB	NBC
Serbia	PI: BS+IS BCB	Sectoral
Singapore	CB	CB
Slovak Republic	CB	NBC
Slovenia	Sectoral, BSBCB	NBC
South Africa	PI: IS+SS, BSBCB	African National Credit Regulator; Ombudsman for banking services
Spain	Sectoral, BSBCB	Sectoral
Sri Lanka	Sectoral, BSBCB	Financial Ombudsman
Sweden	FSA	Swedish Consumers' Banking & Finance Bureau; The Swedish Consumers Insurance Bureau
Switzerland	FSA	FSA
Syrian Arab Republic	Sectoral, BSBCB	NBC
Thailand	Sectoral, BSBCB	NBC
Trinidad and Tabago	PI: BS+IS BCB	NBC
Tunisia	Sectoral, BSBCB	NBC

Turkey	Sectoral, BSOCB	NBC
Ukraine	Sectoral, BSBCB	NBC
United Arab Emirates	PI: BS+SS BCB	Sectoral
United Kingdom	FSA	FSA
United States	Sectoral, BSBCB	NBC**
Uruguay	CB	CB
Venezuela, RB	Sectoral, BSOCB	Sectoral
Vietnam	Sectoral, BSBCB	NBC

Notes: * Since April 2011, Belgium adopted a Twin Peak Supervisory Model; ** The U.S. Consumer Financial Protection Bureau was established in 2010 and was officially opened in July 2011.

Sectoral: Each segment of the financial sector is supervised by a different agency; BSBCB: Banking Supervision is conducted by the central bank; BSOCB: Banking Supervision is conducted by an agency outside of the central bank;

PI: Partial Integration; BS+IS: Joint Banking and Insurance Supervision; BS+SS: Joint Banking and Securities Supervision; IS+SS: Joint Insurance and Securities Supervision; BCB: by the central bank; OCB: by an agency outside of the central bank.

FSA: Financial Supervisory Agency or Financial Services Agency;

CB: central bank is the unified supervisor;

NBC: no business conduct.

Table A2: Transition Matrix for Prudential Supervisory Structures 1999-2010

As of 1999		As of 2010					
		Sectoral Supervision		Partial Integration		FSA Integration	Central Bank Integration
		BS* within CB	BS* outside CB	in CB**	outside CB		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
All economies		**36**	**7**	**10**	**11**	**24**	**8**
Sectoral Supervision, BS* within the CB	**48**	32 (4 countries entered the sample later than 1999)	1	3	5-1 (one changed further)***	3	*5*
Sectoral Supervision, BS outside of the CB	**7**	0	5; 1 entered later	0	0	2	0
Partial Integration in the CB**	**7**	0	0	4; 2 entered later	0	3-1***	2-1***
Partial Integration outside the CB	**13**	0	0	0	3; 1 entered later	7	0
FSA Integration	**10**	0	0	0	0	10	0
CB Integration	**3**	0	0	1	0	0	2
High financial depth		**14**	**2**	**8**	**5**	**15**	**3**
Sectoral Supervision, BS within the CB	**18**	12; 2 entered later	1	2	2	0	1
Sectoral Supervision, BS outside of the CB	**2**	0	1	0	0	1	0
Partial Integration in the CB	**7**	0	0	4; 1 entered later	0	3-1***	2-1***
Partial Integration outside the CB	**7**	0	0	0	3	4	0
FSA Integration	**8**	0	0	0	0	8	0
CB Integration	**2**	0	0	1	0	0	1
Lower financial depth		**22**	**5**	**2**	**6**	**9**	**5**
Sectoral Supervision, BS* within the CB	**30**	20; 2 entered later	0	1	3-1***	3	4
Sectoral Supervision, BS* outside of the CB	**5**	0	4; 1 entered later	0	0	1	0
Partial Integration in CB	0	0	0	1 later	0	0	0
Partial Integration outside CB	6	0	0	0	3, 1 entered later	3	0
FSA Integration	**2**	0	0	0	0	2	0
CB Integration	**1**	0	0	0	0	0	1

Source: Authors calculations; **Note:** *BS means banking supervision; ** CB means central bank: *** a minus sign means that a number of countries changed further to a different regime.

