

# Bank Capital Regulation and Dividend Policy

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## ABSTRACT

Building upon five recent world-wide surveys on bank regulation (Barth et al., 2001, 2004, 2006, 2008, 2012 and Čihák et al., 2012), we contribute to this assessment by examining whether bank capital requirement relevance of banks' dividend payout policy. Based on an un-balanced panel analysis of 9,127 observations in 83 countries over the period 1999 to 2012, we find that greater capital requirement regulation stringency is significantly and negatively associated with bank's dividend payout. We also find the capital regulatory pressure not only pronouncedly explains dividend payout during the financial crisis but also in developed countries. However, the capital regulatory pressure was only effective in limiting dividend payouts by undercapitalized banks in non-developed countries. Our findings are valuable for regulatory reforms that are being discussed among policymakers.

***Keywords:*** *Dividend Policy, Bank Capital Regulation, Basel III*

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## 1. Introduction

Commercial bank dividend payouts have recently received great attention from regulators and investors especially over the recent banking and financial crisis which started in 2007. Not only recent proposal to increase oversight of the dividend payouts by the Federal Reserve Board (FRB, 2011) and the Basel Committee on Banking Supervision (BCBS, 2011) point towards the increasing regulatory relevance of banks' dividend payout policy, but also anecdotal evidence suggests that banks restrictions on dividends should be included in a set of sanctions for banks that do not satisfy certain capital requirements in terms of solvency and liquidity (Brunnermeier et al., 2009)<sup>1</sup>. Such measures are also relevant to the Basel III framework (Caruana, 2010).<sup>2</sup> In addition, capital adequacy and bank dividend policy constitute two important pillars for sound and prudent management and are closely entwined (Onali, 2010).

The purpose of this paper is to contribute to the assessment by examining whether government capital requirement relevance of banks' dividend payout policy. We addressed by five worldwide surveys on bank regulation and supervision conducted by Barth et al., (2001, 2004, 2006, 2008, 2012) and Čihák et al., (2012) under the auspices of the World Bank. The five surveys provide a comprehensive and detailed picture of differences in bank capital requirement regulation in countries, thereby proving an excellent opportunity to examine whether government capital requirement relevance of banks' dividend payout policy.

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<sup>1</sup> For example, Bank of China (Hong Kong) payout ratio would be 40 per cent to 60 per cent from this year, down from 60 per cent to 70 per cent previously, because of increased capital requirements from the Hong Kong Monetary Authority and the Basel III international standard, which will be fully implemented in 2019.

<sup>2</sup> In the wake of the 2007-09 financial crisis, regulators were heavily criticized for the inadequate amount of minimum capital required by their framework (see Allen and Carletti, 2010; Goodhart and Persaud, 2008). To address this inadequacy, the Basel III proposal incorporates a more challenging definition of capital and strengthens the capital requirements.

Banks only have limited possibilities to strengthen their capital base. Given that banks could issue new equity raising capital from external resources there was quite expensive for banks. Banks might also decide to reduce the supply of credit (see Buch and Prieto, 2012; Hyun and Rhee, 2011). However, policymakers surely do not favor a reduction to bank lending in an economic crisis because there are fears that a negative shock to credit supply could further hurt the economy activity (see Walsh and Wilcox, 1995; Akhter et al., 2010). The last way for banks can also improve their capitalization by cutting or even omitting dividend payments.<sup>3</sup> In fact, Mayne (1980) has noted that U.S. banks used dividend cuts to improve their capital base in the banking crisis of the years 1973 to 1976. Boldin and Leggett (1995) have argued that retained earnings were the primary source of capital for the U.S. banking industry after the savings and loan crisis. However, Bessler and Nohel (1996) have pointed out that bank managers in the U.S. were reluctant to cut dividend in the 1980s despite suffering losses. Some observe seem to fear that investors and financial analysts could interpret a reduction of dividend payments as a negative signal indicating future problems. More recently, the empirical evidence from the European banking industry indicate that dividend signaling and/or dividend smoothing are not relevant economic phenomena (Basse et al., 2014). Abreu and Gulamhussen (2013) construct U.S. bank holding companies to the study the dividend policy in the context of the 2007-09 financial crisis and show signaling and regulatory pressure hypothesis only applies to the period during the financial crisis.

Given these controversial discussions about dividend cuts we collect and analyze a new and comprehensive data set from Bankscope database over the period 1999 to

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<sup>3</sup> For instance, not only Citigroup cuts its dividend only in November 2008 but also the Federal Reserve in early 2012 did not want to permit Citigroup to raise its dividend in order improve the ability of the bank to cope with future financial shocks. Besides, JP Morgan and Sells Fargo, while recipients of the Troubled Asset Relief Program (TARP) capital in fall 2008, cut dividends as late as February and March 2009, respectively.

2012. A major finding of our study is the essential macroeconomic role is also an important reason for banks being subject to special capital regulatory requirements. Our finding support the government capital regulation may also affect the payout policy of banks (e.g., Rozeff, 1982; Bessler and Nohel, 1995). In other words, banks would consider cutting or omitting dividend to improve their financial strength and satisfy the government capital requirement regulation. However, the capital requirement impact on dividend policy depends on macroeconomic conditions, i.e., more significantly during the financial crisis. Our results also indicate more profitable and low growth banks pay more dividends and also support the dividend smoothing hypothesis in all periods. The agency cost hypothesis on the other hand only applies to the period during the financial crisis. In addition, the capital requirement regulatory pressure more pronouncedly explains dividend payout in developed countries. Finally, the capital requirement regulatory pressure was only effective in limiting dividend payouts by undercapitalized banks in non-developed countries. We obtain the similar results in a dynamic setting, where we explore of changes in bank capital requirement regulation on the change in bank's dividend payout to account for potential time-invariant unobservable factors that might affect both the capital requirement regulation and bank's dividend payout.

