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Working Paper 2008-27
December 2008

WORKING PAPER SERIES

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Abstract: This paper extends the literature on bank capital structure by modeling capital structure as a function of important public policy and bank regulatory characteristics of the home country, as well as of bank-specific variables, country-level macroeconomic conditions, and country-level financial characteristics. The model is estimated with annual data from 1992 to 2005 for an unbalanced panel of the seventy-eight largest private banks in the world headquartered in twelve industrial countries. The results indicate that bank capital ratios are significantly affected in the hypothesized directions by most of the bank-specific variables. Several of the country characteristic and policy variables are also significant with the predicted sign: Banks maintain higher capital ratios in home countries in which the bank sector is relatively smaller and in countries that practice prompt corrective actions more actively, have more stringent capital requirements, and have more effective corporate governance structures.

JEL classification: G21, G29

Key words: capital requirements, country public and regulatory policies, large banks

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The authors thank James R. Barth, Robert Bliss, Diana Hancock, Mark Flannery, Charles Goodhart, Edward Kane, Geoffrey Miller, Mitchell Petersen, Triphon Phumiwasana, participants at the Finlawmetrics 2008 Conference at Bocconi University, and an anonymous reviewer for valuable comments and suggestions on earlier versions of this paper. The research assistance of Syed Hussain is greatly appreciated. The views expressed here are the authors' and not necessarily those of the Federal Reserve Banks of Atlanta and Chicago or the Federal Reserve System. Any remaining errors are the authors' responsibility.

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Bank Capital Ratios Across Countries: Why Do They Vary?

1. Introduction

Observed private capital ratios for large internationally active banking organizations, whether risk-adjusted or not, vary substantially among countries in which the banking organizations are headquartered. This variation exists despite the fact that many of these banking organizations compete with each other in the same or similar markets and thus are subject to more or less the same forces. They are also all subject to basically the same Basel minimum regulatory capital requirements that were intended to reduce differences in competitive inequality, including capital ratios, although U.S. banks are also subject to an additional minimum leverage constraint. The differences in capital ratios by home country are highlighted in Table 1. For example, over the period 1992-2005, the average simple book value equity capital to total on- balance sheet asset ratios (leverage ratios) for the largest private banks or bank holding companies in the world each year varied from a high of 8.40% for the United States to a low of 3.01% for Germany, in the 12 countries in which the headquarters of these banks were located. Likewise, over the same 14 year period, the average Tier 1 capital to risk-weighted on- and selected off-balance sheet assets (Basel I risk-weighted capital) for these banks varied from a high of 10.04% for Switzerland to a low of 6.27% again for Germany.[1]

Why do capital ratios of these roughly similar banking organizations vary so much across different developed countries? This paper attempts to answer this puzzle. In particular, it focuses on whether the differences may reflect differences in home country public and prudential

[1] Book value equity includes common stock, preferred stock and retained earnings. Tier 1 capital includes book equity and a few additions, such as for trust preferred securities, and a few deductions, most notably goodwill.. Thus, the equity leverage ratios can be greater or smaller than the tier 1 ratios.

regulatory policies towards domestic banks that affects both the likelihood and costs to the economy of bank failures, as well as differences in individual bank characteristics and in the macro-economic and financial characteristics of the headquarter country. The paper extends the existing literature by including the public and regulatory policy characteristics of individual countries that may affect the amount of capital private banks maintain. Previous studies of banks in developed countries either have been limited to individual countries, so that all banks are affected equally by the country's public policy and regulations towards banks, or, when analyzing bank capital ratios across countries, have not accounted for the public policy or regulatory factors. In other words, this paper explores the effects, if any, of public policy factors on bank capital structure.

Whether and how public policy variables impact capital ratios across countries is of current importance for at least two reasons. One, to the extent bank profitability is affected by bank capital ratios, knowledge of bank capital ratios may help explain intercountry differences in bank profitability and competitiveness. Two, the results may have implications for the design of government policies towards market discipline and prudential supervision. The different levels of bank capital ratios across countries may provide information about the extent to which the safety net is weakening market discipline and the need for public capital to implicitly supplement private capital, as well as the extent to which prudential supervision is substituting for the market discipline. If countries are dissatisfied with these outcomes, they may be able to modify them by changing their public or regulatory policies.

Because observed private capital ratios at any moment of the time are not necessarily equilibrium target or desired ratios, the paper constructs a model to estimate the unobserved equilibrium ratios based on observed important characteristics of both the banks themselves and

the country in which they are headquartered. The banks are assumed to adjust their capital ratios from where they were in the previous observation period towards the current equilibrium target in a partial adjustment process. However, because our observations are limited by data availability to only annually, we cannot observe adjustments that are completed within one year. Accordingly, in robustness checks, we assume alternatively that the observed capital ratios are also the target equilibrium ratios.

In preview, the paper finds that for the years 1992 through 2005 the factors discussed above explain large bank equilibrium equity leverage ratios better than equilibrium tier 1 risk-based capital ratios, that larger banks have lower equilibrium capital ratios than smaller banks, and that the equilibrium equity leverage ratios are statistically significantly higher in countries that practice regulatory prompt corrective action and good corporate governance and significantly lower in countries whose financial markets are dominated by banks. The remainder of the paper is organized as follows. Section 2 summarizes alternative theories explaining banking organization's capital structure. Section 3 constructs the model of bank capital to be tested. Section 4 discusses the data used and the empirical methodology. Section 5 presents the results. Section 6 expands the specification with country regulatory and public policy variables to consider whether these variables may affect the desired bank capital ratios nonlinearly and depend on the values of other independent variables. Robustness tests are reported in section 7 and the conclusions in section 8

2. *Determinants of bank capital structure*

Banks are private corporations that are subject to pervasive government regulation in all countries. As such, a bank's use of equity capital to fund its operations should be determined by the same set of forces that influence other firms plus the combined impact of any government

safety net policies and capital regulation. Two alternative theories are identified in the literature that explains the capital structure for corporations in general. One theory holds that firms' capital positions are determined by the trade-off between the benefits and costs of debt financing.[2] The benefits of debt financing include any tax shield provided by debt but not by equity and reductions in the cost of agency conflicts between firm's owners and managers. The costs of debt financing include higher expected costs of financial distress and increases in the greater cost of agency conflicts between the firm's owners and its creditors.

The second theory holds that the short-run costs of adjusting a firm's capital structure exceed the benefits of capital structure changes over wide ranges. In this theory, firms change their capital structure in a pre-determined pecking order.[3] They rely first on retained earnings, which is cheapest to raise, to fund new projects. If this is inadequate, they then issue debt. They issue new equity to fund remaining projects only if the marginal costs of issuing additional debt exceed the costs of issuing equity. Under this "pecking order" theory, the firm's capital ratio at any moment of time can vary over potentially wide ranges.

The government may impact a bank's capital structure decisions in two ways. First, the government may provide under-priced guarantees, e.g., explicit deposit insurance and implicit guarantees of deposits and other liabilities.[4] The effect of under-priced liability guarantees is to reduce the marginal benefit of higher private capital and, thus, reduce bank's use of equity capital. Second, regulators may also alter banks' capital structure by increasing the costs associated with capital levels the regulators deem inadequate.

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[2] See Fama and French (2002) for a survey of the literature on the determinants of corporate capital structure.
[3] See Myers and Majluf (1984).

[4] See Berger, Herring and Szegö (1995) for a review of the literature on the determinants of bank capital structure.

If the costs of adjustment are not large enough to prevent adjustments in a bank's capital positions, then the impact of capital adequacy regulation would depend on whether the supervisor's requirements were above or below the individual bank's value maximizing level. If the regulatory capital requirements are less than the bank's optimum capital ratio, the regulations would have no effect. Let us call this the trade-off theory of bank capital determination with non-binding regulation. However, if the regulatory requirements are higher than the bank's optimal ratio and the costs of violating the requirements are sufficiently high, then banks would maintain capital levels exactly at supervisory minimums. We shall call this the trade-off theory with binding regulation.[5]

Alternatively, if the both the cost of adjustment and the cost of falling below the regulatory standards are high, banks would seek to maintain capital in excess of the regulatory minimums. That is, they would maintain a capital buffer above the minimum required ratio.[6] The size of the buffer depends on the costs of falling below the supervisory minimums, on the distribution of potential adverse shocks to capital, and, in the pecking order theory, on the changes in retained earnings.

