# Bank Regulation and Supervision Ten Years after the Global Financial Crisis

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## Abstract

This paper summarizes the latest update of the World Bank Bank Regulation and Supervision Survey. The paper explores and summarizes the evolution in bank capital regulations, capitalization of banks, market discipline, and supervisory power since the global financial crisis. It shows that regulatory capital increased, but some elements of capital regulations became laxer. Market discipline may have deteriorated as the financial safety nets became more generous after the crisis. Bank supervision became stricter and more complex compared with the pre–global financial crisis period. However, supervisory capacity did not increase in proportion to the extent and complexity of new bank regulations. The paper documents the importance of defining bank regulatory capital narrowly, as the quality of capital matters in reducing bank risk. This is particularly true for large banks, because they have more discretion in the computation of risk weights and are better able to issue a variety of capital instruments.

# Bank Regulation and Supervision Ten Years after the Global Financial Crisis

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# 1    Introduction

Banking crises often uncover weaknesses in the design and implementation of bank regulation and supervision. The latest 2007-2009 global financial crisis (GFC) was no different, and it has sparked a heated discussion on the lessons to be learned and how to design efficient and safer banking systems. One clear outcome of the GFC has been a period of intense regulation, with several initiatives put in motion to address the flaws that were revealed during the crisis. To analyze the progress in regulatory reforms and the determinants of these changes, we rely on the fifth update of The World Bank - Bank Regulation and Supervision Survey (henceforth the 2019 BRSS or 'round 5'), which we also introduce and describe in detail in this paper.

There is widespread agreement that the GFC was caused by excessive risk-taking by financial institutions and thin capital cushions to cover for unexpected financial losses (see, for instance, The World Bank (2012) and references therein). Excessive leverage was facilitated by a disproportionate reliance on wholesale funding. Excessive risk-taking was also fueled by lower lending standards, inaccurate credit ratings, and complex structured instruments. Moreover, the prospect of bank default did not deter speculative investments because of the expectation that failing institutions would be rescued in case of trouble (Caprio et al., 2010). By the same token, poorly designed and managed deposit insurance schemes enabled banks to take on excessive risk (Anginer and Demirgüç-Kunt, 2018). Limitations in supervisory enforcement measures and in market discipline (i.e., the capacity and incentives of market participants to monitor and influence bank health) exacerbated the issue by not providing the external checks needed to affect bank risk-taking behavior. To compound matters, misaligned incentives in the supervisory framework undermined the effectiveness of supervisory monitoring due to lack of enforcement of the existing rules (Barth et al., 2012). Market discipline may have also weakened because of distorted incentives of market players and lack of available information to objectively assess the risk and value of financial institutions and instruments.

In this paper, we concentrate on three critical elements underlying the 2007-2009 financial turmoil: capital regulations and holdings, market discipline and banking supervision (Caprio et al., 2010). We define capital regulations as quantitative capital requirements and the degree of stringency in the definition of regulatory capital. Market discipline captures the capacity and incentives of market participants to monitor and influence bank health. We show that on average the level of regulatory capital held by banks was higher by the end of 2016 than at the end of 2010. The levels of the highest loss-absorbency types of capital had also increased over time, indicative of a positive effect brought about by the new Basel III capital framework and regulatory capital reforms enacted at the country level. Many countries also introduced a binding leverage ratio to limit the adverse effects of financial leverage on bank stability. We take these developments as good signs since previous analysis using BRSS data from 2010 (round 4) showed that bank capital ratios were lower in countries that experienced a crisis in 2007-2009 than in others (Cihak et al. 2013). Those results also showed that incentives for the private sector to monitor banks' risk were weaker in countries that experienced a crisis.

However, and contrary to the positive trends for capital ratios, the definition of capital became less stringent since a higher percentage of countries allow for the inclusion of hybrid debt capital instruments, asset revaluation gains and subordinated debt in calculating tier 1 capital.[2] We also document that 115 countries have now introduced a formal deposit insurance system (compared with 86 in 2010) and that in some instances the schemes have become more generous than before the crisis. This may have dampened the monitoring incentives of depositors. Furthermore, we present some descriptive evidence that points to an increase in the complexity of bank supervision that has not been met by a comparable increase in the number of bank supervisors, in their training nor experience.

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[2] According to the definition of the Basel Committee on Banking Supervision, tier 1 capital comprises Common Equity Tier 1 (CET1)— the highest quality component of capital, essentially common shares and retained earnings—or additional Tier 1 instruments (AT1)—other regulatory capital instruments that meet the criteria for inclusion in the Tier 1 capital (Basel Committee on Banking Supervision, 2011).

While the univariate comparisons over time describe changes in regulation and supervision in broad terms, they cannot explain why countries chose the approaches that they did. We therefore turn to regressions to investigate the factors that were associated with changes in bank regulation and supervision, focusing specifically on capital regulation. We confirm that the countries that experienced a crisis were more likely to increase their capital requirements. In particular, these crisis countries were more likely to increase their capital holdings as reflected in their tier 1 capital ratios. But those increases hinge on what constitutes tier 1 capital in the numerator and on the way risk-weighted assets are calculated in the denominator of the tier 1 capital ratio. For other, simpler measures of capital adequacy such as the leverage ratio, banks in crisis countries showed no statistically significant improvement. We then examine the impact of risk-weights and tier 1 stringency on solvency risk using bank level data. Examining over 20,000 banks in 158 countries, we find that controlling for the overall level of capital, bank risk is more sensitive to regulatory capital if a higher share of capital is in the form of higher quality tier 1 capital. We also find that bank risk is more sensitive to regulatory capital ratios and risk-weights if the domestic regulators impose greater stringency on what constitutes higher quality capital. Finally, when we examine the motives for the adoption of the latest capital regulations, we find evidence of peer country effects in three new capital regulations that have been implemented in the aftermath of the global financial crisis. In particular, we show that countries were more likely to adopt Basel III and countercyclical and conservation capital buffers if countries in the same region also adopted these new capital regulations.

The rest of the paper is organized as follows. Section 2 summarizes the implementation of the survey and presents some evidence on a subset of questions focusing on capital regulation, private monitoring by market participants and supervisory monitoring. Section 3 analyzes the drivers of post-crisis changes in capital regulation and their impact on bank risk. Section 4 discusses policy implications and concludes.

## 2 Implementation and update of the 2019 BRSS

The fifth round of the World Bank - Bank Regulation and Supervision Survey was completed in 2019. The survey encompasses information on 160 jurisdictions listed in Appendix I, including two monetary areas (Euro Area and the West African Economic and Monetary Union), 66 high-income countries and 93 emerging and developing economies. [3] These include all G-20 countries and countries from all the World Bank developing regions, as reported in Figure 1, Panel A and B.