The remainder of the paper is organized as follows. Section 2 discusses our data sources and presents the measure and summary statistics of our variables. We present our empirical results and discuss their implications in section 3. Section 4 provides some robustness tests as check on our findings. Finally, section 5 concludes the paper with a discussion of the policy implications.

## *2. Data and Variables*

### *2.1 Data*

The dataset use in this study is compiled two main sources: (1) The Bankscope database provided by Bureau van Dijk and Fitch Ratings, which has comprehensive coverage of banks in a large number of countries and accounts for over 90% of all banking assets in each country. The information for each bank consists of detailed balance sheet and income statement data, and (2) the Barth et al., (2001, 2004, 2006, 2008, 2012) and Čihák et al., (2012) datasets on bank regulation, supervision and monitoring, which is a comprehensive database compiled from the answers provided by official regulator and supervisory authorities.

We match the bank-level information with bank capital requirement regulation measures to explore the link between capital requirement regulation and bank's dividend payout. Since this database is available at only five point in time we use information from Version I for bank observations over the period 1999-2000, from Version II for bank observations over the period 2001-2003, from Version III for bank observations over the period 2004-2005, from Version IV for bank observations over the period 2005-2007, from Version V for bank observations over the period 2008-2012.<sup>4</sup> Data for the market structure and macroeconomic conditions are collected from World Bank's World Development Indicators (WDI). The final sample consists of 9,127 bank observations in the 83 countries over the period 1999 to 2012. We focus on commercial banks and bank holding companies because they have homogeneous objective functions.<sup>5</sup>

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<sup>4</sup> We tried some alternative ways to assign values, such as moving all the thresholds one year before or one year later and find the results to be quite robust. Another way was to try a longer time period but consistent results are obtained in the case as well.

<sup>5</sup> We also calculate the average bank's dividend payout ratio during the reference period as well as the independent and control variable on the corresponding reference period. One advantage of using data averaged over the reference period is that we smooth variables that vary over time (Demirguc-Kunt et al., 2004), Furthermore, due to the incomplete overlap among the datasets and missing firm-level and banking sector variables (Barth et al., 2013). To save space, we do not report these results; the tenor of the results remains unchanged and they are available from the authors upon request.

To better illustrate the features of relationship between bank capital requirement regulation and bank's dividend payout, we graphically present in Figure 1 time-series trend of bank capital requirement regulation and bank's dividend payout for our sample period. We observe that there are two obviously downward trends for the bank's dividend payout. One is during 2000-2002 which have the U.S. internet bubble; the other is during 2007-2009 which have the financial crisis. Therefore, we split our sample into four sub-period during the internet bubbles (1999 to 2002); before the financial crisis (2003 to 2007); during the financial crisis (2007 to 2009) and after financial crisis (2010 to 2012). Furthermore, on average, it is intuitive that there is a negative relationship between bank capital requirement regulation and bank's dividend payout

[Figure 1 inserted here]

## 2.2 Variables

### 2.2.1 Dependent Variables

We use the dividend payout (*Dividend payout*) as the dependent variable and constructed it by the dividend to net income ratio for each reference period.<sup>6</sup>

### 2.2.2 Independent variable: Capital Stringency

*Capital Index* is an index of capital requirements that accounts for both initial and overall capital stringency. Initial capital stringency indicates whether the source of funds that count as regulatory capital can include assets other than cash or government securities and borrowed funds, as well as whether the regulatory or supervisory authorities verify these sources of capital. Overall capital stringency

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<sup>6</sup> We also follow Abreu and Gulamhussen (2013) to used total assets to scale dividends to ensure that the results were not driven by stock price and earnings volatility associated with the financial crisis. To save space, we do not report these results; the tenor of the results remains unchanged and they are available from the authors upon request.

indicates whether risk elements and value losses are considered while calculating the regulatory capital. The index can take values between 0 and 10, with higher values indicating more stringent capital requirements.<sup>7</sup>

### 2.2.3 Control variables-Firm level

There have been some important studies to discuss dividend policy issue from the perspective of banking industry. Gupta and Walker (1975) have shown that bank dividends are related to corporate profit, total asset growth and liquidity. Mayne (1980) show larger banks seem to pay higher dividends. Boldin and Leggett (1995) have found empirical evidence supporting the dividend signaling hypothesis. Fama and French (2001) identified three common characteristics of dividend payers, which we also control in our study: size, profitability and growth opportunities. We measure bank size (*Size*) through the natural log of the total assets for the reference period. Profitable banks are expected to pay put higher dividends; therefore, a positive relationship between profitability and dividend payout is expected. We measure profitability by the average of the net income to total assets (*ROA*) ratio. Bank with high growth opportunities are expected to plowback their earnings to avoid costly equity and debt financing. We captured this effect through the annualized rate of growth off total assets (*Growth*) throughout the reference period.

Since banks are regulated, the degree of regulatory pressure should capture the differences in the dividend payouts across distinct degrees of capitalization and risk appetites. We follow Arbeu and Gulamhussen (2013) to measure firm-level regulatory pressure (*Tier 1 Leverage Ratio*) as the tier 1 leverage ratio (tier 1 capital to assets) and employ nonperforming loan to total asset (*NPL*) ratio to represent bank risk appetites. Additionally, we also follow Arbeu and Gulamhussen (2013) to consider

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<sup>7</sup> The detailed information on capital requirement index variable is provided in the Appendix Table A1.

that regulators increase their pressure on banks when banks are approaching the minimum levels of capital and not only when those level are breached. Therefore, the banks considered to be subject to increased regulatory pressure are those classified as “undercapitalized”. For the purpose of this variable, we include a dummy *PCA* assumes a value of unity if a bank does not meet at least one of these following threshold were consider threshold of 8% for the tier 1 risk weighted capital ratio (tire 1 capital/ risk-weighted assets) and 7% for the tier1 leverage ratio (tire 1 capital/ total asset). In order to test the hypothesis that when faced grater regulatory pressure, the undercapitalized banks tend to plowback their earnings than well capitalized banks, we consider the interaction of *Capital Index* index with *PCA* and negative relationship is expected between *Capital Index \* PCA* and *Dividend payout*.