The theories of capital determination under regulation reviewed above suggests that banking organizations' capital ratios are determined in one of four ways: (1) by the trade-off hypothesis with non-binding regulations, (2) by the trade-off theory with binding regulations, (3) by the pecking order with non-binding regulations or (4) by the pecking order hypothesis incorporating the costs of falling below the standards. The trade-off hypothesis with binding

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[5] Marshall and Prescott (2001) provide a model with mispriced deposit insurance in which banks with sufficiently high franchise value maintain capital ratios near the social optimum but banks with lower franchise values must be constrained by regulation.

[6] Wall and Peterson (1987) conjecture the existence of a buffer in their empirical analysis of the impact of regulatory factors on bank capital determination. Barrios and Blanco (2003), Ayuso, Pérez and Saurina (2004), and Peura and Keppo (2006) provide formal models of the determination of such a buffer.

regulation has a readily testable prediction. In instances where there is only one such minimum ratios, as is true in all countries in our sample but the United States, that banking organizations should generally be operating at or slightly above the minimum capital ratios specified by their regulators.[7] This prediction, however, is not consistent with the results found in previous studies of bank capital ratios nor is it consistent with the range of capital ratios we reported in Table 1. Basel I Tier 1 capital ratios generally exceed 7 percent whereas Basel I, which is the regulatory guideline in force during our sample period in most countries, only requires a minimum of 4 percent. This is also reported recently by Berger, DeYoung, and Flannery (2008).

Among the three remaining hypotheses, both the trade-off and pecking order with non-binding regulations hypotheses assert that market forces alone determine bank capital ratios. The last hypothesis, pecking order with binding regulations, assigns a significant role to government regulation, but retains an important role for market forces in determining the cushion banks seek to maintain over the minimum capital requirements.

Most of the recent empirical literature has focused primarily on testing the impact of market and regulatory forces on capital ratios in only a single country.[8] This limited focus misses a potentially valuable source of cross-sectional heterogeneity--cross-country differences in regulations and public policy forces that may affect both the cost of private capital and the cost of falling below the regulatory standard. This paper contributes to our understanding of

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[7] The tradeoff hypothesis with binding regulation is also testable in principle in the United States provided one recognizes that only one of the two capital ratios, leverage or tier one, need be binding for any given bank. We do not verify this for the United States as the Federal Reserve's definition of primary capital includes items that are not a part of equity such as mandatory convertible instrument, perpetual debt and allowances for loan and lease losses.

[8] See Jackson, et al. (1999) for a survey of empirical analysis of papers examining the relative roles of the supervisors and the regulators.

bank capital regulation by conducting a more complete cross-country study of the determinants of capital regulation at large banks.[9]

3. Theoretical framework and model specification

The primary hypothesis examined in this article is that country-specific public policy and regulatory factors help to explain cross-country differences in capital ratios amongst large banking organizations. This regulatory effect hypothesis is tested empirically by examining the relation between changes in the capital ratios for these banks and the extent of a country's safety net, the quality of external governance mechanisms, and the degree in which a country's supervisory authorities may intervene effectively to promote a "safe and sound" banking system. These regulatory or public policy variables are in addition to the variables that explain a banking organization's capital structure by the banking organization's own (bank specific) characteristics and those of the country in which it is headquartered (country specific).

Following Marcus (1983), we relate a banking organization's (j) target equilibrium ratio of capital to total assets however measured ($KRATIO^*$) to a set of exogenous variables, X:

$$KRATIO^* = k_0 + kX \qquad (1)$$

We classify the exogenous variables into three groups: 1) bank-specific factors, 2) country-specific macroeconomic factors, and 3) country-specific regulatory and public policy factors.

3.1 Bank-specific factors

[9] The European Central Bank (2007) has also recently analyzed the capital ratios of large banks in the EU and the U.S. However, its focus was on the market determinants of banks' capital ratios and it only had one regulatory variable. The implication of the study's primary finding, that capital ratios are determined by market forces, for the role of regulatory forces is hard to interpret for two reasons. First, the pecking order theory with binding regulation assigns an important role to market forces. Second, the study's sole regulatory variable, whether the supervisors in each country said its capital standards were risk-based is hard to interpret given that both the EU and US had implemented Basel I at the start of this study's sample period.

Most recently, Gropp and Heider (2007) and earlier Shrieves and Dahl (1992) have analyzed the determinants of bank optimal capital structure. They found that a banking organization's asset-size is an important determinant of its capital ratio in an inverse direction. Larger banks have lower capital-to-asset ratios. This may occur because firm size serves as a proxy for a banking organization's asset diversification. Larger banking organizations typically have better-diversified asset portfolios than smaller firms, which reduces their risk exposure and thus capital needs. Larger banks may also be viewed as more likely to be " too-big-to-fail" and thus require less private capital to remain in operation. Gropp and Heider (2007) show that a banking organization's capital ratio is positively correlated with its risk exposure. An increase in a banking organization's risk increases its target capital ratio because it increases the probability of insolvency and the costs of bankruptcy for any given capital ratio.

Profitability also influences a banking organization's target capital ratio. Gropp and Heider (2007) find that more profitable banking organizations tend to have more capital relative to assets. This finding is consistent with the prediction of the pecking-order-theory of the capital structure that firms tend to first rely on their retained earnings to fund new projects.

3.2 Country-specific macroeconomic factors

A country's business cycle and economic growth rates and the extent to which its financial system is bank-based are important determinants of the capital structure of banking organizations headquartered in that country.[10] In recessions, defaults on bank loans increase and generate higher losses that are charged against bank capital and vice-versa. Higher growth rates in any given year may be associated with greater growth possibilities in the banking sector and

[10] To the extent that most of the banking organizations in our sample also have branches or subsidiaries in countries other than the one in which they are headquartered, this specification fails to capture all the relevant effects. But for most banking organizations, activities in its headquartered country may be expected to be the most important.

higher target capital ratio to accommodate these possibilities. Higher growth rates may also increase the value of bank assets and thereby capital and capital ratios. Alternatively, higher growth rates may be associated with lower capital ratios under the pecking order theory if assets are growing faster than internally generated capital.

The extent to which a financial system is more bank-based than market-based could reflect the degree of competition within the system. Schaeck and Čihák (2007) show that banks tend to hold higher capital ratios when operating in a more competitive environment. This is consistent with the observation that more bank-based an economy is, the less is any competition from capital markets and the smaller are the risks of bank insolvency likely to be. The more a financial system is bank-based than market-based may also make regulatory capture easier and increase the incentive for bank supervisors to be more lenient in their treatment of undercapitalized banks. Lastly, the greater the importance of banks, the more extensive is the bank safety-net likely to be and the lower the private capitalization of banks.

3.3 Country-specific public and regulatory policy factors

Government policies may influence capital both directly and indirectly through their impact on market discipline. All of the developed countries in our sample try to influence capital directly, including the enforcement of the Basel I risk-based capital standards.[11] However, their enforcement procedures differ which is likely to result in differences in the effectiveness of the regulation. Banking organizations are likely to increase their target capital ratios when they perceived that the regulatory authorities would impose a significant penalty on them for not being adequately capitalized. In countries in which the regulatory authorities have established pre-determined standards of capital deterioration that induce automatic timely and costly

[11] Basel Committee on Bank Supervision, (1998) gives the 1988 Basel I standards updated to include revisions through 1998.

sanctions by regulators along the lines of prompt corrective action (PCA) in the United States, banking organizations may desire to hold a buffer against shocks that could cause their capital ratios to fall below these levels. Additionally, bank size may also influence supervisory capital requirements to the extent large banks are able to exercise greater political influence over bank supervisors.

The extent of market discipline depends in part on the extent to which market participants are at risk versus the extent to which the government bears risk through its provision of a safety net. Market discipline may also depend on the extent to which banks disclose the information needed for the market to effectively discipline banks. Baumann and Nier (2003) find that banking organizations that disclose more information -- a sign of better governance -- tend to have higher capital ratios and more protection against unexpected losses than banking organizations that disclose less. Higher levels of external governance should also lead to higher profits because they suggest a greater degree of outside monitoring that encourages banking organizations to be both more efficient and thus, ceteris paribus, more profitable and more heavily capitalized.