**Figure 1: Number of countries by income group and region – BRSS 2019**
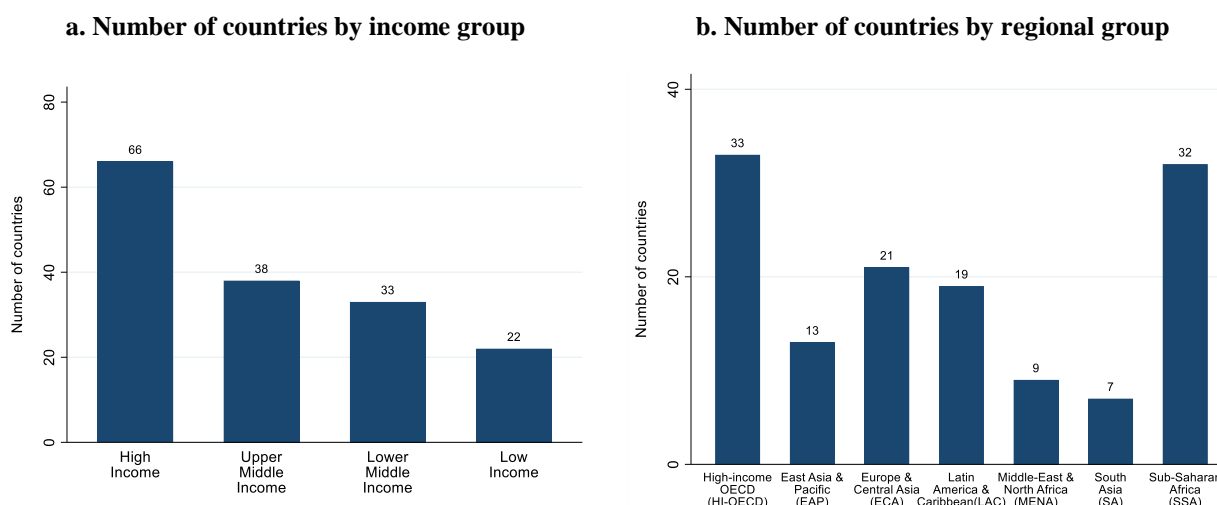


Source: Wave 5, BRSS.
Note: In Panel A, we use classifications drawn from The World Bank - World Development Indicators (WDI). In Panel B, we use a combination of classifications from the WDI, the Organisation for Economic Co-operation and Development (OECD) and the Financial Stability Board (2010). Off-shore financial centers are excluded from Panel B. For further detail on country groupings in the HI OECD category and the World Bank developing regions, please see Appendix I. The developing region definitions are based on World Bank country classifications as described in Anginer and Demirgüç-Kunt, (2014a).

The questionnaire builds on previous rounds while adding new questions on recent regulatory developments that characterized the period 2011-2016 such as the Basel III capital and liquidity requirements, bank resolution mechanisms and macroprudential supervision.[4] Specifically, compared to the

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[3] The 2019 Bank Regulation and Supervision Survey and previous iterations are available at: http://www.worldbank.org/en/research/brief/BRSS. Notice that questionnaires have been received from 159 jurisdictions and the European Central Bank (the ECB). Since October 2014, the ECB has overseen directly significant banking institutions in the Euro Area.

[4] The description and implementation of the previous rounds of the survey appear in Barth et al. (2001, 2006 and 2008) and Čihák et al. (2012). For a comprehensive view of all four rounds of the survey, see Barth et al. (2013).

BRSS 2011-2012 (i.e., round 4), there are 91 new questions and a new section on Islamic banking, bringing the total number of questions to 361.[5] The final list of questions included in the fifth round of the BRSS reflects feedback from several banking experts, both within the World Bank and external, who suggested re-wording of questions from the previous round and the inclusion of new questions.

The questionnaire was distributed in March 2017 using the survey platform Qualtrics and addressed to the directors of banking supervision units or relevant officials within bank supervisory authorities. However, 30 agencies opted to submit a hard copy of the questionnaire. To limit coding errors, the survey team regularly communicated with the national authorities and clarified the intended meaning of the BRSS questions. The survey team checked each submission and followed up with the relevant agencies to clarify any issues arising from conflicting answers to various questions or consistency between responses in the current survey and the preceding one. [6]

Because the data and questionnaire are available online, the discussion that follows presents results from a subset of questions focusing on capital regulation, market discipline, and supervisory monitoring. As alluded to above, these aspects of regulation and supervision have been identified as being crucial differences between countries that experienced a banking crisis during the GFC and countries that did not (Cihak et al., 2013). In Appendix II, we take a more comprehensive approach and report a list of questions organized by survey section where we identify regulatory and supervisory aspects that are different between high-income countries and emerging and developing economies (definitions of these groups appear at the beginning of Appendix II).

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[5] Just two questions have been discontinued, and a total of 12 questions do not match exactly between the two most recent surveys. Most of the questions have been re-drafted or changed to improve clarity and lessen measurement error concerns.

[6] For instance, selecting the Basel II framework as capital framework in place during the period 2011-2016 and then reporting 2018 as the year of adoption of Basel II.
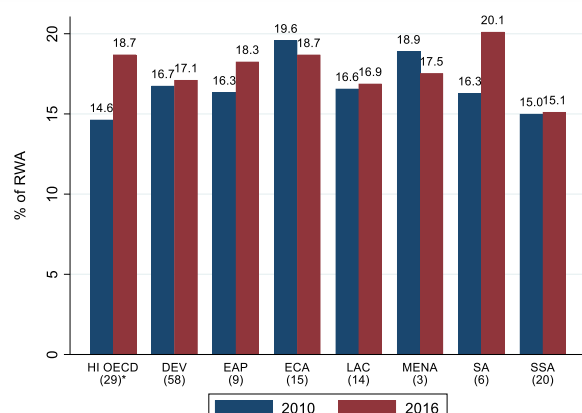
## 2.1 *Capital regulation*

The GFC highlighted the risk of having thin capital buffers to cover unexpected losses. Across the world there has been a trend toward increasing the minimum regulatory capital requirements to improve banking system resilience. The increase in the minimum regulatory capital requirement has translated into higher levels of actual holdings of regulatory capital. This is particularly true for high-income OECD countries where capital holdings increased from a mean value of 14.6% of risk-weighted assets (RWA) in 2010 to 18.7% of RWA in 2016 (Figure 2, Panel A). Conversely, we do not observe statistically significant differences in the average levels of regulatory capital holdings in developing countries between 2010 and 2016, possibly because they already had higher levels of capital to start with.  Nevertheless, except in South Asia and in ECA, holdings of regulatory capital in developing regions ended up lower than in high-income OECD countries. Moreover, in ECA and MENA we observe a modest decrease in regulatory capital holdings. None of these differences are statistically significant however, suggesting that regulatory capital has not changed much in developing countries.