Table A3: Transition Matrix for Business Conduct Supervisory Structures 1999-2010

As of 1999		As of 2010				
		No business conduct	**Sectoral business conduct**	**Outside agency for financial consumer protection**	**FSA/Central Bank**	**Twin Peaks**
	(1)	(2)	(3)	(4)	(5)	(6)
All economies		**47**	**19**	**9**	**19**	**3**
No business conduct	**71**	41; 6 new	14; 2 new	4	12	0
Sectoral business conduct	**6**	0	3	0	1	2
Outside agency for financial consumer protection	**5**	0	0	5	0	0
FSA/Central Bank	**6**	0	0	0	6	0
Twin Peaks	**1**	0	0	0	0	1
High financial depth economies		**18**	**11**	**5**	**11**	**3**
No business conduct	**28**	15; 3 new	9	0	4	0
Sectoral business conduct	**6**	0	2	0	2	2
Outside agency for financial consumer protection	**5**	0	0	5	0	0
FSA/Central Bank	**5**	0	0	0	5	0
Twin Peaks	**1**	0	0	0	0	1
Lower financial depth economies		**29**	**8**	**4**	**8**	**0**
No business conduct	**43**	26; 3 new	6; 2 new	4	7	**0**
Sectoral business conduct	**0**	0	0	0	0	
Outside agency for financial consumer protection	**0**	0	0	0	0	0
FSA/Central Bank	**1**	0	0	0	1	0
Twin Peaks	**0**	0	0	0	0	0

Source: authors' calculations

Table A4. Data sources for all explanatory variables

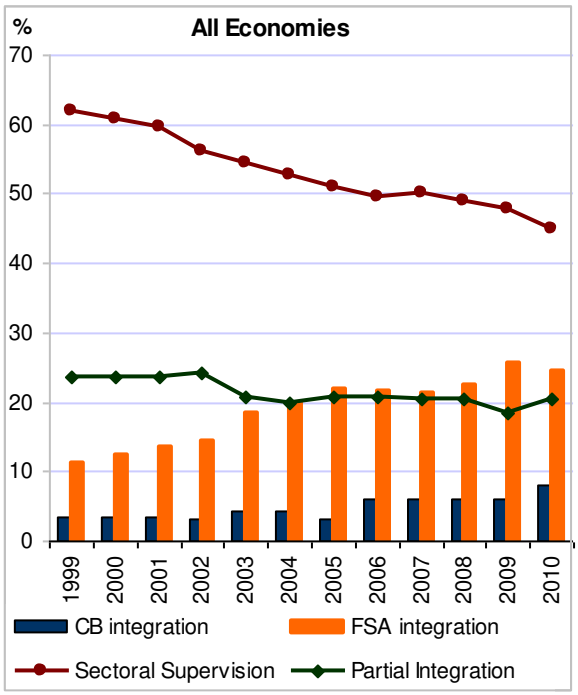
Explanatory variable	Sources
Population	World Bank World Development Indicators
GDP per capita	World Bank World Development Indicators
Country degree of openness (total trade as a percentage of GDP)	IMF World Economic Outlook
Quality of governance	Kaufmann et al. (2010).
Central bank autonomy	Arnone et al. (2007)
Financial sector development indicators	World Bank FinStats 2011
Banking sector indicators	World Bank FinStats 2011