3.4 Control variables

Differences in accounting standards are a potential source of variations in capital ratios. In particular, United States Generally Accepted Accounting Principles (GAAP) and the International Accounting Standards place higher priority on accurate measurement of net income than on the conservative valuation of firm's assets. Additionally, bank capital ratios may be subject to variations through time, for many reasons, including changes in the Basel standards, world economic conditions, and public policy philosophy.

The target equilibrium capital-to-asset ratio model in equation (1) for bank j may now be written as:

$$KRATIO^{*} = k_0 + b\,\text{Bank Specific Variables} + c\,\text{Country Macro Variables} + d\,\text{Country Public and Regulatory Policy Variables} + e\,\text{Controls} + \text{Time fixed effects} \quad (2)$$

But a bank's target equilibrium capital ratio in any period cannot be observed directly. However, the change in the bank's capital ratio from the previous observation period can be observed. As noted earlier, the unobserved equilibrium capital ratio can thus be stated as the sum of the observed previous period ratio and the observed change in the ratio. Thus, equation (2) can be rewritten to solve for the observed change in the ratio. Following Shrieves and Dahl (1992) and Wall and Peterson (1995), the observed change in a banking organization's capital ratio at any time can be decomposed into two components, 1) a discretionary adjustment to its targeted equilibrium ratio and 2) an adjustment caused by exogenous current events:

$$\Delta KRATIO_{j,c,t} = \Delta^{d} KRATIO_{j,c,t} + E_{j,c,t} \quad (3)$$

where $\Delta KRATIO_{j,c,t}$ is equal to the actual change in the capital ratio $\Delta^{d}KRATIO_{j,c,t}$ is equal to the desired discretionary change in the capital ratio and $E_{j,t}$ is an exogenously determined random shock.

But the organization may not be able to adjust to its target equilibrium capital ratio instantaneously. Thus, the discretionary change in capital may in turn be decomposed into two components – 1) the unobserved target equilibrium in period t and 2) the observed capital ratio in the previous period, t-1 – and modeled in a partial adjustment framework:

$$\Delta KRATIO_{j,c,t} = \alpha(KRATIO^{*}_{j,c,t} - KRATIO_{j,c,t-1}) + E_{j,c,t} \quad (4)$$

Substituting equation (2) into equation (4) gives:

$$\Delta KRATIO_{j,c,t} = \beta_0 + \alpha \begin{pmatrix} b \text{ Bank Specific Variables}_{j,c,t-1} + c \text{ Country Macro Variables}_{c,t-1} \\ + d \text{ Country Public Policy and Regulatory Variables}_{c} \\ + e \text{ Controls}_{c,t} + \text{Time fixed effects} \end{pmatrix} - \alpha KRATIO_{j,c,t-1} + E_{j,c,t} \quad (5)$$

This is the basic model we test empirically for large banking organizations across industrial countries. As a robustness check, we also test the model under the assumption that the adjustment is fast and for annual observations the banks are always at their target capital level. In this case we substitute the actual capital level at time *t* for the target ratio in equation (2) yielding:

$$KRATIO_{j,c,t} = k_0 + b \text{ Bank - specific Variables}_{j,c,t-1} + c \text{ Country Macro Variables}_{c,t-1} + d \text{ Country Public Policy and Regulatory Variables}_{c} + e \text{ Controls}_{c,t} + \text{Time fixed effects} \quad (6)$$

4. Data, variables, and methodology

The data used in the tests are for banking organizations that are included in the *Bureau Van Dijk BankScope* (BBS) database for the period from 1992 to 2005. We construct a sample of large banking organizations that may be expected to be subject to largely similar economic and financial forces. The first step in the sample is to identify the banks that were ranked in the largest 150 banks of the world in each year during our sample period as reported in *The Banker* magazine's (TB) annual listing of the world's largest 500 to 1000 banks (depending on the year). These banking organizations are headquartered in 12 industrial countries: Australia, Canada, France, Germany, Ireland, Italy, Japan, the Netherlands, Sweden, Switzerland, the United

Kingdom, and the United States.[12] Banks with cooperative or government ownership are excluded as these banks' objective function is likely to include more than maximizing long-run shareholder value and they may be subject to broader safety-net and other government guarantees. The sample is also purged of entities labeled "banks" by *The Banker*, but whose financial ratios are very different. This purge includes banks in the United States that specialize in credit cards and any bank not classified as a "commercial bank" or a "bank holding company" by BBS. Lastly, banking organization observations in the BBS database with negative capital or a return on equity less than -100% in any given year were excluded in that year. Because several institutions were merged, did not have complete data, or did not satisfy our selection criteria during this period, the same banks are not included in each year and the sample is an unbalanced panel. The resulting sample includes 78 banking organizations that appear in any one of the 14 years for a total of 649 bank-year observations.

All financial statement data for the banks in the sample are obtained from BBS. Data on additional control variables are obtained from IMF *International Financial Statistics*. Observations with incomplete data are dropped.

Two different measures of bank capital ratios are specified as the dependent variable: 1) the ratio of a banking organization's book value equity to the banking organization's book value total on-balance sheet assets (leverage ratio) and 2) the ratio of a banking organization's book value Tier 1 capital to the banking organization's book value Basel I risk-weighted on and selected off-balance sheet assets (risk-based capital). U.S. regulations set minimum requirements for both the risk-based ratio and for a leverage ratio where the capital measure

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[12] South Korea was also included in the initial sample selection. However, the one private bank from South Korea that ranked in the top 150 in TB was dropped because BBS lacked the information to calculate its ratio of risk weighted assets to total assets.

consists primarily of equity. European capital regulations generally rely exclusively on the risk-based capital ratio.[13]

All of the bank specific and country macro variables except the fixed effect variables are lagged one period to reduce simultaneity. *SIZE* is the lagged log of total assets. ROA is the banking organization's net income divided by the average of its beginning and end of year on-balance sheet assets. A bank's credit risk exposure, RISK, is proxied by dividing a banking organization's Basel I risk-weighted assets (RWA) by its total on-balance sheet assets. The larger is this ratio, the greater is the banking organization's portfolio credit risk exposure assumed to be.

The variable reflecting the state of the economic conditions in a country is the growth rate of its real gross domestic product (RGDP), computed as the annual percentage change in a country annual rate of RGDP. RGDP is obtained from the IMF *International Financial Statistics* database. The extent to which a country's financial system is bank-based (*BANK)* is estimated by taking the total assets of the banking system divided by the country's gross domestic product.[14]

Public policy variables are specified to capture the degree of external governance (EGOVERN), capital standards (CSTAND), supervisory authority independence (INDEP), and whether a country has a law establishing pre-determined levels of bank solvency deterioration which requires automatic intervention, such as regulatory enforcement actions (PROMPT), are computed from data in Barth, Caprio, and Levine (2006), which in turn is derived from a survey conducted by the World Bank on bank regulation and supervision practices across countries. Following Barth, Bertus, Hartarska, Jiang, and Phumiwasana (2007), we construct EGOVERN using three sets of questions from the World Bank's survey: (1) the strength of external audits;

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[13] Book value data are used for all banks because regulatory requirements are specified in these terms.
[14] See Demirguc-Kunt and Huizinga (2000).

(2) the transparency of financial statements; and (3) the use of external credit ratings and reliance on credit monitoring. The greater external governance, the higher the index value. A higher level of external governance index should lead to higher capital ratios as risks would be both recognized and managed more efficiently.

CSTAND is used to capture whether a country has explicit regulatory requirements for the amount of capital that a bank must maintain relative to various guidelines. It is based on a country's answers to five questions from the World Bank survey about whether the country has a minimum capital-to-asset ratio that conforms to the Basel standards; whether the minimum capital-to-asset ratio vary with market risk; whether the market value of loans losses is deducted from reported accounting capital; and whether unrealized losses in the securities portfolio or from foreign exchange operations are deducted from reporting accounting capital. *CSTAND* ranges from 0 to 5, with a higher value indicating greater capital stringency. Greater capital stringency should be associated with greater capital maintained by banks.