The agency cost hypothesis states that dividends counterbalance the increased need for monitoring associated with banks with dispersed shareholders. We used the commonly deployed independence Indicator (*Independence*) developed by Bankscope to capture the effect of agency costs. This indicator classifies the degree of independence of firms from their shareholders.<sup>8</sup> Based on the data for the end of the period under analysis, the dummy *Independence* assumes a value of unity for the most independent banks and zero for all the others. In addition, dividend smoothing hypothesis states that dividends are smoothed from year to year. Therefore, we also include the lag value of dividend payout (*Dividend<sub>t-1</sub>*).

#### 2.2.4 Control variables-Country level

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<sup>8</sup> Variable equal to “A” if attached to any company with known recorded shareholders none of which having more than 25% of direct or total ownership. Variable equal to “B” if attached to any company with a known recorded shareholder none of which with an ownership percentage (direct, total or calculated total) over 50%, but having one or more shareholders with an ownership percentage above 25%. Variable equal to “C” if attached to any company with a recorded shareholder with a total or a calculated total ownership over 50%. Variable equal to “D” if any company with a recorded shareholder with a direct ownership of over 50%; and “U” if there is an unknown degree of independence from the shareholders. The 25% threshold for ownership concentration is used in other studies of corporate governance (see, for example, Andres, 2008; Arbu and Gulamhussen, 2013)

The empirical analysis also includes several country-level variables to control for differences in economic development and institutions across countries (Bhattacharyya, 2007). We include the natural logarithm of the GDP (*LNGDP*) to capture the size of an economy and most importantly, we control for inflation (*Inflation*) in an economy. Basse (2009) has suggested that inflation may be relevant arguing that this important macroeconomics variable is a major driver of dividend growth. All the variable definitions are provided in the Table 1.

[Table 1 inserted here]

To answer the question regarding the effects of *Capital Index* on *Dividend payout*, we implement the panel regression with random effect and follow Petersen (2009) to estimate standard error cluster by firm.<sup>9</sup>

### 2.3 Summary Statistics

We present the sample summary statistics in Table 2. The dividend payouts deteriorated during the sample period. That is, the dividend payouts decreased from an average 31.6% before the financial crisis to 30.4% and 25.1% during the financial crisis and after the financial crisis. Besides, the banks facing increased capital regulatory pressure rose sharply during the sample period (from *Capital Index* of 6.370 to 7.223).

[Table 2 inserted here]

In Table 3, we provide pairwise correlation of the variables in our sample. The correlations between *Dividend payout* and *Capital Index* are significantly negative.

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<sup>9</sup> We also estimated our model with Tobit regression and the findings proved to be qualitatively similar, we do not report the tables for the sake of brevity.

Most of the correlation coefficients are below 0.3, which makes us comfortable with simultaneously including these variables in the estimated models.

[Table 3 inserted here]

### 3. Empirical Results

#### 3.1 Regression Results

We present the baseline findings of our model in Table 4, considering *Capital Index* to capture the effect of capital requirement pressure (Model (1)), and additionally *PCA* and its interaction with *Capital Index* (Model (2)) to capture the effect of capital regulatory pressure on undercapitalized banks. Our results show that the coefficient of *Capital Index* is negative and significant related with *Dividend Payout*, i.e. the more stringent capital requirements decrease the dividend payout of banks. This finding is as similar as Kroszner and Strahan (1996), Carow et al. (2004), Theis and Dutta (2004) and Abreu and Gulamhussen (2013). The variable deployed to capture *PCA* is also negative and significant related with *Dividend Payout* when consider in isolation (Model (2)), and its interaction with *Capital Index*, *Capital Index \*PCA*, is negative but insignificant related *Dividend Payout* i.e. undercapitalized banks (bank subject to regulatory pressure) are expected to plow back the earnings to build their capital buffers.

Table 4 also provides findings related to the control variables. The findings indicate that the Fama and French (2001) characteristics of dividend payers can be applied to banks: *ROA* is positively and significantly related with and *Growth* is negatively and significantly related with *Dividend Payout* i.e. more profitable banks paid larger dividend payouts, and banks with low historical growth opportunities also paid more dividends. These findings are consistent with previous studies (Casey and

Dickens, 2000; Collins et al., 1994; Dickens et al., 2002; Abreu and Gulamhussen, 2013). In terms of the variable used to capture the effect of firm-level regulatory pressure, as expected *Tier 1 Leverage Ratio* is positively and significantly related with dividend payout, i.e. the more levered banks retained their earnings to rebuild their capital buffers, a finding that is consistent with the findings of Kroszner and Strahan (1996), Carow et al. (2004), Theis and Dutta (2009) and Abreu and Gulamhussen (2013).<sup>10</sup> The estimation of *NPL* coefficient is negatively significant, indicating non-performing loan erosion the bank's profit and retained earnings inducing reduce the bank's dividend payout. *Dividend Payout<sub>t-1</sub>* is also positive and significant, thereby proving clear support for the existence of dividend smoothing effect. However, *Independence* has no significant impact on *Dividend Payout*. We think bank regulation also reduce agency costs borne by the shareholders of a firm by providing an external monitoring instance. Thus, the agency cost problem is less important for banks (Allen, 2001).