Another contentious issue brought to the fore of the policy discussion after the GFC was the computation of capital requirements. The adequacy of capital to cover unexpected losses can be achieved by increasing the level and/or quality of regulatory capital or by decreasing total risk exposure (Jones, 2000). The GFC highlighted the crucial importance of defining bank capital narrowly to improve bank performance, especially in times of crisis, and high-loss absorbency components such as common equity should be preferred. Data from the 2019 BRSS shows that levels of Tier 1 capital, the regulatory capital component with the highest capacity for loss absorption, increased significantly over time for high-income OECD countries (5 percentage points), but did not change much for developing countries.  Looking at individual regions reveals some positive (East Asia and South Asia) and negative (ECA and MENA) changes, but again none of these are statistically significant (Figure 2, Panel B).

## Figure 2: Regulatory capital holdings

**a. Mean regulatory capital holdings (% of RWA)**     **b. Mean Tier 1 capital ratio (% of RWA)**
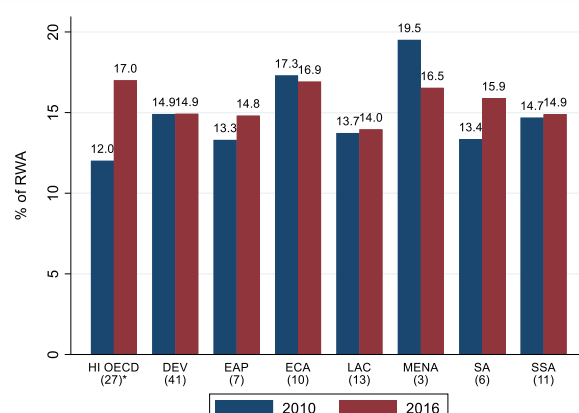


Source: Waves 4 and 5, BRSS.
Note: Off-shore financial centers are excluded from the calculations. DEV are developing countries. Below each regional label, within parentheses, we report the number of countries for which we have a response for the specific item/question for both rounds. For example, a country that has information from round 5 but not round 4 is excluded from the calculation. * next to the number of countries represents a statistically significant difference in the mean value for each regional group in the two reference years at the 10% level using a two-tailed test. In some countries, deductions to Tier 1 capital are applied when this is included in the calculation of total regulatory capital. In addition, the value of Tier 2 capital can be negative. Therefore, the value of Tier 1 capital could be higher than the value of regulatory capital. Moreover, it is worth noting that the definitions of regulatory capital and Tier 1 capital vary over time and depend on the regulatory capital framework that a country has adopted (e.g., Basel I versus Basel III).

Drawing on bank-level information on over 20,000 banks in 158 countries allows us to investigate these trends further, as well as differences across large versus small banks. Large banks are defined as the top 20 percent in terms of total banking assets and small as the bottom 80 percent. Figure 3, Panel A shows that post-GFC increases in the total regulatory capital ratio in high-income OECD countries occurred for both large and small banks. As discussed above, increases in the regulatory capital in developing country banks were modest, given these countries started from much higher levels. We also observe that the regulatory capital held by smaller banks was higher both in high-income OECD, as well as developing countries, though the overall patterns are similar to those of the large banks. Figures 3, Panel B and Panel C also show that improvements in simple leverage ratios (calculated as capital divided by total banking assets) were more limited, and capital increases particularly in high-income OECD countries were largely accompanied by declines in risk-weighted assets (as a share of total assets). Thus, while Figure 2 and Figure 3 Panel A and B suggest that capital buffers increased for banks in high-income OECD countries in the wake of the crisis, Figure 3, Panel C indicates that this conclusion partly hinges on the decline in risk-

weighted assets (RWAs), particularly for the largest banks.[7] The decline in RWAs was less significant in developing countries overall and for smaller banks in general. In summary, the accuracy of measures of risk-weighted assets is a key concern especially for large banks in high-income OECD countries. Experience with risk-weights during the GFC provides a caution: research shows that regulatory capital requirements set as a proportion of risk-weighted assets were mostly dismissed by market participants at the time of the crisis, since those risk exposures did not adequately reflect actual risk (Demirguc-Kunt et al., 2013).

**Figure 3: Bank leverage and risk-weights: large versus small banks**

**a. Average regulatory capital over risk-weighted assets**
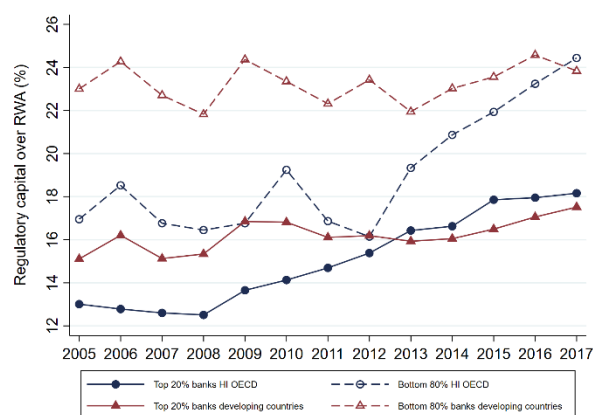


**b. Average capital over total assets**



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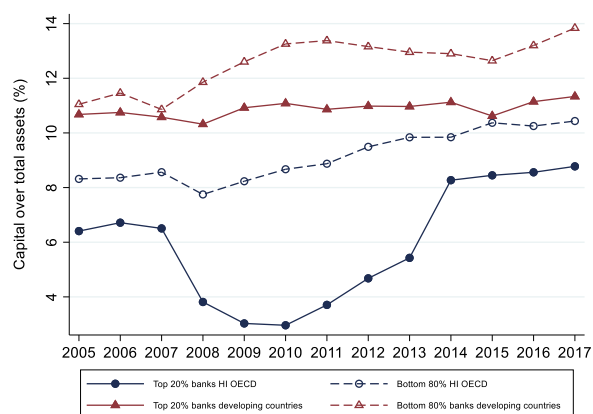
[7] The patterns reported in Figure 3 are similar when we weight banks equally within each country and when we weight the regional average ratios by country GDP levels.