INDEP measures the degree to which a country's supervisory authorities are independent. It is based on a country's answers from the World Bank survey about how is the head of the supervisory agency (and other directors) appointed; to whom are the supervisory bodies responsible; and how is the head of the supervisory agency (and other directors) removed. Barth, Caprio, and Levine (2006) code *INDEP* as 1 for low independence, 2 for medium independence, and 3 for high independence. An independent supervisory agency reduces political capture of the regulatory authorities. and should enhance the governance of banking organizations in the country.[15] A higher level of regulatory governance should lead to increased supervisory

[15] Beck, Demirgüç-Kunt and Levine (2003) find that an independent supervisory agency reduces political capture of the regulatory authority. Caprio, Laeven, and Levine find that the independence of the supervisory authority does not influence bank valuation as measured by Tobin's Q and the market-to-book ratio.

discipline, which can lead to either higher bank capital requirements or, to the extent that the market perceives the greater supervisory discipline to be effective, lower capital ratios than otherwise..

PROMPT measures whether a country has a law establishing pre-determined levels of bank solvency deterioration which forces effective automatic enforcement actions by regulators. It is an aggregate index built up from a country's answers to a series of questions from the World Bank survey about whether the supervisory authorities can force a bank to change its internal organizational structure; whether failure to abide by a cease-desist type order can lead to the automatic imposition of civil and penal sanctions on the directors and managers of a banking organization; whether the supervisory authorities can order a bank's directors/managers to increase provisions to cover actual or potential losses; and whether the supervisory authorities can suspend the directors' decision to distribute dividends, bonuses or management fees. *PROMPT* ranges from 0 to 6, with a higher value indicating greater promptness and effectiveness in responding to bank problems. The greater the cost of poor performance imposed by regulators, the greater the capital banks wish to hold as protection.

SAFETY-NET proxies the extent of the government safety net. It is the Demirgüç-Kunt and Detragiache's (2002) moral hazard variable, derived from the database assembled by the World Bank. The variable is designed to capture features of deposit insurance systems that are associated with moral hazard behavior by banking organizations. The features include indicators of co-insurance, broadness of scope (e.g., coverage of foreign currency and interbank deposits), extent of explicit coverage, type and source of funding, management, and nature of membership. Higher values of the variable indicate a broader safety net that provides for greater opportunity

for moral hazard behavior by banks, and identify countries that are more vulnerable to banking crises because they permit lower private capital ratios.

GOVCONT50 proxies for the fraction of banks in a country that is government owned. It is based on data obtained from La Porta and Lopez-de-Silanes and Shleifer (2002), and is the percent of the top 10 banks in which the government owns more than 50 percent of the stock. A high level of government ownership should be associated with lower private capital ratios..*CONTROLCF* measures the extent to which a country's ownership structure influences its bank capital ratio. It is based on bank-country level data from Caprio, Laeven, and Levine (2007) on control rights that reflect controlling shareholders ownership and on cash flow rights that reflect the fraction of the firm's cash flow owned by its controlling shareholder. *CONTROLCF* measure the wedge between the country-average control rights and cash flow rights. Caprio, Laeven, and Levine (2007) argue that a large value of *CONTROLCF* "may reflect both an owner's ability (large voting rights) and incentives (small cash-flow rights) to expropriate bank resources." Higher values of CONTROLCF thus are likely to be associated with greater risk taking by banks and lower capital ratios.

The complete partial-adjustment model to be estimated is:

$$\Delta KRATIO_{j,c,t} = \beta_0 + \alpha \begin{pmatrix} k_1 SIZE_{j,c,t-1} + k_2 ROA_{j,c,t-1} + k_3 RISK_{j,c,t-1} + c_1 RDGP_{c,t-1} + c_2 BANK_{c,t-1} \\ + d_1 PROMPT_c + d_2 EGOVERN_c + d_3 SAFETY - NET_c + d_4 CTAND_c \\ + d_5 INDEP_c + d_6 GOVCONTROL50_c + d_7 CONTCF_c \\ + e_1 Controls_c + \sum_{t=2}^{T} k_{o,t} TIND_t \end{pmatrix} - \alpha KRATIO_{j,c,t-1} + E_{j,c,t} \quad (7)$$

Where $TIND_t$ (l=2,...,T) is a time-period indicator variable.

5. Empirical results –Adjustment to the target

Summary statistics are presented in Table 2. The mean change in both capital ratios is small (around 7 basis points) but the standard deviations are approximately 10 times as large, indicating substantial variation across observations. The lagged tier 1 ratio risk-based capital is well above the Basel I requirements. The simple correlations among the variable is provided in Table 3. The change in the tier 1 capital ratio is correlated with most of the explanatory variables in the model. The change in the leverage ratio is less correlated with the other variables and most highly correlated with the public policy variables *PROMPT, EGOVERN*, *SAFETY-NET*, and *GOVCONT50.*

Equation (7) is estimated for a pooled cross-section time series panel of 78 very large banking organizations headquartered in industrial countries. The panel estimation technique used to obtain the coefficients α and β_0 corrects the standard errors of the coefficient estimates using Rogers' procedure (see Rogers, 1993; and Williams, 2000). This procedure corrects for both that the error terms for a given banking organization may be correlated across years (time series dependence) and that the error terms of a given year may be correlated across different banking organizations (cross-sectional dependence). The corrected (Rogers') standard errors are White's standard errors adjusted to account for possible correlation within a cluster.

The adjusted estimated regression coefficients are the product of the rate of adjustment coefficient, α, and the variable's contribution to the banks' target capital ratios. In order to obtain the parameter value of the contribution of each variable to the banks' target capital, we divide the estimated regression coefficient for that variable by α. As a result, the usual statistical tests are not appropriate. Rather the Wald test of statistical significance which is included in the statistical package LIMDEP is used instead. Table 4 reports the estimated contribution of each of

the variables to each of the two capital targets.[16] For example, it reports the value of k_1, which is calculated as the estimated regression coefficient on $SIZE_{j,c,t-1}$ divided by α.

Observations are annual from 1992 through 2005. Because the specific banking organization included each year varies due to changes in bank size, mergers, or missing information, the panel is unbalanced. As noted, two measures of capital are specified. One is the simple leverage ratio and the other is the Basel I risk-based capital ratio. The numerator of both ratios is basically the same. The major differences occur in the denominators.

The regression results are shown in columns (1) - (4) of Table 4 for the leverage ratio and in columns (5) – (8) for the Tier 1 ratio. Columns (1) and (5) show the results for a basic model that specifies each capital measure only as a function of 3 bank-specific factors plus year-fixed effects. The model is progressively expanded to include country fixed-effects in columns (2) and (6), then country macro variables in columns (3) and (7) in place of the country fixed-effects and finally with 7 public policy and regulatory variables in columns (4) and (8). The impact of the public policy and regulatory variables across countries can be quantified by comparing the results of the expanded specifications with the baseline models.

5.1 Baseline model results: Without country-binary variables

Columns (1) and (5) of Table 4 show that the changes in both capital ratios are negatively correlated with the logarithm of total assets, but the results are only significant for the leverage equation. Bank risk is positively and significantly related to the change in bank's leverage ratio, but inversely related to the Tier 1 ratio. The latter reflects that the risk-weighted assets, RWA, appear in both the numerator of our risk measure and in the denominator of the Tier 1 capital

[16] Except for the coefficient on lagged capital, α which measures the rate adjustment towards the target.

ratio. This introduces a negative bias in the correlation between the two series. Profitability is positively related to both capital ratios, at the 5% level of statistical significance in the Tier 1 equation but only at the 10% level in the leverage equation. The Wald test is also used to provide a test of whether the bank-specific variables collectively make a significant contribution to explaining the banking organizations' target capital. The test statistic is 182.00, statistically significant at better than the 1% level, indicating that the bank-specific variables collectively make a significant contribution in explaining banking organizations' target leverage ratio. For the Tier 1 capital ratio, the test statistic is 65.04, statistically significant at the 1% level.

The coefficient on the lagged on $KRATIO_{j,t-1}$ which captures the rate of adjustment towards the target capital ratio is also shown in columns (1) and (5). For the leverage ratio the rate of adjustment is 0.1162 and for Tier 1 ratio the rate of adjustment is 0.2118. This indicates that the average banking organization moves only 12% and 21%, respectively, of the way towards their target on average in a given year and requires some 5 years to reach target equilibrium. These estimated rates of adjustment are similar to that reported in Wall and Peterson (1988) but smaller than that reported in Marcus (1983).