[Table 4 inserted here]

### 3.2.2 *Sample split by period*

We present the findings for the sub- period during the internet bubbles (1999 to 2002); before the financial crisis (2003 to 2007); during the financial crisis (2007 to 2009) and after financial crisis (2010 to 2012) in Table 5. The evidence shows that the coefficient of *Capital Index* is negative and significant related with *Dividend Payout* only holds during the financial crisis, a period during in which regulators exerted more capital pressure on banks with low capital buffers.

[Table 5 inserted here]

### 3.2.3 *Sample split by macroeconomic condition*

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<sup>10</sup> We also replaced *Tier 1 leverage ratio* by lag one period (*Tier 1 leverage ratio<sub>t-1</sub>*) to estimate our model and the findings proved to be qualitatively similar. The detailed results are provided in the Appendix Table A2.

Table 6 presents the results of two subsamples from developed and non-developed countries.<sup>11</sup> We find that the effects of capital requirement regulation in developed countries are statistically significant and consistent with our previous results. However, there are some different results in non-developed countries. Especially, the undercapitalized banks plow back earnings to recapitalize themselves only holds in non-developed countries (the coefficient associated with *Capital Index \*PCA* is statistically significant and negative). In other words, undercapitalized banks (banks subject to capital requirement regulatory pressure) in non-developed countries are expected to pay out less of their earnings as dividends, instead using the earnings for recapitalization.

[Table 6 inserted here]

#### *4. Robustness Check: Bank Capital Requirement Regulation Changes*

As Barth et al. (2008) point out, a large number of banking regulatory reforms have occurred in various countries over the past decade. Since these reforms arguably have had a meaningful effect on the requirement environment, it is interesting to explore how the efficiencies of banks have responded to these regulatory changes. We compare the bank regulatory environment in year 2001 (using Survey I) with year 2008 (using Survey IV) and in year 2008 with year 2012 (using Survey V) to examine the effects of capital requirement regulatory changes on bank's dividend payout changes, we use the first differencing estimation with three sub-periods (corresponding to the three surveys). The empirical results are presented in Table 7.

[Table 7 inserted here]

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<sup>11</sup> According to the World Economic Situation and Prospects definition, we split our sample into developed and non-developed countries. In addition, we also based the GDP to split our sample into high GDP and Low GDP countries. The detailed results are provided in the Appendix Table A3.

As can be seen from the Table 7, the empirical results are highly robust to our previous findings. We find that the changes in capital regulatory stringency are negatively associated with the changes in bank's dividend payout. The control variables also yield similar results.

## *5. Conclusion*

The recent financial crisis has enhanced the interest as a result of the unique macroeconomic setting and the regulatory shifts that occurred during this period. We construct a comprehensive dataset to study the relationship between government capital requirement regulation and bank's dividend payout. Our main findings indicate the capital requirement impact on dividend policy depends on macroeconomic conditions, i.e., more significantly during the financial crisis. Our findings also indicate more profitable and low growth banks pay more dividends and also support the dividend smoothing hypothesis in all periods. The agency cost hypothesis on the other hand only applies to the period during the financial crisis. In addition the capital requirement regulatory pressure more pronouncedly explains dividend payout in developed countries. Finally, the capital requirement regulatory pressure was only effective in limiting dividend payouts by undercapitalized banks in non-developed countries. We think our findings are valuable for government to determine the bank supervisory policy in the future.

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*Table 1 Variable Definition*

Variables	Definition
<b>Dependent Variable</b>	
<i>Dividend Payout</i>	The dividends to net income
<b>Independent Variable</b>	
<i>Capital Index</i>	According Barth et al.(2001; 2004; 2006; 2008 ; 2012) survey on bank regulation and supervision. Overall capital stringency indicates whether risk elements and value losses are considered while calculating the regulatory capital. The index can take values between 0 and 10, with higher values indicating more stringent capital requirements.
<b>Control Variables</b>	
<i>Dividend<sub>t-1</sub></i>	Lag one period of dividend payout
<i>Size</i>	The natural logarithm of the total assets
<i>ROA</i>	The net income to total asset
<i>Growth</i>	The annualized growth rate of total assets
<i>Tier 1 Leverage Ratio</i>	Tier 1 capital divided by total assets
<i>NPL</i>	Non-performing loan divided by total assets
<i>PCA</i>	Dummy that assumes the value of unity if the bank is not well capitalized, considering thresholds of 8% for the tier 1 risk-weighted capital ratio and 7% for the tier 1 leverage ratio
<i>Independence</i>	Dummy that assumes the value of unity for the most independent banks (classified as “ A” in the Bankscope Independent Indicator )and zero for all the others
<i>LNGDP</i>	he natural logarithm of the GDP
<i>Inflation</i>	The annualized growth rate of CPI