**c. Average risk-weighted assets over total assets**

Beyond the levels of the Tier 1 capital ratio, another aspect of the quality of bank capital is the balance-sheet items allowed in the computation of Tier 1 regulatory capital. As shown in Figure 4, Panels A, B, and C, between BRSS rounds 4 and 5 more countries allowed hybrid debt capital instruments, asset revaluation gains, and subordinated debt to be used in the computation of Ti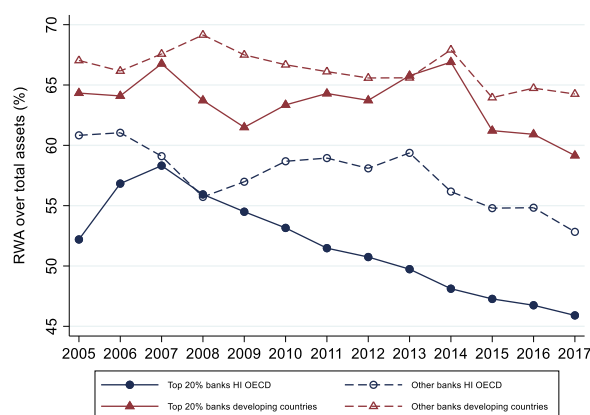er 1 capital, although with important regional differences. In general, a higher proportion of high-income OECD countries allowed alternative capital instruments to be counted as Tier 1 capital. There was also a notable change between wave 4 and wave 5 in the proportion of countries allowing asset revaluation gains and subordinated debt into Tier 1 capital, predominantly for high-income OECD countries and developing countries, specifically for countries in the developing regions EAP, ECA and SSA. Broadening the definition of Tier 1 capital in this way raises at least three concerns, especially for developing countries. First, a broader definition of bank regulatory capital may increase opacity for private monitors in assessing bank risk, an issue highlighted by the GFC (see, for instance, Haldane, 2011). Second, there may be much less liquidity for debt contracts in developing countries where financial markets are less developed. Third, there is inherent complexity in the valuation of hybrid debt capital instruments, asset revaluation gains, and subordinated

debt, placing a greater burden on supervisory authorities that may lack the necessary knowledge and skills to review banks' capital calculations.

**Figure 4: Definition of Tier 1 regulatory bank capital**

**a. Hybrid Debt Capital Instruments allowed into Tier 1 capital (% of respondents answering Yes)**
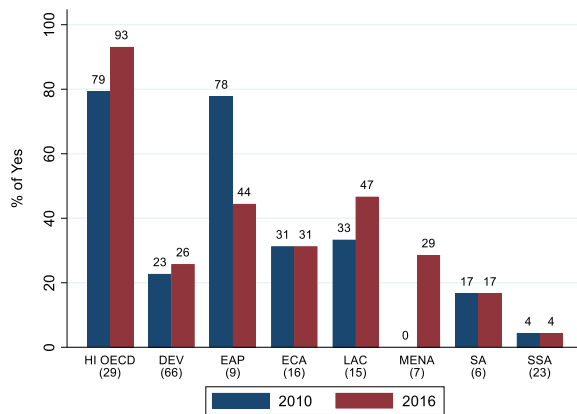
**b. Asset Revaluation Gains allowed into Tier 1 capital (% of respondents answering Yes)**
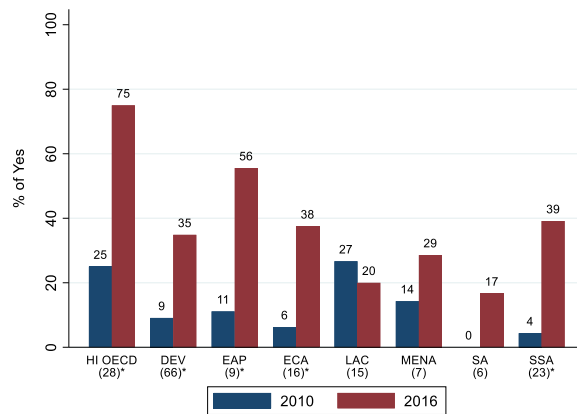
**c. Subordinated Debt allowed into Tier 1 capital (% of respondents answering Yes)**
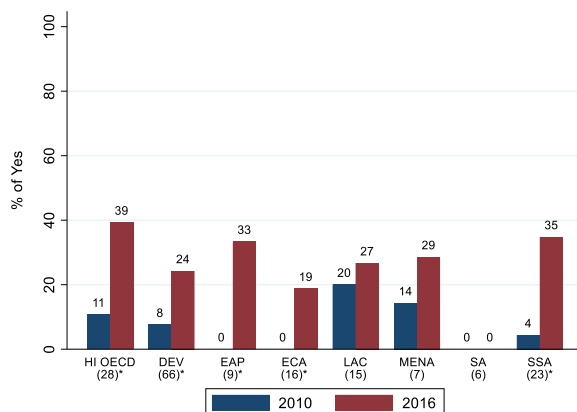


Source: Waves 4 and 5, BRSS.
Note: Off-shore financial centers are excluded from the calculations. DEV are developing countries. The number of countries for which we have a response for the specific item/question for both rounds appears in parentheses. * next to the number of countries represents a statistically significant difference in the mean values for a regional group in the two reference years at the 10% level using a two-tailed test.

Capital regulations also specify the resources needed to capitalize banks initially. Data from round 5 show that some elements used to define the quality of bank capital have been relaxed since round 4, especially for developing regions. For example, 44% of countries in Sub-Saharan Africa answered that the initial disbursement or subsequent injections of capital cannot be done with assets other than cash or

government securities, a lower percentage than in round 4, indicating less stringency in initial capital provision from bank owners (Figure 5, Panel A). In addition, in SSA 48% of countries indicated that initial capital contributions by prospective shareholders cannot be in the form of borrowed funds, a lower percentage than that recorded in round 4 (Figure 5, Panel B). For high-income OECD countries, those ratios were very similar in BRSS rounds 4 and 5. They were, however, substantially lower than for most developing regions, indicating that advanced markets continue to permit a broader set of options for satisfying initial capital requirements.

**Figure 5: Definition of regulatory capital**

**a. Initial disbursement or subsequent injections of capital can be done with assets other than cash or government securities (% of respondents answering No)**

**b. Initial capital contributions by prospective shareholders can be in the form of borrowed funds (% of respondents answering No)**
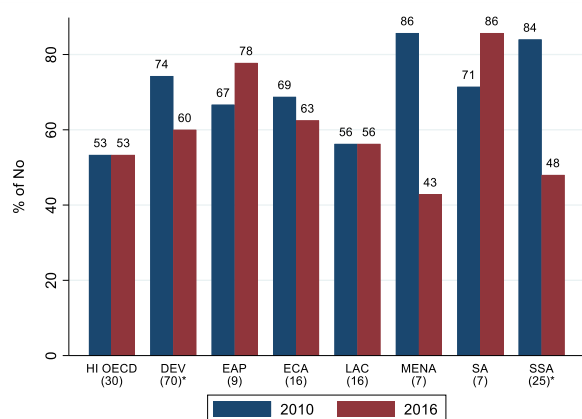