5.2 With country-binary variables

Columns (2) and (6) of Table 4 add country fixed effects to the specifications in columns (1) and (5). The omitted country is Japan. The results in columns (2) and (6) are qualitatively similar to those in columns (1) and (5). SIZE is negatively correlated with both measures of capital and is now statistically significantly different from zero in both equations. RISK remains positively and statistically correlated with changes in the leverage ratio, and negatively and statistically correlated with changes in the Tier 1 ratio. ROA is positively correlated with changes in both capital ratios, but neither coefficient is statistically different from zero. In

column (2), 4 of the 10 country binary variables are significant, 3 negatively correlated and 1 positively correlated with the target capital ratio.[17] The Wald statistic of 54.70 indicates that collectively the country binary variables make a significant contribution in explaining the target capital ratio in column (2). As for leverage ratios, the country binary variables collectively make a significant contribution in explaining banking organizations' changes in their Tier 1 capital ratios, the Wald statistic is 38.16. In column (6), 6 of the 10 country binary variables are positive and significantly correlated with the change in Tier 1 capital ratios. These results indicate that the differences in capital ratios are explained by home country factors in addition to bank-specific factors.

5.3 Model results with country macroeconomic variables

Columns (3) and (7) of Table 4 drop the country binary variables and instead include two lagged country macroeconomic variables -- the annual percentage change in real GDP and the ratio of aggregate bank assets to nominal GDP. As hypothesized, the coefficients on the change in real GDP are positive. But they are not statistically significantly related to either measures of capital. However, the impact of real GDP may be partially captured by the time fixed effects. The coefficients on BANK are negative, also as hypothesized, but only marginally statistically significant in the leverage equation at the 10 percent level. In addition, the adjusted R-squared statistics decline. This suggests that the country effects in columns (2) and (6) capture more than just these two macroeconomic variables. This may reflect that these banking organizations tend to operate in countries beside their home country and in instances, such as the Dutch and Swiss banking organizations, are likely to be affected as much, if not more, by macroeconomic conditions in host countries.

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[17] The country coefficients are measured relative to the omitted country of Japan. The coefficient estimates are not reported in Table 4, but are available from the authors upon request..

5.4 Model results with country public and regulatory policy variables

Columns (4) and (8) add seven country policy variables: PROMPT; EGOVERN; SAFETY-NET; CSTAND; INDEP; GOVCONT50; and CONTROLCF to the baseline model in columns (3) and (7). The coefficient estimates on the previously specified variables, lagged capital ratios, SIZE, ROA, RISK, RGDP, and BANK, are qualitatively similar to those in regressions reported in columns (3) and (7). The partial-adjustment coefficients in columns (4) and (8) of 0.1826 and 0.2613 are slightly higher than 0.1231 and 0.2124 in columns (3) and (7), respectively. As in column (3) changes in the leverage ratio in column (4) are positively correlated with both RISK and ROA and negatively correlated with SIZE, with the coefficients on RISK and SIZE statistically different from zero. Likewise compared to column (7) results changes in Tier 1 capital ratio in column (8) are negatively correlated with RISK and SIZE and positively correlated with ROA. Now the coefficients on both SIZE and RISK are statistically significant, but as noted earlier the coefficient on RISK has the wrong sign. The coefficient on RGDP in both equations is not significant at usual levels. The negative coefficient on BANK in the leverage equation is statistically significant while it remains insignificant in the Tier 1 equation.

Of the seven regulatory and public policy variables, five are statistically significant in the leverage equation shown in column (4). Changes in the leverage ratio tend to be higher in countries with better external governance, better provisions for prompt corrective action, and a greater emphasis on explicit regulatory requirements regarding the amount of capital banks must maintain relative to specific guidelines. The coefficients on both the supervisory authority independence and the difference between control rights and cash flow rights variables are negative and only marginally statistically significant. The safety-net variable that measures the

incentive for moral hazard and the government ownership of banks variable are statistically insignificant. The addition of the regulatory variables both increases the adjusted R^2 and produces a significant Wald test statistic of 38.05. Both statistics indicate that the regulatory and public policy variables collectively make a significant contribution to explain changes in banking organizations' leverage ratios.

Only two of the country public policy and regulatory variables also enter statistically significant in the Tier 1 ratio equation shown in column (8). Similar to the leverage ratio, changes in Tier 1 are positively and statistically significantly related with quality of external governance. But unlike for the leverage ratio, changes in Tier 1 are insignificantly related to prompt corrective action and the capital standard index (*CSTAND*). The safety-net variable is insignificant in the changes in Tier 1 equation. Unlike for the leverage ratio, changes in Tier 1 are marginally significantly negatively related to the government ownership of banks variable. Once again, the adjusted R-squared statistic increases and the Wald test takes the statistically significant value of 22.45.

6. Expanded specifications

The public policy and regulatory variables may also affect desired bank capital ratios nonlinearly and depend on the values of other independent bank or country macro specific variables. Thus, for example, regulatory monitoring and enforcement of capital standards may be stronger for riskier banks, for whom failure is more likely, or weaker for banks in countries in which the banking system is relatively more important, so that the banks may wield greater political power and capture regulatory agencies more easily. Accordingly, we expand the model developed in the previous sections to incorporate public policy variables interactively with other independent variables where theoretically persuasive.

Table 5 reports the results of expanding the model in column (4) of Table 4 by including all seven public policy variables interactively with RISK and BANK, respectively. Two results are readily evident. First, few of the interactive variables are statistically significant. Second, their introduction tends to dramatically reduce both the statistical and economic significance of the macro-country and stand alone public policy and regulatory variables estimated in the previous models. Similar negative results were obtained for a wide range of specifications of alternative interactive terms. As a result, we have less confidence in the meaningfulness of the estimated results in this section than in those of the previous sections.

7. Robustness tests

As indicated previously, because our observations are limited by data availability to only annually, we cannot observe adjustments that are completed within one year. Thus, for purposes of robustness, we also estimate specifications of the capital equation that allow the observed capital ratios to be also the equilibrium ratios. These results are reported in Table 6. The level of both measures of capitalization is more completely explained than are the changes. As for the changes in capital ratios, the model explains the leverage ratio better than Tier 1. Eleven of the 12 explanatory variables for the leverage ratio are significant at the 5% level with the hypothesized sign. Both capital measures are negatively and statistically related to SIZE and positively and statistically related ROA. These results, especially for ROA, are consistently stronger across both level measures of capital than those reported earlier for the change specifications. Like the results for the change specifications, RISK is positively and statistically related to the leverage ratio and negatively and statistically related to the Tier 1 ratio. The two country macro variables are statistically significant in both of the leverage equations. The level of the leverage ratio decreases as hypothesized with BANK, but also decreases with the

percentage change in real GDP, contrary to expectations. The level of the Tier 1 capital ratio also decreases with both BANK and RGDP. Unlike for the leverage ratio, the Tier 1 capital ratio and RGDP relation is insignificant in both of the regressions, column (8) of Table 6.

The leverage ratio is explained by six of the seven regulartory and public policy variables at the 5% level of statistical significance and five in the hypothesized direction. As in the change specification for the leverage ratio, the level of the leverage ratio is statistically significantly higher, as hypothesized, in countries that practice regulatory prompt corrective action, better external corporate governance, and a greater emphasis on explicit regulatory requirements regarding the amount of capital their banks must maintain relative to specific guidelines. The level of the leverage ratio is also significantly negatively related, as hypothesized, to the supervisory authority independence variable, the government ownership of banks variable, and the difference between control rights and cash flow rights variables. Like the results for the change in Tier 1 capital, the level of Tier 1 capital is positively and statistically significantly related to EGOVERN, and insignificantly related to PROMPT, SAFETY-NET, CSTAND, and CONTROLFL. The government share ownership of banks variable enters the Tier 1 level equation with a negative sign and is statistically significantly different from zero. As expected, the adjusted R^2 statistics are substantially higher than those for the change regressions. Thus, the level regressions suggest that country regulatory and public policy variables are even more significant determinates of bank capital ratios in the country than for changes in capital ratios.

8. Conclusions

This paper attempts to explain the observed substantial differences across countries in the capital structure of the largest banks in industrial countries by characteristics unique to the individual banks and to the country in which these banks are headquartered. The paper extends

the existing literature by modeling capital structure not only as a function of factors capturing bank specific variables and the macro-economic and financial characteristics of the bank's home country, but also important public policy and bank regulatory characteristics of the home country. These forces affect the capital structure of banks by affecting the intensity of competition in the banking sector, the extent of any bank safety-net, the extensiveness of capital standards, and the ability of bank regulators to intervene promptly and effectively in troubled banks.