Table A5: Correlation Matrix of Explanatory Variables

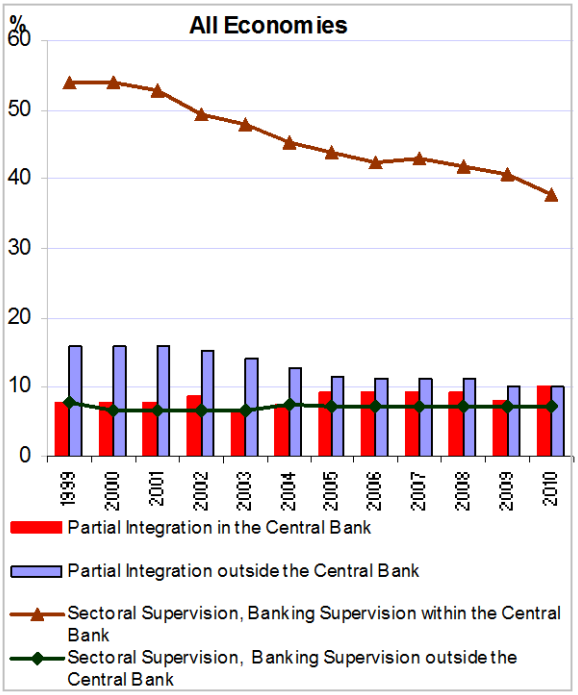
	L1. GDP per capita	L1. Population	L1. Trade to GDP ratio	L1. Governance	L1. Central Bank Autonomy index	L1. Crisis cumulative	L1. Credit to GDP ratio	L1. Non life premium	L1. Stock market capitalization	L1. Number of listed companies	L1. Concentration	L1. Cost to income ratio	L1. Net interest margin	L
L1. GDP per capita	1													
L1. Population	-0.1019	1												
L1. Trade to GDP ratio	0.2312	-0.2152	1											
L1. Governance	0.772	-0.157	0.2491	1										
L1. Central Bank Autonomy index	0.2732	-0.1305	-0.0281	0.3349	1									
L1. Crisis cumulative	-0.0815	0.1979	-0.049	-0.1311	-0.0243	1								
L1. Credit to GDP ratio	0.6718	0.0163	0.2873	0.6672	0.0711	-0.0118	1							
L1. Non life premium	0.6376	-0.1699	0.1274	0.6794	0.2776	0.0742	0.5311	1						
L1. Stock market capitalization	0.5285	-0.0156	0.3895	0.415	-0.1117	-0.1073	0.5034	0.2857	1					
L1. Number of listed companies	0.2183	0.4559	-0.2101	0.114	-0.0697	0.0449	0.1054	0.1619	0.2035	1				
L1. Concentration	0.045	-0.1983	0.1234	0.1869	0.0737	-0.2234	0.0392	-0.0594	0.0824	-0.281	1			
L1. Cost to income ratio	-0.0506	-0.0452	-0.2459	-0.0275	0.1508	0.0883	-0.1156	0.0195	-0.1665	0.0086	-0.0249	1		
L1. Net interest margin	-0.4829	-0.0638	-0.1575	-0.5176	-0.076	0.0513	-0.5521	-0.3637	-0.366	-0.0981	-0.081	0.0277	1	
L1. Non interest income	0.1926	-0.1021	0.0371	0.1501	0.1443	0.0037	0.0932	0.1956	0.1803	0.0472	-0.0537	0.2065	-0.1636	
L1. Private credit to deposit ratio	0.1753	-0.1106	-0.0312	0.345	0.2029	-0.107	0.3636	0.3153	0.0128	-0.1172	0.0217	0.0492	-0.0648	
L1. Liquid assets to funding ratio	0.0286	-0.1425	0.0994	-0.048	0.1979	-0.1004	-0.0905	-0.0712	0.0222	-0.1356	0.1237	0.0919	-0.0127	