Source: Waves 4 and 5, BRSS.
Note: Off-shore financial centers are excluded from the calculations. DEV are developing countries. The number of countries for which we have a response for the specific item/question for both rounds app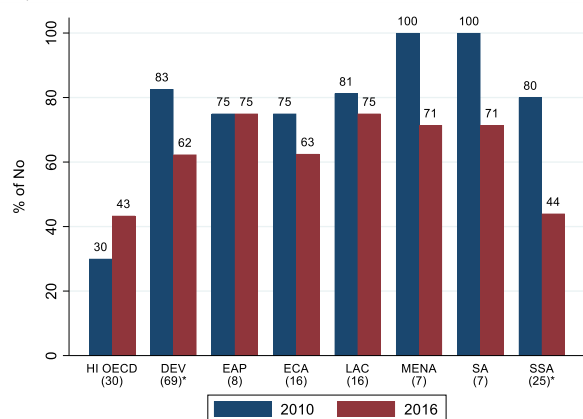ears in parentheses. * next to the number of countries represents a statistically significant difference in the mean values for a regional group in the two reference years at the 10% level using a two-tailed test. In both Panel A and B, a higher number entail greater stringency in the definition of initial capital contributions.

Overall, while tier 1 capital ratios are at their highest levels since the GFC, supervisors would be wise to interpret them with caution. Looking forward, BRSS 5 responses indicate that a wider array of instruments is now permitted to satisfy Tier 1 capital requirements and that non-cash assets including borrowed funds are increasingly permitted in banks' initial capital formation in developing countries. While

we do not have data on the banks that have relied on the new instruments and non-cash options to date, this too is an issue worth monitoring.

## 2.2    *Market discipline*

The latest BRSS survey responses suggest that market discipline may have deteriorated in many countries because of weaker incentives to monitor bank risk-taking. Deposit insurance coverage has become more generous and government interventions in the banking sector to rescue ailing banks have probably undermined the incentives of market participants to monitor their banks' risk-taking behavior. This has likely encouraged banks, especially large banks, to take on more risk. Moreover, the information set available to assess the risk profile of banks has not improved substantially according to the round 5 BRSS responses compared to what was recorded in round 4.

The presence of an explicit deposit insurance scheme can reduce the incentives of depositors to monitor banks (Anginer et al., 2014). Many more countries now have explicit deposit insurance than before the GFC (104 in round 5 versus 86 in round 4 among those countries that responded to both rounds).[8] Moreover, we observe an increase in the generosity of deposit insurance schemes  in all regions, except MENA, as reflected in the share of countries that report that coverage has been broadened, though the change over time is significant only for high-income OECD countries (Figure 6, Panel B). The share of countries that report an increase in the amount covered also increased in high-income OECD countries, ECA and EAP (Figure 6, Panel C). The reach of deposit insurance agencies has also been expanded as a higher share of countries now indicates that the deposit insurance fund can be used for purposes other than depositor protection, such as recapitalization of distressed banks. Those increases are statistically significant

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[8] Considering round 5 submissions only, 115 countries had an explicit deposit insurance scheme at the end of 2016. In addition, the People's Republic of China is not included among the countries that adopted a formal deposit insurance scheme in round 5 because section 8 – Deposit (Savings) protection schemes – of their survey was not completed. Nonetheless, since May 2015, a formal deposit insurance system is in place in this country for all deposit taking institutions. Furthermore, for round 4, data for Tonga and Lesotho have been adjusted, as country officials confirmed that there was not a formal financial safety net operating in the country as per the end of year 2010.

for high-income OECD countries, overall in developing countries, and for the ECA region (Figure 6, Panel D).

Expansions in deposit insurance coverage and scope may have helped in restoring confidence in banking sectors across the globe, but these developments have likely come at a cost in terms of market discipline. Admittedly, with only a few exceptions, there have not been contagious runs by retail depositors in recent years (Hasan et al., 2017). However, overreaction to fix public confidence in the banking system in the short-term can ultimately be destabilizing over longer time horizons.[9] Limited (but credible) ex-ante funding commitments are therefore crucial in three respects. First, they limit risk-taking incentives by banks. Second, they limit the amount of tax-payer funds that are potentially at risk. Finally, they help to harmonize insurance schemes in common banking areas, therefore limiting regulatory arbitrage (Anginer and Can Bertay, 2019).

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[9] In the post-GFC period, policy makers acknowledged that market discipline could be undermined by government intervention in the banking sector. An effort to design clear rules to wind down distressed institutions was therefore undertaken. Furthermore, there was explicit recognition that larger/more interconnected banks presented a critical challenge because of the economic and political ramifications connected to their failure. This effort led to the shoring up of resolution frameworks by, for instance, creating separate procedures for bank and non-financial firms. Insolvency resolution schemes were introduced or re-designed to incentivize banks' shareholders and managers to encourage the prudent management of banks. An important distinction was also made in terms of size of individual institutions and the potential domestic and international impact of distressed institutions. The Financial Stability Board has been publishing the list of Globally Systemically Important Banks (G-SIBs) since 2014. Since 2012 there has also been discussion of adapting the policy framework for G-SIBs to domestic systemically important banks (D-SIBs). In this regard, there is a risk that incentives by market participants to monitor large banks could be reduced as investors might not monitor large or interconnected entities assuming that this task would be performed by the banking supervisory agencies. See *The Global Financial Development Report 2019/2020: Bank Regulation and Supervision* for further discussion.

**Figure 6: Deposit insurance generosity**

**a. Number of countries with an explicit deposit insurance protection system for banks**
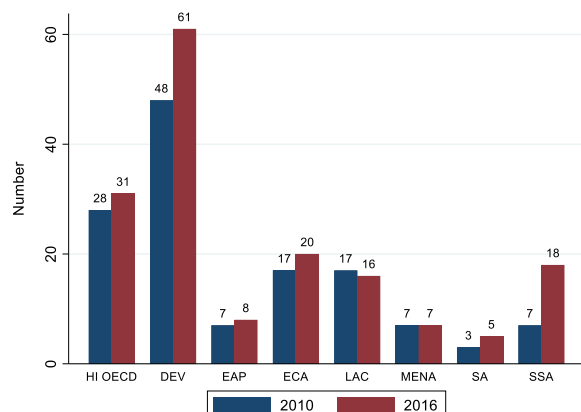