Table 2 Summary Statistics

	<i>Dividend</i>	<i>Capital</i>	<i>Dividend<sub>t-1</sub></i>	<i>Size</i>	<i>ROA</i>	<i>Growth</i>	<i>Tier 1</i>	<i>Independence</i>	<i>NPL</i>	<i>PCA</i>	<i>LN_GDP</i>	<i>Inflation</i>
		<i>Index</i>					<i>Leverage Ratio</i>					
<b>Full Sample : 1999-2012 (# of obs.=9,127)</b>												
Mean	0.293	6.873	0.297	16.215	0.563	0.119	0.090	0.246	0.325	0.082	21.819	0.030
Median	0.258	7.000	0.261	15.519	0.625	0.071	0.080	0.000	0.009	0.000	23.054	0.028
Std. Dev.	0.268	1.018	0.274	2.984	0.237	0.250	0.054	0.431	1.635	0.274	2.054	0.028
<b>Internet Bubble : 1999-2002 (# of obs.=1,653)</b>												
Mean	0.313	6.370	0.314	15.310	0.638	0.134	0.084	0.170	0.014	0.087	22.326	0.022
Median	0.260	6.000	0.253	14.464	0.658	0.078	0.075	0.000	0.004	0.000	23.021	0.024
Std. Dev.	0.293	0.940	0.298	2.745	0.160	0.312	0.042	0.376	0.026	0.282	1.683	0.018
<b>Before Financial Crisis : 2003-2006 (# of obs.=2,482)</b>												
Mean	0.316	6.689	0.318	16.369	0.627	0.132	0.087	0.262	0.014	0.123	21.922	0.027
Median	0.279	7.000	0.286	15.541	0.648	0.078	0.077	0.000	0.005	0.000	23.134	0.027
Std. Dev.	0.265	1.020	0.268	3.113	0.164	0.240	0.058	0.440	0.023	0.328	2.156	0.020
<b>During Financial Crisis : 2007-2009 (# of obs.=2,296)</b>												
Mean	0.304	7.021	0.313	16.540	0.625	0.135	0.091	0.250	0.015	0.095	21.396	0.036
Median	0.283	7.000	0.289	16.094	0.645	0.083	0.080	0.000	0.006	0.000	21.677	0.029
Std. Dev.	0.268	1.104	0.271	2.878	0.163	0.269	0.056	0.433	0.026	0.293	2.123	0.041
<b>After Financial Crisis : 2010-2012 (# of obs.=2,696)</b>												
Mean	0.251	7.223	0.255	16.351	0.406	0.084	0.096	0.275	1.067	0.030	21.774	0.032
Median	0.205	7.000	0.208	15.808	0.519	0.051	0.088	0.000	0.031	0.000	23.397	0.027
Std. Dev.	0.251	0.803	0.262	2.986	0.303	0.190	0.054	0.447	2.875	0.170	2.026	0.022

Table 3 Correlation matrix

	<i>Dividend</i>	<i>Capital</i> <i>Index</i>	<i>Dividend<sub>t-1</sub></i>	<i>Size</i>	<i>ROA</i>	<i>Growth</i>	<i>Tier 1 Leverage</i> <i>Ratio</i>	<i>NPL</i>	<i>PCA</i>	<i>Independence</i>	<i>LNGDP</i>
<i>Capital Index</i>	-0.109										
<i>Dividend<sub>t-1</sub></i>	0.839	-0.126									
<i>Size</i>	0.007	-0.035	0.027								
<i>ROA</i>	0.060	-0.156	0.023	0.017							
<i>Growth</i>	-0.085	0.014	-0.056	0.080	0.039						
<i>Tier 1</i> <i>Leverage Ratio</i>	0.064	-0.053	0.078	0.270	0.064	-0.096					
<i>NPL</i>	-0.068	0.041	-0.063	0.009	0.096	0.005	0.015				
<i>PCA</i>	-0.060	-0.071	-0.022	0.265	0.146	-0.080	-0.263	0.063			
<i>Independence</i>	0.009	-0.010	0.007	0.140	0.002	-0.070	-0.098	-0.025	0.084		
<i>LNGDP</i>	-0.033	-0.079	-0.057	-0.33 9	0.140	-0.157	-0.015	-0.087	-0.028	0.078	
<i>Inflation</i>	-0.121	0.263	-0.127	0.103	-0.003	0.256	0.201	0.160	-0.144	-0.084	-0.433

*Table 4 Regression Results-Full Sample*

	Model (1)		Model (2)		Model (3)	
<i>Intercept</i>	0.250	(0.037)***	0.288	(0.040)***	0.285	(0.040)***
<i>Capital Index</i>			-0.005	(0.002)**	-0.005	(0.002)**
<i>Dividend<sub>t-1</sub></i>	0.600	(0.008)***	0.598	(0.008)***	0.598	(0.008)***
<i>Size</i>	0.000	(0.001)	-0.001	(0.001)	-0.001	(0.001)
<i>ROA</i>	0.028	(0.009)***	0.026	(0.009)***	0.026	(0.009)***
<i>Growth</i>	-0.023	(0.008)***	-0.023	(0.008)***	-0.023	(0.008)***
<i>Tier 1 Leverage Ratio</i>	0.177	(0.044)***	0.180	(0.044)***	0.180	(0.044)***
<i>NPL</i>	-0.006	(0.001)***	-0.006	(0.001)***	-0.006	(0.001)***
<i>PCA</i>	-0.049	(0.008)***	-0.049	(0.008)***	-0.021	(0.042)
<i>Independence</i>	0.007	(0.006)	0.008	(0.006)	0.007	(0.006)
<i>LNGDP</i>	-0.005	(0.001)***	-0.005	(0.001)***	-0.005	(0.001)***
<i>Inflation</i>	-0.140	(0.086)	-0.093	(0.088)	-0.094	(0.088)
<i>Capital Index*PCA</i>					-0.004	(0.006)
<i># of obs.</i>	9,127		9,127		9,127	
<i># of banks</i>	2,027		2,027		2,027	
<i>R-square: within</i>	0.090		0.091		0.091	
<i>between</i>	0.705		0.704		0.705	
<i>overall</i>	0.473		0.473		0.473	