Figure A1: Prudential Supervision, 1999-2010

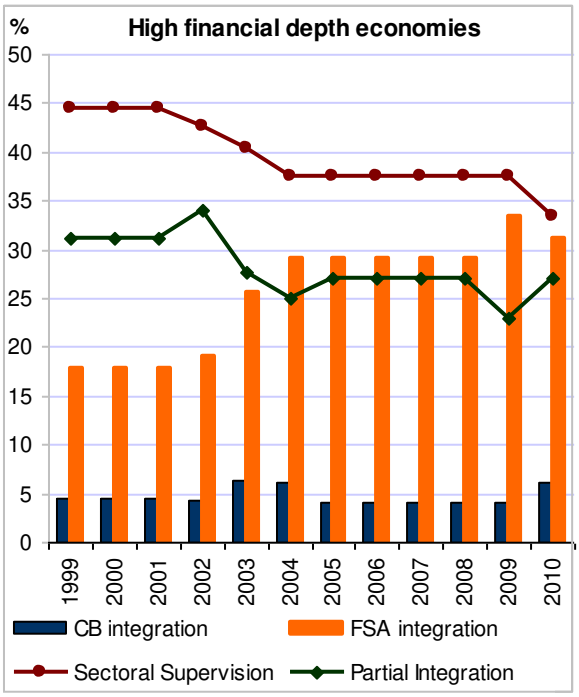
Panel A. All Economies



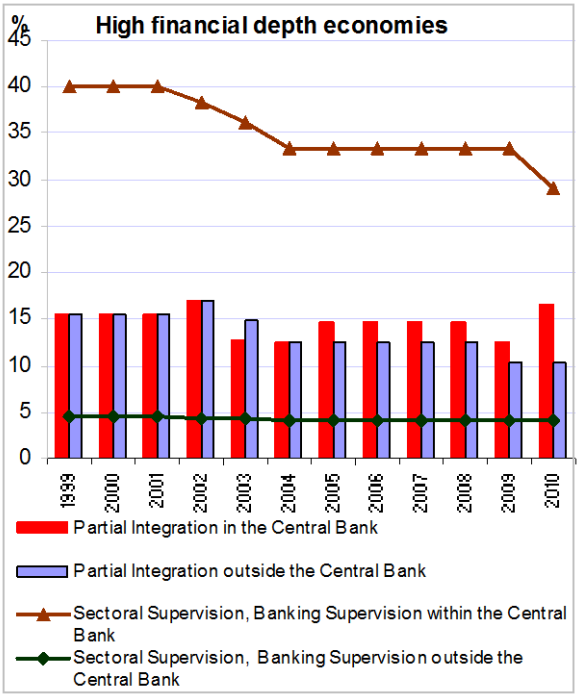
Panel B. All Economies



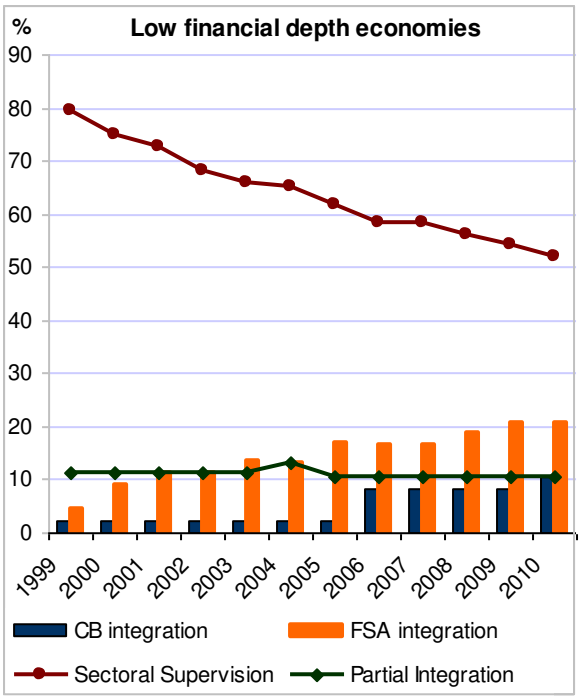
Panel C. High financial depth economies



Panel D. High financial depth economies