**b. Expansion of coverage since 2009 (% of respondents answering Yes)**
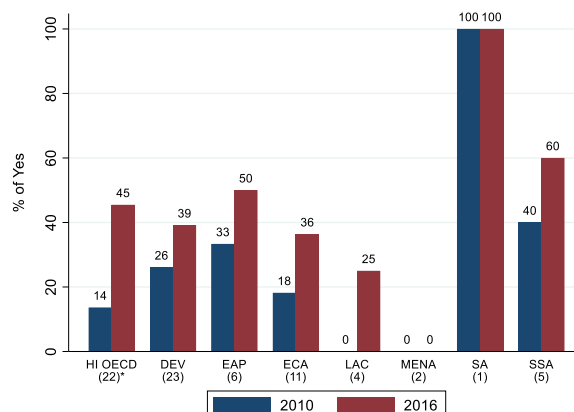


**c. Increased in the amount covered since 2009 (% of respondents answering Yes)**
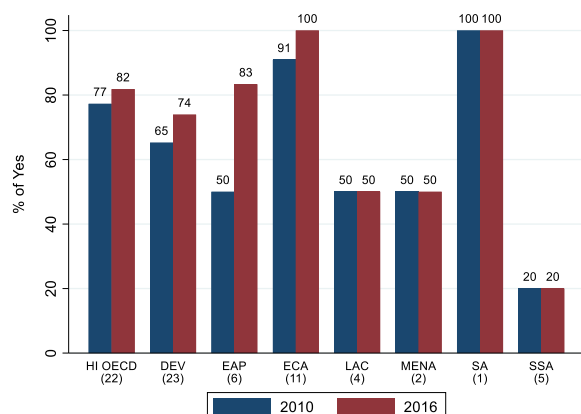


**d. Deposit insurance fund used for purposes other than depositor protection (% of respondents answering Yes)**
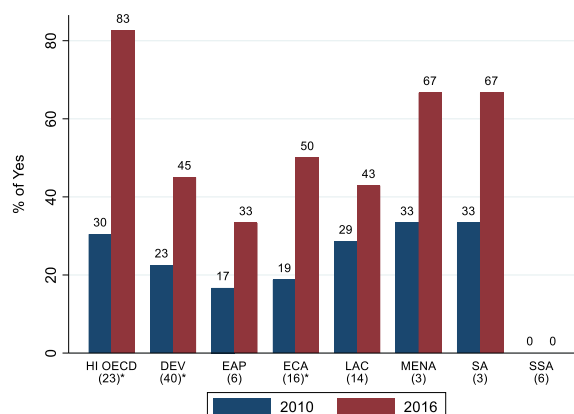


Source: Waves 4 and 5, BRSS.
Note: Off-shore financial centers are excluded from the calculations. DEV are developing countries. The number of countries for which we have a response for the specific item/question for both rounds appears in parentheses. * next to the number of countries represents a statistically significant difference in the mean values of a regional group in the two reference years at the 10% level using a two-tailed test. In panel a, the total number of countries that have deposit insurance in LAC is higher in wave 4 than in wave 5 because Puerto Rico and Venezuela, which have a formal deposit insurance system, submitted a questionnaire in wave 4 but not in wave 5. In panels b, c and d, higher values indicate greater generosity.

Almost 90 percent of high-income OECD countries introduced creditor bail-in initiatives, which should help enhance market discipline (Figure 7, Panel A).[10] Relatively fewer developing countries introduced these regulations, but this is not surprising since the introduction of bail-in instruments hinges on the existence of well-developed capital markets. Developing regions such as LAC lag substantially

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[10] Bail-in regulations force banks' creditors to bear some of the burden of bank default by having a portion of their debt written off.

behind high-income OECD countries on this dimension. Moreover, to limit disruptions after bank defaults, banks were required to submit plans that detail a strategy for rapid and orderly resolution in the event of material financial distress or failure. As indicated in Figure 7, Panel B, almost two-fifths of developing countries had this requirement in place by the end of 2016. Along the same lines, bank supervisory agencies and resolution authorities were required to draft resolution plans for banks. High-income OECD, ECA and SA countries have adopted this arrangement more often than countries in other regions (Figure 7, Panel C). National regulations and cooperation with host countries for cross-border resolution of international banks are crucial in markets where a high percentage of the banking system's assets is held by foreign-owned banks. Many countries' banking sectors are dominated by foreign-owned banks but just six countries in all developing regions had a regulatory framework in place to deal with the resolution of international banks by the end of 2016 (Figure 7, Panel D). Although the adoption of these measures should enhance market discipline in principle, many of the newly-implemented mechanisms are still untested. It remains to be seen how much they will influence the expectations of market participants that governments will step in to rescue ailing banks, especially considering the frequency and size of recapitalizations and liquidity support during recent crisis episodes.

**Figure 7: New resolution rules and bail-in debt requirements**

**a. Framework in place to enable the bail-in of creditors (% of respondents answering Yes)**
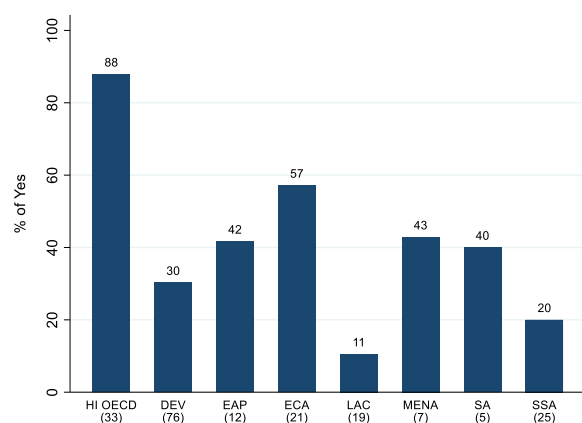
**b. Banks required to file resolution plans (% of respondents answering Yes)**
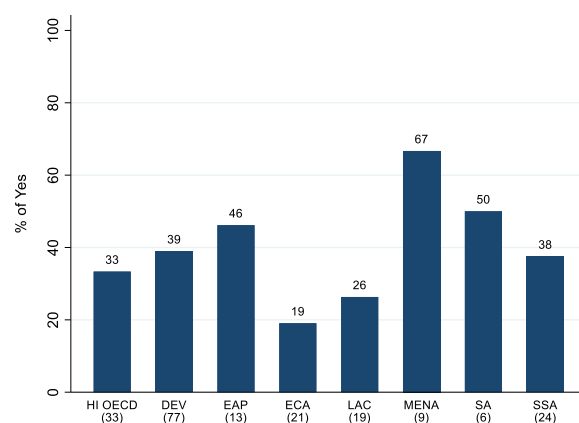
**c. Bank supervisory agency / resolution authority required to prepare resolution plans for banks (% of respondents answering Yes)**
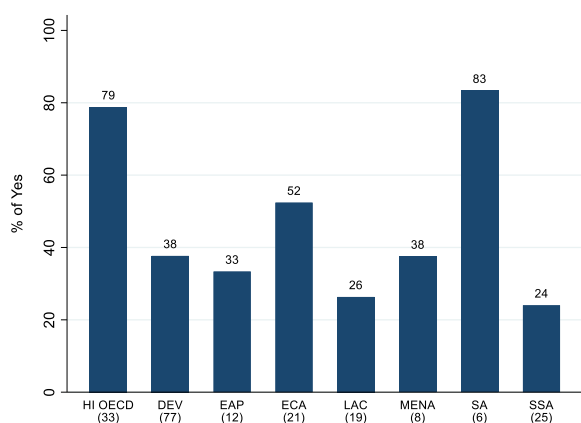
**d. Formal supervisory and regulatory framework to deal with the resolution of international banks (% of respondents answering Yes)**
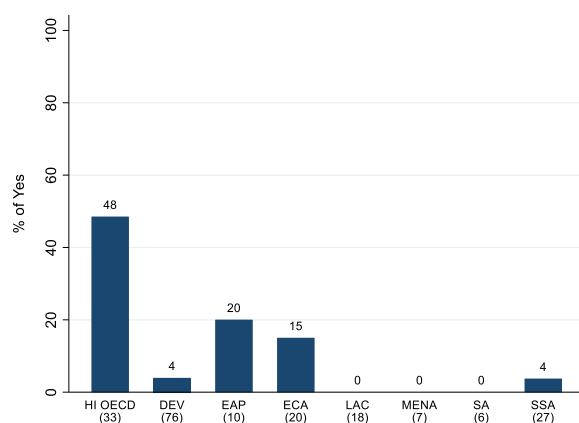