Table 5 Sample Split by period

	Model (1)		Model (2)		Model (3)	
<b>Panel A: Internet Bubble</b>						
<i>Intercept</i>	0.191	(0.134)	0.225	(0.139)	0.207	(0.138)
<i>Capital Index</i>			-0.007	(0.007)	-0.002	(0.007)
<i>PCA</i>	-0.047	(0.025)*	-0.044	(0.025)*	0.215	(0.136)
<i>Capital Index*PCA</i>					-0.040	(0.020)*
<i>Control Variables</i>	Yes		Yes		Yes	
<i># of obs.</i>	1,653		1,653		1,653	
<i># of banks</i>	725		725		725	
<i>R-square</i>	0.590		0.589		0.594	
<b>Panel B: Before Financial Crisis</b>						
<i>Intercept</i>	0.385	(0.072)***	0.410	(0.079)***	0.409	(0.079)***
<i>Capital Index</i>			-0.004	(0.005)	-0.003	(0.005)
<i>PCA</i>	-0.050	(0.015)***	-0.050	(0.015)***	-0.043	(0.070)
<i>Capital Index*PCA</i>					-0.001	(0.011)
<i>Control Variables</i>	Yes		Yes		Yes	
<i># of obs.</i>	2,482		2,482		2,482	
<i># of banks</i>	962		962		962	
<i>R-square</i>	0.682		0.681		0.681	
<b>Panel C: During Financial Crisis</b>						
<i>Intercept</i>	0.258	(0.089)***	0.353	(0.095)***	0.353	(0.096)***
<i>Capital Index</i>			-0.012	(0.004)***	-0.012	(0.005)***
<i>PCA</i>	-0.048	(0.016)***	-0.048	(0.016)***	-0.046	(0.075)
<i>Capital Index*PCA</i>					0.000	(0.010)
<i>Control Variables</i>	Yes		Yes		Yes	
<i># of obs.</i>	2,296		2,296		2,296	
<i># of banks</i>	1,269		1,269		1,269	
<i>R-square</i>	0.552		0.550		0.550	
<b>Panel D: After Financial Crisis</b>						
<i>Intercept</i>	0.410	(0.065)***	0.472	(0.080)***	0.480	(0.080)***
<i>Capital Index</i>			-0.007	(0.005)	-0.008	(0.005)
<i>PCA</i>	-0.090	(0.022)***	-0.089	(0.022)***	-0.384	(0.243)
<i>Capital Index*PCA</i>					0.040	(0.033)
<i>Control Variables</i>	Yes		Yes		Yes	
<i># of obs.</i>	2,696		2,696		2,696	
<i># of banks</i>	1,322		1,322		1,322	
<i>R-square</i>	0.664		0.663		0.663	

Table 6 Sample Split by macroeconomic condition

	Developed Countries				Non-developed countries			
	Model (1)		Model (2)		Model (3)		Model (4)	
<i>Intercept</i>	0.264	(0.057)***	0.269	(0.058)***	0.428	(0.066)***	0.415	(0.066)***
<i>Capital Index</i>	-0.010	(0.004)***	-0.011	(0.004)***	-0.004	(0.003)	-0.003	(0.003)
<i>Dividend<sub>t-1</sub></i>	0.616	(0.009)***	0.616	(0.009)***	0.482	(0.018)***	0.481	(0.018)***
<i>Size</i>	0.000	(0.001)	0.000	(0.001)	0.002	(0.002)	0.002	(0.002)
<i>ROA</i>	0.029	(0.011)***	0.029	(0.011)***	-0.007	(0.019)	-0.008	(0.019)
<i>Growth</i>	-0.021	(0.010)**	-0.021	(0.010)**	-0.046	(0.014)***	-0.046	(0.014)***
<i>Tier 1 Leverage Ratio</i>	0.263	(0.058)***	0.263	(0.058)***	0.050	(0.074)	0.054	(0.074)
<i>NPL</i>	-0.009	(0.002)***	-0.009	(0.002)***	-0.002	(0.002)	-0.002	(0.002)
<i>PCA</i>	-0.046	(0.010)***	-0.076	(0.055)	-0.055	(0.018)***	0.088	(0.065)
<i>Independence</i>	0.010	(0.007)	0.010	(0.007)	0.007	(0.011)	0.005	(0.011)
<i>LNGDP</i>	-0.004	(0.002)**	-0.004	(0.002)**	-0.012	(0.003)***	-0.012	(0.003)***
<i>Inflation</i>	0.700	(0.183)***	0.698	(0.183)***	-0.440	(0.108)***	-0.440	(0.107)***
<i>Capital Index*PCA</i>			0.004	(0.008)			-0.021	(0.009)**
# of obs.	6,948		6,948		2,179		2,179	
# of banks	1,432		1,432		595		595	
R-square: within	0.113		0.112		0.035		0.038	
between	0.729		0.729		0.605		0.608	
overall	0.499		0.499		0.385		0.386	

*Table 7 Robustness Check: Changes Regression Results*

	Model (1)		Model (2)	
<i>Intercept</i>	0.288	(0.040)***	0.285	(0.040)***
$\Delta$ <i>Capital Index</i>	-0.005	(0.002)**	-0.005	(0.002)**
$\Delta$ <i>Dividend</i> <sub>t-1</sub>	0.598	(0.008)***	0.598	(0.008)***
$\Delta$ <i>Size</i>	-0.001	(0.001)	-0.001	(0.001)
$\Delta$ <i>ROA</i>	0.026	(0.009)***	0.026	(0.009)***
$\Delta$ <i>Growth</i>	-0.023	(0.008)***	-0.023	(0.008)***
$\Delta$ <i>Tier 1 Leverage Ratio</i>	0.180	(0.044)***	0.180	(0.044)***
$\Delta$ <i>NPL</i>	-0.006	(0.001)***	-0.006	(0.001)***
<i>PCA</i>	-0.049	(0.008)***	-0.021	(0.042)
<i>Independence</i>	0.008	(0.006)	0.007	(0.006)
$\Delta$ <i>LNGDP</i>	-0.005	(0.001)***	-0.005	(0.001)***
$\Delta$ <i>Inflation</i>	-0.093	(0.088)	-0.094	(0.088)
$\Delta$ <i>Capital Index*PCA</i>			-0.004	(0.006)
<i># of obs.</i>	1,154		1,154	
<i>R-square</i>	0.067		0.071	