Capital structure is measured by two capital ratios—1) the ratio of book value equity to total book value on-balance sheet assets (leverage ratio) and 2) the ratio of tier 1 capital to Basel I risk-weighted assets (risk-based capital), also in terms of book value. The bank-specific variables include profitability, credit risk, and asset size. The country-specific macro variables include changes in GDP and the relative size of the banking sector in the home country. The country regulatory and public policy variables include seven variables reflecting the intensity of external corporate governance in the home country, the strength of prompt corrective action legislation, and extent of the bank safety-net. In addition, a number of control and fixed effect variables are specific. In response to changes in these variables, the banks are assumed to adjust their capital ratios to their unobserved target equilibrium values. This adjustment process is modeled in a partial-adjustment framework.

The model is estimated for annual data for an unbalanced panel of the 78 largest private banks in the world headquartered in 12 industrial countries over the period between 1992 and 2005, after the implementation of Basel I. The results indicate that the variables specified explain the leverage ratio better in the hypothesized direction than the Basel risk-weighted ratio, although the latter is the sole capital ratio specified in the minimum capital directives in all

countries but the United States. As for any firm, bank capital ratios are significantly affected in the hypothesized directions by most of the bank-specific variables. But these results cannot differentiate among the competing theories of capital structure. Given these relations, banks maintain higher capital ratios in home countries in which the bank sector is relatively smaller and in countries that practice prompt corrective actions more actively, have more stringent capital requirements, and have more effective corporate governance structures. These results are basically unchanged if banks are assumed to adjust their capital structure quickly so that the observed capital ratios are assumed to be the equilibrium ratios. Thus, the observed differences in capital ratios across countries may be in part explained by the public policy and regulatory regimes the countries themselves put in place. These effects appear to limit the attempts of Basel I to reduce differences in cross-country capital ratios among large banking organizations.

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Table 1
Large bank capitalization ratios, by country
covering the period 1992-2005
All ratios expressed as percentages

This table reports the mean values of book equity to total on-balance sheet assets (leverage) ratios and the Basel Tier 1 risk-based capital ratio of (mostly) equity to risk weighted on and selected off-balance sheet assets of the banks headquartered in twelve countries in our sample in descending order of ratio. Government owned and coop banks are excluded. Banks are also excluded if they report a negative value for equity capital and or a return on average equity (ROAE) less than -100 percent.

Country	Number of banks In 2000	Equity to total asset ratio	Tier 1 capital ratio
United States	13	8.40	8.11
Australia	4	6.97	7.48
Ireland	1	5.89	7.72
United Kingdom	4	5.22	7.86
Italy	4	5.10	6.97
Canada	4	4.94	8.48
Japan	16	4.46	6.28
Switzerland	2	4.33	10.04
Sweden	2	4.15	7.75
France	2	3.74	7.23
The Netherlands	1	3.61	7.38
Germany	2	3.01	6.27

Table 2
Summary statistics
covering the period 1992-2005

Variable	Mnemonic	Mean	Standard Deviation
Dependent variables and bank-specific, country Macro-economic factors, and country policy factors			
Dependent variables			
Change in capital-to-asset ratio	ΔLEVERAGE	0.0669	0.6842
Change in Tier 1 capital-to-asset ratio	ΔTIER	0.0753	0.8973
Bank-specific variables			
Lagged KRATIO	$LEVERAGE_{-1}$	5.6270	2.0526
Lagged TKRATIO	$TIER_{-1}$	7.4301	1.6709
Lagged log total assets	SIZE	18.9102	0.9217
Lagged return on average assets	ROA	0.6131	0.6773
Risk-weighted assets to total assets	RISK	0.6700	0.1688
Country macro-economic factors			
Percentage change in real gross domestic product	RGDP	0.0231	0.0199
Bank assets to nominal gross domestic product	BANK	1.7586	0.9949
Country policy factors			
Prompt corrective action index	PROMPT	2.8459	2.7890
External governance index	EGOVERN	9.8120	1.8713
Moral hazard index	SAFETY-NET	1.7516	1.9924
Capital standard index	CSTAND	4.2034	1.1648
Independence of Supervisory Authority index	INDEP	3.4777	0.6333
Share of the assets of the top 10 banks controlled by the government at the 50 percent level	GOVCONT50	7.9652	12.1379
Control rights divided by cash flow rights	CONTROLCF	2.1121	6.1895
Accounting standard	ACCT	0.3683	0.4827

Table 3
Correlation coefficients of variables used in the regression analysis

This table reports the correlation coefficients of the variables used in the regression analysis. LEVERAGE is the ratio of a banking organization's book value equity to the banking organization's book value total assets; TIER is the ratio of a banking organization's book value Tier 1 capital to the banking organization's book value Basel I risk-weighted assets (Risk-based capital); SIZE is the log of total assets (SIZE); RISK is the banking organization's Basel I risk-weighted assets (RWA) divided by its total assets; ROA the banking organization's net income divided by the average of its on-balance sheet assets at the beginning and end of the year; RGDP is the percentage change in real gross domestic product; BANK is the bank assets to nominal gross domestic product; PROMPT is the Barth, Caprio, and Levine's (2006) "Prompt Corrective Action" variable; EGOVERN is a version of the external governance index derived by Barth, Bertus, Hartarska, Jiang, and Phumiwasana (2007); SAFETY-NET is Demirgüç-Kunt and Detragiache's (2002) moral hazard variable; CSTAND is the Barth, Caprio, and Levine's (2006) "Overall Capital Stringency" variable; INDEP is the Barth, Caprio, and Levine's (2006) "Independence of Supervisory Authority" variable; GOVCONT50 is the La Porta, Lopez-de-Silanes, and Shleifer's (2002) "share of the assets of the top 10 banks in a given country controlled by the government at the 50 percent level" variable; CONTROLFL is the difference between control rights and cash flow rights; and ACCT takes the value of 1 if the bank is reporting in a standard other than its local GAAP, zero otherwise. Panel A reports the correlation coefficients between the capital ratios used in the regression equations; panel B provides the correlation coefficients between the independent variables and the capital ratios; and panel C provides the correlation coefficients for the independent variables used in the regression equations. * indicates significance at the 10% level; ** indicate significance at the 5% level; and *** indicate significance at the 1% level.

Panel A: Correlation coefficients between the capital ratios used in the regression equations

Variables	ΔLEVERAGE	ΔTIER1	$LEVERAGE_{-1}$	$TIER1_{-1}$
ΔLEVERAGE	1.00			
ΔTIER1	0.51^{***}	1.00		
$LEVERAGE_{-1}$	0.05	0.14^{***}	1.00	
$TIER1_{-1}$	0.13^{***}	0.27^{***}	0.42^{***}	1.00

Panel B: Correlation coefficients of the independent variables with the capital ratios

Variables	ΔLEVERAGE	ΔTIER1	$LEVERAGE_{-1}$	$TIER1_{-1}$
SIZE	-0.03	0.08*	0.39***	0.14***
RISK	0.06	-0.03	-0.64***	0.25***
ROA	-0.02	-0.13***	-0.70***	-0.47***
RGDP	0.03	-0.04	-0.33***	-0.24***
BANK	-0.03	0.06	0.51***	0.21***
PROMPT	0.13***	-0.04	-0.18***	0.25***
EGOVERN	-0.07*	-0.02	-0.34***	-0.47***
SAFETY-NET	0.09**	0.00	-0.08**	0.01
CSTAND	-0.00	-0.01	-0.12***	0.10***
INDEP	-0.01	-0.00	-0.47***	-0.30***
GOVCONT50	-0.09**	0.01	0.26***	0.02
CONTROLCF	-0.06*	0.05	0.24***	-0.21***
ACCT	0.02	-0.06	-0.41***	-0.11***