Source: Wave 5, BRSS.

Note: The questions reported in this Table are new questions introduced in the BRSS round 5. Off-shore financial centers are excluded from the calculations. DEV are developing countries. The number of countries for which we have a response for the specific item/question appears within parentheses.

The availability of accurate and timely information is a prerequisite for effective monitoring. Stringent disclosure rules, independent external audits, and availability of public and private credit ratings all increase transparency and allow for better monitoring by market participants (Djankov et al., 2007). In recent years, developing countries have shown a decrease in some aspects of availability and quality of information.[11] Knowledge of the ultimate owner and controller of a bank facilitates the consolidated assessment of its exposures. However, market participants in developing countries often do not have information on the ultimate (beneficial) owner of a bank Figure 8, Panel A). This is also often true for bank supervisors because the controlling company may sit outside the regulatory perimeter. By the same token, disclosure to the public of the governance and risk management frameworks of a bank enables the assessment of its risk management approach. For high-income OECD countries and the SA and SSA regions this information was disclosed less frequently in BRSS round 5 than in round 4 (Figure 8, Panel B).[12]

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[11] We acknowledge, however, that these declines are not generally statistically significant.

[12] The decline was statistically significant for the SSA region only.

**Figure 8: Disclosure of information**

**a. Laws or regulations require the ultimate (beneficial) owner and controller of a bank to be publicly disclosed (% of respondents answering Yes)**

| Region | 2010 | 2016 |
|---|---|---|
| HI OECD (29) | 55 | 55 |
| DEV (65) | 49 | 45 |
| EAP (9) | 67 | 56 |
| ECA (15) | 73 | 67 |
| LAC (15) | 40 | 27 |
| MENA (6) | 83 | 83 |
| SA (6) | 33 | 50 |
| SSA (23) | 35 | 26 |

**b. Banks disclose to the public governance and risk management framework (% of Yes)**
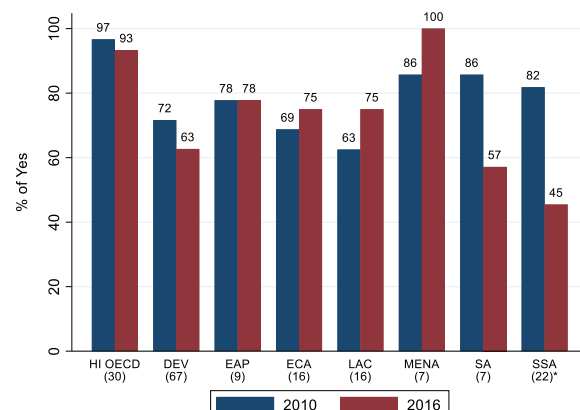
| Region | 2010 | 2016 |
|---|---|---|
| HI OECD (30) | 97 | 93 |
| DEV (67) | 72 | 63 |
| EAP (9) | 78 | 78 |
| ECA (16) | 69 | 75 |
| LAC (16) | 63 | 75 |
| MENA (7) | 86 | 100 |
| SA (7) | 86 | 57 |
| SSA (22)* | 82 | 45 |

Source: Waves 4 and 5, BRSS.

Note: Off-shore financial centers are excluded from the calculations. DEV are developing countries. The number of countries for which 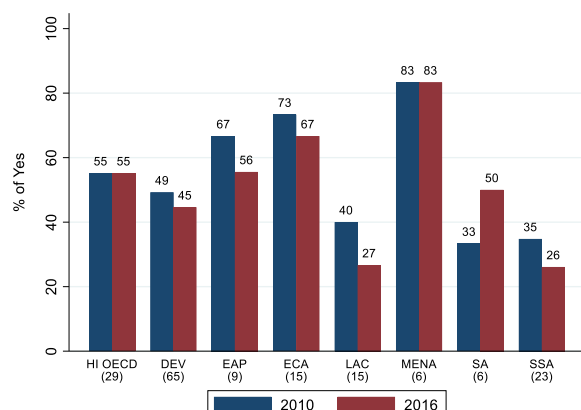we have a response for the specific item/question for both rounds appears within parentheses. * next to the number of countries represents a statistically significant difference in the mean values of a regional group in the two reference years at the 10% level using a two-tailed test. In both panels, higher values indicate that better quality information is available to market participants.

Ratings are an essential source of information to evaluate the creditworthiness of counterparts though they should be not the sole source of information to evaluate a bank's risk exposure. The BRSS data show a modest increase in the share of countries that require banks to have external credit ratings, though in EAP and ECA this was still not a requirement (Figure 9, Panel A). Although economies of scale facilitate the provision of these information services, on average less than half the top-ten banks in developing countries overall and, specifically, in the ECA, SA and SSA regions had credit ratings provided by an international credit rating agency (Figure 9, Panel B). It follows that market participants in these regions often lacked key information to monitor and influence banks to limit excessive risk-taking.