Panel E. Low financial depth economies



Panel F. Low financial depth economies

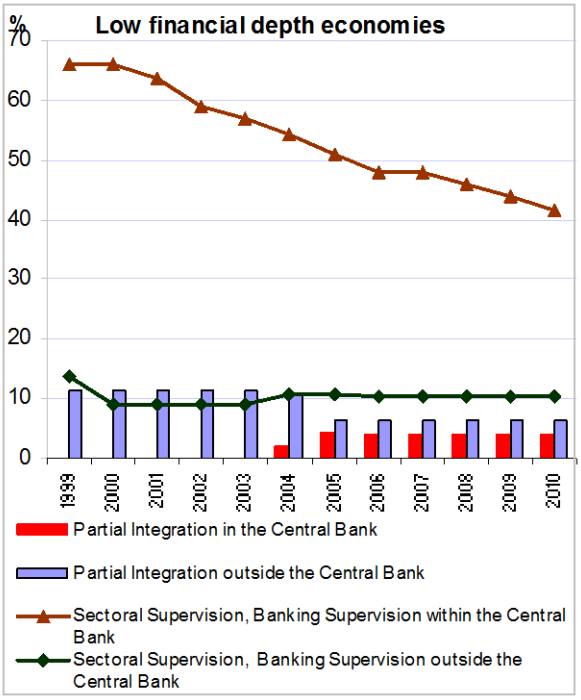
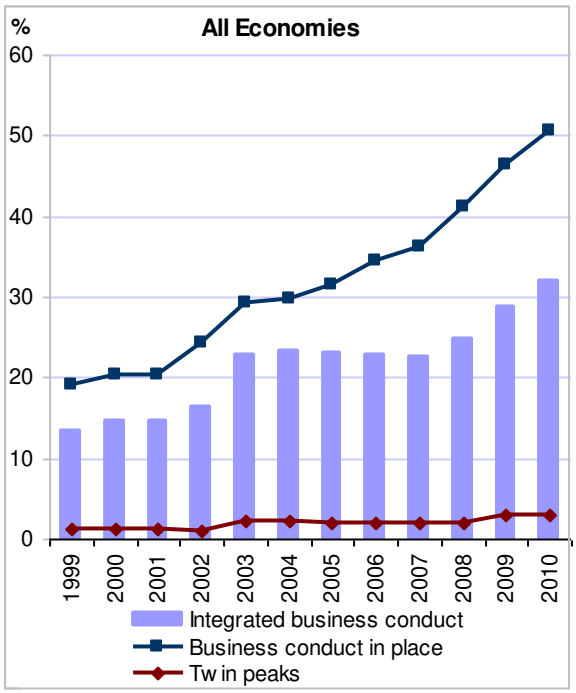
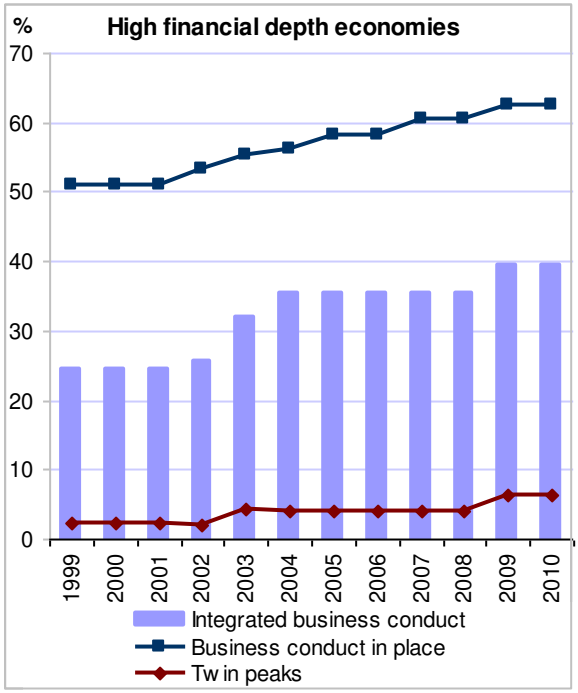


Figure A2: Business Conduct, 1999-2010

Panel A



Panel B



Panel C