Panel C: Correlation coefficients of the independent variables

	SIZE	RISK	ROA	RGDP	BANK	PROMPT	EGOVERN	SAFETY-NET	CSTAND	INDEP	GOVCONT50	CONTROLCF	ACCT
SIZE	1.00												
RISK	-0.41***	1.00											
ROA	-0.21***	0.34***	1.00										
RGDP	-0.20***	0.17***	0.58***	1.00									
BANK	0.30***	-0.39***	-0.45***	-0.24***	1.00								
PROMPT	-0.06	0.39***	-0.14***	-0.23***	0.10**	1.00							
EGOVERN	0.04	-0.05**	0.57***	0.42***	-0.35***	-0.61***	1.00						
SAFETY-NET	0.19***	0.08*	-0.09**	-0.26***	0.02	0.65***	-0.32***	1.00					
CSTAND	0.06	0.18***	0.13***	0.11***	0.22***	-0.18***	0.20***	-0.28***	1.00				
INDEP	-0.04	0.25***	0.57***	0.45***	-0.21***	-0.08**	-0.58***	-0.11***	0.27***	1.00			
GOVCONT50	0.06	-0.31***	-0.12***	-0.06	-0.15***	-0.67***	0.35***	-0.52***	0.03	-0.31***	1.00		
CONTROLCF	0.27***	-0.41***	-0.04	-0.04	-0.05	-0.30***	0.27***	-0.06	-0.25***	-0.01	0.22***	1.00	
ACCT	0.17***	0.30***	0.32***	0.09**	-0.18***	0.38***	0.29***	0.47***	-0.07*	0.35***	-0.19***	0.02	1.00

Table 4
Models of changes in bank capital ratios

This table reports the regression results of estimating the relation between changes in the capital ratios and a set of bank-specific, country macro and country policy and regulatory factors over the period 1992-2005. The change in the capital ratios specified as the dependent variable are 1) the ratio of a banking organization's book value equity to the banking organization's book value total assets and 2) the ratio of a banking organization's book value Tier 1 capital to the banking organization's book value Basel I risk-weighted assets (Risk-based capital). The coefficient on the lagged capital ratio (*LAGGED KRATIO*) gives the rate of adjustment of the bank towards its capital structure. The coefficients on the remaining variables give their contribution to the bank's capital target. The bank-specific variables are the log of total assets (*SIZE*); banking organization's Basel I risk-weighted assets (RWA) divided by its total assets (*RISK*); and the banking organization's net income divided by the average of its on-balance sheet assets at the beginning and end of the year (*ROA*). The country macro variables are is the percentage change in real gross domestic product (*RGDP*) and bank assets to nominal gross domestic product (*BANK*). The bank-specific and country macro variables are lagged one period. The set of country policy and regulatory variables includes Barth, Caprio, and Levine's (2006) "Prompt Corrective Action" variable, (*PROMPT*), a version of the external governance index derived by Barth, Bertus, Hartarska, Jiang, and Phumiwasana (2007) (*EGOVERN*); Demirgüç-Kunt and Detragiache's (2002) moral hazard variable, (*SAFETY-NET*); "Overall Capital Stringency" variable, (*CSTAND*), and "Independence of Supervisory Authority" variable, (*INDEP*); La Porta, Lopez-de-Silanes, and Shleifer's (2002) "share of the assets of the top 10 banks in a given country controlled by the government at the 50 percent level" variable, (*GOVCONT50*); and the difference between control rights and cash flow rights, (*CONTROLCF*). The control variable is an indicator variable capturing the accounting standard used in the various countries. *ACCT* takes the value of 1 if the bank is reporting in the International Accounting Standards or U.S. GAAP, zero otherwise. Fixed time effects are included in all specification. Country fixed effects are included in the column (2). The numbers in parentheses below the coefficient estimates are t-statistics; * indicates significance at the 10% level; ** indicate significance at the 5% level; and *** indicate significance at the 1% level. We use Rogers' standard errors to perform the tests of the hypotheses for the constant and *LAGGED KRATIO* (see Rogers, 1993; and Williams, 2000). All other tests of significance are Wald tests of the significance of the variable's contribution to the target's capital ratio (i.e., the regression coefficient on that variable divided by the rate of adjustment coefficient (coefficient on *LAGGED KRATIO*)).

Variables	ΔLEVERAGE				ΔTIER1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CONSTANT	1.6915 (2.31) **	2.7771 (3.50) ***	1.7094 (2.32) **	1.8532 (2.25) **	3.0578 (3.00) ***	4.7475 (4.19) ***	2.8804 (2.73) ***	3.3002 (2.77) ***
LAGGED KRATIO	0.1162 (4.87) ***	0.1958 (6.21) ***	0.1231 (4.81) ***	0.1826 (6.11) ***	0.2118 (6.83) ***	0.2922 (7.88) ***	0.2124 (6.70) ***	0.2613 (7.45) ***
Bank-specific								
SIZE	-0.7234 (-2.38) **	-0.5093 (-2.70) ***	-0.6308 (-2.12) **	-0.5516 (-2.80) ***	-0.2335 (-1.17)	-0.4086 (-2.79) ***	-0.1783 (-0.91)	-0.3569 (-2.19) **

RISK	7.7826 (4.72) ***	2.5752 (2.06) **	7.2488 (4.90) ***	3.2242 (2.49) **	-4.1690 (-3.11) ***	-2.1893 (-1.89) *	-4.3044 (-3.17) ***	-2.3013 (-1.86) *
ROA	0.7794 (1.68) *	0.3473 (0.76)	0.4289 (0.74)	0.4359 (0.90)	0.8296 (2.48) **	0.2526 (0.64)	0.4569 (0.97)	-0.0494 (-0.10)
Country Macro								
RGDP	------	------	10.0507 (0.66)	10.1354 (0.95)	------	------	17.4432 (1.36)	6.6273 (0.63)
BANK	------	------	-0.4087 (-1.64)	-0.7726 (-3.77) ***	------	------	-0.1733 (-0.98)	-0.0122 (-0.07)
Country policy and regulatory								
PROMPT	------	------	------	0.4444 (4.07) ***	------	------	------	-0.1051 (-1.03)
EGOVERN	------	------	------	0.5548 (3.12) ***	------	------	------	0.4216 (2.44) **
SAFETY-NET	------	------	------	0.0300 (0.25)	------	------	------	0.2007 (1.59)
CSTAND	------	------	------	0.3899 (2.76) ***	------	------	------	-0.1236 (-0.75)
INDEP	------	------	------	-0.5628 (-1.68) *	------	------	------	0.1121 (0.29)
GOVCONT50	------	------	------	-0.0302 (-1.41)	------	------	------	-0.0370 (-1.71) *
CONTROLCF	------	------	------	-0.0348 (-1.86) *	------	------	------	-0.0321 (-1.20)
Controls								
ACCT	1.0302	-0.8029	1.0205	-0.2549	0.1073	-0.2835	0.1600	-0.5095
	(1.84) *	(-1.61)	(1.90) *	(-0.51)	(0.28)	(-0.64)	(0.41)	(-1.05)
Country fixed effects	No	Yes	No	No	No	Yes	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.0836	0.1224	0.0851	0.1207	0.1609	0.2004	0.1631	0.1883
F-statistic	4.28 ***	4.12 ***	4.01 ***	4.29 ***	7.90 ***	6.60 ***	7.32 ***	6.57 ***
Number of observations	649	649	649	649	649	649	649	649

Table 5
Models of changes in bank capital ratios - with interactions between bank importance in a country and government asset share and a country's policy and regulatory variables

This table reports the regression results of estimating the relation between changes in the capital ratios and a set of bank-specific, country macro and country policy and regulatory factors over the period 1992-2005. The change in the capital ratios specified as the dependent variable is the ratio of a banking organization's book value equity to the banking organization's book value total assets. The coefficient on the lagged capital ratio (*LAGGED KRATIO*) gives the rate of adjustment of the bank towards its capital structure. The coefficients on the remaining variables give their contribution to the bank's capital target. The bank-specific variables are the log of total assets (*SIZE*); banking organization's Basel I risk-weighted assets (RWA) divided by its total assets (*RISK*); and the banking organization's net income divided by the average of its on-balance sheet assets at the beginning and end of the year (*ROA*). The country macro variables are is the percentage change in real gross domestic product (*RGDP*) and bank assets to nominal gross domestic product (*BANK*). The bank-specific and country macro variables are lagged one period. The set of country policy and regulatory variables includes Barth, Caprio, and Levine's (2006) "Prompt Corrective Action" variable, (*PROMPT*), a version of the external governance index derived by Barth, Bertus, Hartarska, Jiang, and Phumiwasana (2007) (*EGOVERN*); Demirgüç-Kunt and Detragiache's (2002) moral hazard variable, (*SAFETY-NET*); "Overall Capital Stringency" variable, (*CSTAND*), and "Independence of Supervisory Authority" variable, (*INDEP*); La Porta, Lopez-de-Silanes, and Shleifer's (2002) "share of the assets of the top 10 banks in a given country controlled by the government at the 50 percent level" variable, (*GOVCONT50*); and the difference between control rights and cash flow rights, (*CONTROLCF*). The control variable is an indicator variable capturing the accounting standard used in the various countries. *ACCT* takes the value of 1 if the bank is reporting in the International Accounting Standards or U.S. GAAP, zero otherwise. Fixed time effects are included in all specification. Country fixed effects are included in the column (2). The numbers in parentheses below the coefficient estimates are t-statistics; * indicates significance at the 10% level; ** indicate significance at the 5% level; and *** indicate significance at the 1% level. We use Rogers' standard errors to perform the tests of the hypotheses for the constant and *LAGGED KRATIO* (see Rogers, 1993; and Williams, 2000). All other tests of significance are Wald tests of the significance of the variable's contribution to the target's capital ratio (i.e., the regression coefficient on that variable divided by the rate of adjustment coefficient (coefficient on *LAGGED KRATIO*)).