Figure 1 Time Series Trend of Capital Index and Dividend

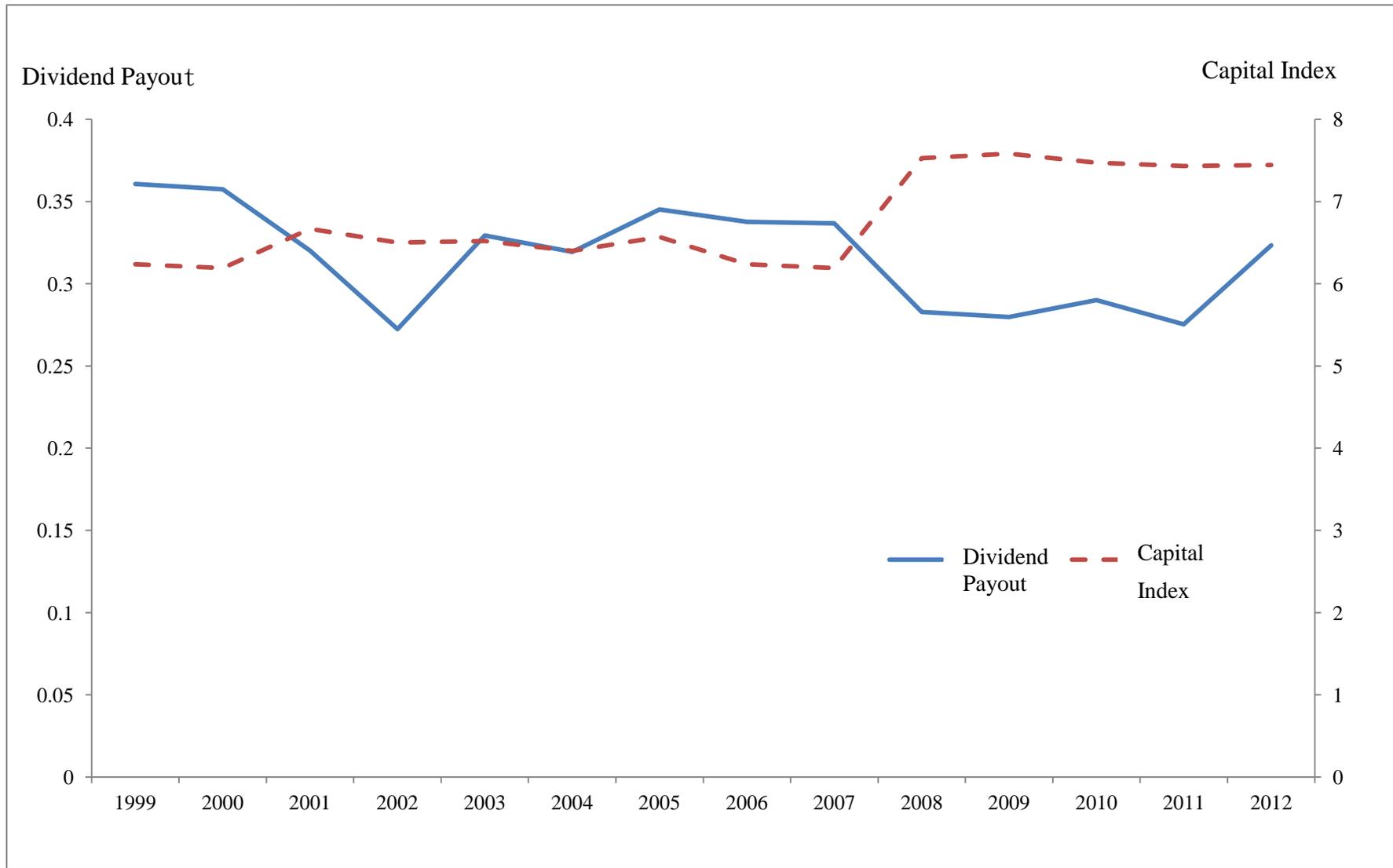


Table A1 Information on capital requirement index

<i>Variable</i>	<i>Definition</i>	<i>Source and Quantification</i>	<i>World Bank Question</i>
(a)Overall Capital Stringency	Whether the capital requirement reflects certain risk elements and deducted certain market value losses from capital before minimum capital adequacy is determined.	3.1.1+3.2+3.3+3.9.1+3.9.2+3.9.3+(1 if 3.7<0.75) Yes=1, No=0 Higher values indicating greater stringency.	3.1.1 Is the minimum capital-asset ratio requirement risk weighted in line with the Basel I guidelines? Yes / No 3.2 Does the minimum ratio vary as a function of an individual bank's credit risk? Yes / No 3.3 Does the minimum ratio vary as a function of market risk? Yes / No 3.9 Before minimum capital adequacy is determined, which of the following are deducted from the book value of capital ? 3.9.1 Market value of loan losses not realized in accounting books? Yes/No 3.9.2 Unrealized losses in securities portfolios? Yes / No 3.9.3 Unrealized foreign exchange losses? Yes / No 3.7 What fraction of revaluation gains is allowed as part of capital?
(b)Initial Capital Stringency	Whether certain funds may be used to initially capitalize a bank and whether they are officially verified.	1.5 : Yes=1, No=0 ; 1.6&1.7 : Yes=0, No=1 Higher values indicating greater stringency.	1.5 Are the sources of funds to be used as capital verified by the regulatory/supervisory authorities? Yes / No 1.6 Can the initial disbursement or subsequent injections of capital be done with assets other than cash or government securities? Yes / No 1.7 Can initial disbursement of capital be done with borrowed funds? Yes / No
(c)Capital Regulator y Index	The sum of (a) and (b).	(a)+ (b) Higher values indicating greater stringency.	