Variables	ΔLEVERAGE
CONSTANT	7.9554 (3.03) ***
LAGGED KRATIO	0.2145 (6.10) ***
Bank-specific	
SIZE	-0.2792 (-1.55)
RISK	-2.0081 (-0.19)
ROA	0.2799 (0.63)
Country Macro	
RGDP	4.2284 (0.47)

BANK	-15.8783 (-1.88)	*
Country policy and regulatory		
PROMPT	1.3709 (1.70)	*
EGOVERN	-4.8815 (-3.37)	***
SAFETY-NET	-1.0221 (-1.49)	
CSTAND	1.7187 (1.37)	
INDEP	3.7479 (1.39)	
GOVCONT50	0.1755 (1.41)	
CONTROLCF	0.0985 (0.87)	
Interactions		
PROMPT *x* RISK	-0.5616 (-0.61)	
EGOVERN *x* RISK	2.9103 (2.24)	**
SAFETY-NET *x* RISK	0.3959 (0.40)	
CSTAND *x* RISK	-2.1961 (-1.27)	
INDEP *x* RISK	-3.5221 (-1.09)	
GOVCONT50 *x* RISK	-0.1172 (-0.72)	
CONTROLCF *x* RISK	-0.2870 (-1.85)	*
PROMPT *x* BANK	-0.0096 (-0.02)	
EGOVERN *x* BANK	1.9332 (2.66)	***
SAFETY-NET *x* BANK	0.3508 (1.80)	*
CSTAND *x* BANK	-0.3566 (-0.75)	
INDEP *x* BANK	-0.7230 (-0.77)	
GOVCONT50 *x* BANK	-0.0750 (-2.20)	**
CONTROLCF *x* BANK	-0.0675 (-1.42)	
Adjusted R-squared	0.1354	
F-statistic	3.48	***
Number of observations	649	

Table 6
Relation between the level of the capital ratio, bank-specific and country policy and regulatory factors over the period 1992-2005

This table reports the regression results of estimating the relation between the level of the capital ratio and bank-specific and country policy and regulatory factors. The capital ratios specified as the dependent variable are 1) the ratio of a banking organization's book value equity to the banking organization's book value total assets and 2) the ratio of a banking organization's book value Tier 1 capital to the banking organization's book value Basel I risk-weighted assets (Risk-based capital). The bank-specific variables are the log of total assets (*SIZE*); banking organization's Basel I risk-weighted assets (RWA) divided by its total assets (*RISK*); and the banking organization's net income divided by the average of its on-balance sheet assets at the beginning and end of the year (*ROA*). The country macro variables are is the percentage change in real gross domestic product (*RGDP*) and bank assets to nominal gross domestic product (*BANK*). The bank-specific and country macro variables are lagged one period. The set of country policy and regulatory variables includes Barth, Caprio, and Levine's (2006) "Prompt Corrective Action" variable, (*PROMPT*), a version of the external governance index derived by Barth, Bertus, Hartarska, Jiang, and Phumiwasana (2007) (*EGOVERN*); Demirgüç-Kunt and Detragiache's (2002) moral hazard variable, (*SAFETY-NET*); "Overall Capital Stringency" variable, (*CSTAND*), and "Independence of Supervisory Authority" variable, (*INDEP*); La Porta, Lopez-de-Silanes, and Shleifer's (2002) "share of the assets of the top 10 banks in a given country controlled by the government at the 50 percent level" variable, (*GOVCONT50*); and the difference between control rights and cash flow rights, (*CONTROLCF*). The control variable is an indicator variable capturing the accounting standard used in the various countries. *ACCT* takes the value of 1 if the bank is reporting in the International Accounting Standards or U.S. GAAP, zero otherwise. Fixed time effects are included in all specification. Country fixed effects are included in the columns (2) and (5). The numbers in parentheses below the coefficient estimates are t-statistics; * indicates significance at the 10% level; ** indicate significance at the 5% level; and *** indicate significance at the 1% level. We use Rogers' standard errors to perform the tests of the hypotheses (see Rogers, 1993; and Williams, 2000).

Variables	LEVERAGE Capital Ratio				TIER1 Capital Ratio			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CONSTANT	7.6067 (5.85) ***	11.4899 (9.08) ***	11.1816 (7.85) ***	9.2835 (7.22) ***	19.7432 (15.59) ***	19.3924 (13.59) ***	19.7986 (15.34) ***	18.5209 (12.36) ***
Bank-specific								
SIZE	-0.3275 (-5.19) ***	-0.4297 (-7.19) ***	-0.4543 (-6.04) ***	-0.4632 (-7.95) ***	-0.4917 (-8.16) ***	-0.5002 (-7.67) ***	-0.4638 (-7.59) ***	-0.5237 (-8.19) ***
RISK	6.1604 (18.36) ***	3.0936 (7.44) ***	5.0409 (15.78) ***	3.5861 (8.69) ***	-5.3841 (-11.69) ***	-4.6690 (-10.09) ***	-5.5718 (-12.08) ***	-4.6051 (-10.79) ***
ROA	1.4353 (16.38) ***	0.6879 (5.14) ***	1.2262 (10.74) ***	0.8437 (6.29) ***	1.2378 (13.32) ***	0.5937 (4.00) ***	1.1348 (9.24) ***	0.5875 (3.71)
Country Macro								

RGDP	------	------	-4.8496 (-1.78) *	-5.6625 (-1.97) **	------	------	-0.0583 (-0.02)	-5.4829 (-1.50)
BANK	------	------	-0.2732 (-3.55) ***	-0.5066 (-7.38) ***	------	------	-0.1915 (-3.40) ***	-0.1892 (-3.07) ***
Country policy and regulatory								
PROMPT	------	------	------	0.2293 (7.84) ***	------	------	------	-0.0257 (-0.68)
EGOVERN	------	------	------	0.4493 (9.21) ***	------	------	------	0.4122 (5.68) ***
SAFETY-NET	------	------	------	-0.0373 (-1.19)	------	------	------	0.0504 (1.21)
CSTAND	------	------	------	0.2290 (5.43) ***	------	------	------	-0.0257 (-0.45)
INDEP	------	------	------	-0.4249 (-4.73) ***	------	------	------	-0.2704 (-1.74) *
GOVCONT50	------	------	------	-0.0291 (-4.93) ***	------	------	------	-0.0467 (-5.70) ***
CONTROLCF	------	------	------	-0.0248 (-4.74) ***	------	------	------	0.0108 (0.80)
Controls								
ACCT	-2.0424	-0.1951	0.7370	0.1434	0.4420	-0.0780	0.4274	-0.1643
	(-7.68) ***	(-1.70) *	(6.61) ***	(1.16)	(3.56) ***	(-0.49)	(3.37) ***	(-0.10)
Country fixed effects	No	Yes	No	No	No	Yes	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.7049	0.7973	0.7392	0.7915	0.4491	0.5770	0.4567	0.5366
F-statistic	97.76 ***	92.03 ***	97.67 ***	95.59 ***	32.07 ***	32.57 ***	29.67 ***	29.86 ***
Number of observations	649	649	649	649	649	649	649	649