Table A2 Regression Results— Full Sample (include Tier 1 Leverage Ratio<sub>t-1</sub>)

	Fixed effect						Random effect					
	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)		Model (6)	
<i>Intercept</i>	0.457	(0.073)***	0.497	(0.075)***	0.487	(0.075)***	0.216	(0.038)***	0.253	(0.041)***	0.250	(0.042)***
<i>Capital Index</i>			-0.008	(0.003)**	-0.006	(0.004)*			-0.005	(0.002)**	-0.005	(0.002)*
<i>LAGDIV</i>	0.280	(0.011)***	0.279	(0.011)***	0.279	(0.011)***	0.600	(0.008)***	0.599	(0.008)***	0.599	(0.008)***
<i>Size</i>	-0.002	(0.002)	-0.001	(0.002)	-0.001	(0.002)	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)
<i>ROA</i>	0.043	(0.012)***	0.041	(0.012)***	0.042	(0.012)***	0.029	(0.009)***	0.028	(0.009)***	0.028	(0.009)***
<i>Growth</i>	-0.005	(0.009)	-0.006	(0.009)	-0.006	(0.009)	-0.016	(0.009)*	-0.017	(0.009)*	-0.016	(0.009)*
<i>Tier 1 Leverage Ratio<sub>t-1</sub></i>	0.171	(0.075)**	0.168	(0.075)**	0.169	(0.075)**	-0.070	(0.044)	-0.071	(0.044)	-0.071	(0.044)
<i>NPL</i>	-0.008	(0.001)***	-0.008	(0.001)***	-0.008	(0.001)***	-0.006	(0.001)***	-0.006	(0.001)***	-0.006	(0.001)***
<i>PCA</i>	-0.009	(0.012)	-0.009	(0.012)	0.061	(0.055)	-0.044	(0.009)***	-0.044	(0.009)***	-0.017	(0.044)
<i>Independence</i>	0.033	(0.044)	0.032	(0.044)	0.033	(0.044)	0.007	(0.006)	0.007	(0.006)	0.007	(0.006)
<i>LNGDP</i>	-0.012	(0.003)***	-0.012	(0.003)***	-0.012	(0.003)***	-0.005	(0.001)***	-0.005	(0.001)***	-0.005	(0.001)***
<i>Inflation</i>	0.281	(0.137)**	0.309	(0.138)**	0.306	(0.138)**	-0.138	(0.091)	-0.093	(0.093)	-0.094	(0.093)
<i>Capital Index *PCA</i>					-0.010	(0.008)					-0.004	(0.006)
<i># of obs.</i>	8,776		8,776		8,776		8,776		8,776		8,776	
<i># of banks</i>	1,946		1,946		1,946		1,946		1,946		1,946	
R-square:												
<i>within</i>	0.099		0.100		0.100		0.092		0.092		0.092	
<i>between</i>	0.568		0.571		0.570		0.708		0.707		0.707	
<i>overall</i>	0.414		0.417		0.416		0.475		0.475		0.475	

Table A3 Regression Results: Sample Split by GDP

	High GDP Countries				Low GDP Countries			
	Model (1)		Model (2)		Model (3)		Model (4)	
<i>Intercept</i>	0.413	(0.060)***	0.418	(0.060)***	0.571	(0.236)***	0.591	(0.237)***
<i>Capital Index</i>	-0.008	(0.003)***	-0.009	(0.003)***	-0.005	(0.006)	-0.003	(0.006)
<i>Dividend<sub>t-1</sub></i>	0.604	(0.009)***	0.604	(0.009)***	0.504	(0.033***)	0.498	(0.033)***
<i>Size</i>	-0.002	(0.001)**	-0.002	(0.001)*	0.000	(0.003)	0.000	(0.003)
<i>ROA</i>	0.036	(0.010)***	0.036	(0.010)***	-0.020	(0.035)	-0.021	(0.035)
<i>Growth</i>	-0.031	(0.009)***	-0.031	(0.009)***	-0.063	(0.036)*	-0.062	(0.036)*
<i>Tier 1 Leverage Ratio</i>	0.238	(0.048)***	0.238	(0.048)***	0.264	(0.189)	0.269	(0.189)
<i>NPL</i>	-0.010	(0.002)***	-0.010	(0.002)***	-0.001	(0.004)	-0.001	(0.004)
<i>PCA</i>	-0.047	(0.010)***	-0.088	(0.052)*	-0.030	(0.032)	0.147	(0.156)
<i>Independence</i>	0.012	(0.006)*	0.012	(0.006)*	0.025	(0.024)	0.022	(0.024)
<i>LNGDP</i>	-0.009	(0.002)***	-0.009	(0.002)***	-0.022	(0.013)*	-0.024	(0.013)*
<i>Inflation</i>	0.154	(0.135)	0.156	(0.135)	-0.291	(0.157)*	-0.296	(0.157)*
<i>Capital Index*PCA</i>			0.006	(0.008)			-0.026	(0.022)
<i># of obs.</i>	7,597		7,597		591		591	
<i># of banks</i>	1,629		1,629		195		195	
<i>R-square: within</i>	0.092		0.092		0.095		0.096	
<i>          between</i>	0.711		0.711		0.586		0.585	
<i>          overall</i>	0.476		0.476		0.490		0.491	