**Figure 9: Information on ratings**

**a. Banks required by supervisors to have external credit ratings (% of respondents answering Yes)**



**b. Mean percentage of the top ten banks rated by international credit rating agencies (%)**
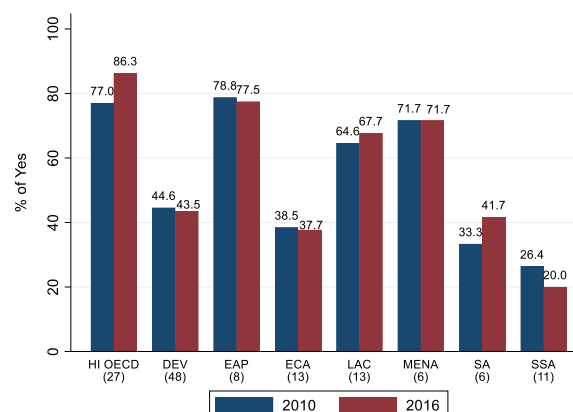


Source: Waves 4 and 5, BRSS.
Note: Off-shore financial centers are excluded from the calculations. DEV are developing countries. The number of countries for which we have a response for the specific item/question for both rounds appears in p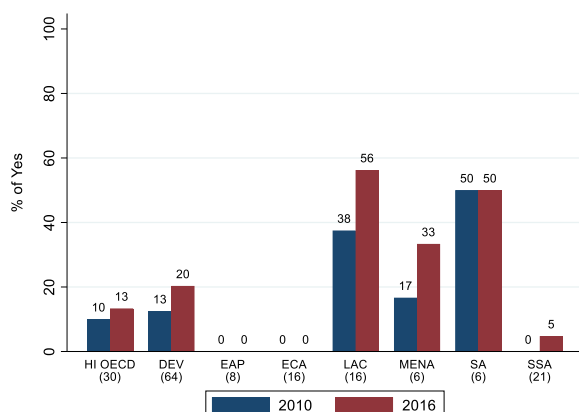arentheses. * next to the number of countries represents a statistically significant difference in the mean values of a regional group in the two reference years at the 10% level using a two-tailed test.

Bank supervisory reporting also contributes to market discipline as it has an indirect influence on banks' behavior and increases the information set available to market participants when it is publicly available (Flannery, 2001). Availability of information on enforcement actions and fines and settlements resulting from non-compliance with regulations provide information both on compliance of individual banks with regulations and on the extent of bank supervisory agency forbearance. Information on enforcement actions is made public in 41% of high-income OECD countries according to BRSS round 5, up from 37% in BRSS round 4 (Figure 10, Panel A). However, except in MENA where the figure increased to 43%, that ratio actually declined or stayed relatively low and unchanged for the other developing regions from BRSS round 4 to BRSS round 5, though these changes over time were not statistically significant except in LAC. The share of countries that require banks to publicly disclose all fines and settlements also increased for all regions except EAP, ECA, and MENA. However, for all the country groupings the changes were not statistically significant (Figure 10, Panel B). In general, the data from BRSS round 5 show no substantial improvement in the quality and availability of information to market participants and the broader public, especially for developing regions.

**Figure 10: Public availability of supervisory reporting**

**a. Bank regulators/supervisors required to make public formal enforcement actions (% of respondents answering Yes)**
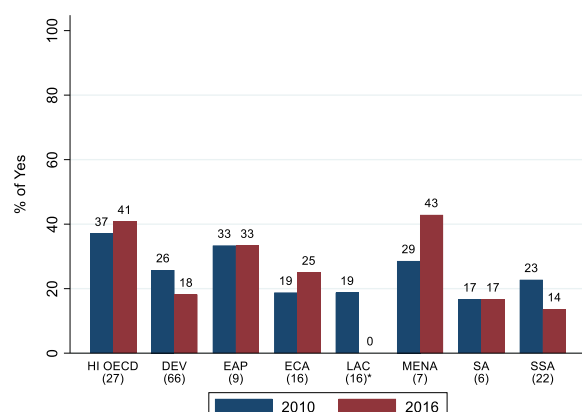
**b. Supervisors require banks to publicly disclose all fines and settlements resulting from non-compliance with regulations (% of respondents answering Yes)**
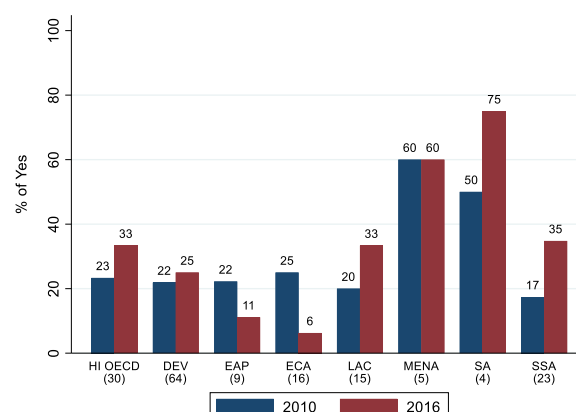
Overall, we conclude that market discipline may have declined somewhat because of weaker incentives to monitor bank risk-taking. Deposit insurance coverage has increased and has also become more generous, especially for high-income OECD countries. This has likely encouraged banks – especially large banks – to take on excessive risk. Moreover, the information set available to assess the risk profile of banks did not improve significantly between BRSS round 5 and round 4.

### 2.3 Supervisory monitoring

The GFC spurred debates about the adequacy of supervision in leading up to and the response to the crisis. On the one hand, the regulatory process has produced several reforms to address the issues uncovered by the crisis. The supervisory agencies, on the other hand, have seen the burden of their task increase because of an evolving, increasingly complex banking business that they now need to oversee. The BRSS responses summarized below show that, although there have been notable increases in the number and complexity of regulations after the crisis, there has not been a corresponding increase in supervisory powers

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and supervisory capacity. As banks become larger and more complex, there is a growing need for supervisory resources and talent to monitor the risks and the financial soundness of these institutions. New rules requiring disclosure and stress testing put additional strain on supervisory resources to generate, process and disseminate information. Finally, new regulations (especially regarding bank resolution) allow supervisors significant discretion and thus require highly experienced and specialized personnel.

To undertake effective monitoring and supervision, authorities must have the power to take timely corrective action. On average, high-income OECD countries and countries in LAC, SSA, and especially in ECA and MENA, saw an increase in the power to require banks to reduce or suspend the remuneration to bank senior management (Figure 11, Panel A).[13] In contrast, developing countries saw a decline in the share of countries where bank supervisors can reduce or suspend dividends to shareholders, specifically in EAP, SA, and, especially, SSA. Developing countries fortified some powers with respect to external auditors, though we acknowledge that most of the changes were not statistically significant (Figure 12, Panel B). The exception is SSA where there was a significant increase in the share of countries that allow the supervisor to take action against an auditor who performs an inadequate audit. In addition, a significantly higher share of high-income OECD countries gave supervisors the right to meet with auditors on a regular basis.

## Figure 11: Supervisory Powers

**a. Banking supervisor can exert this power against banks? (% of respondents answering yes)**



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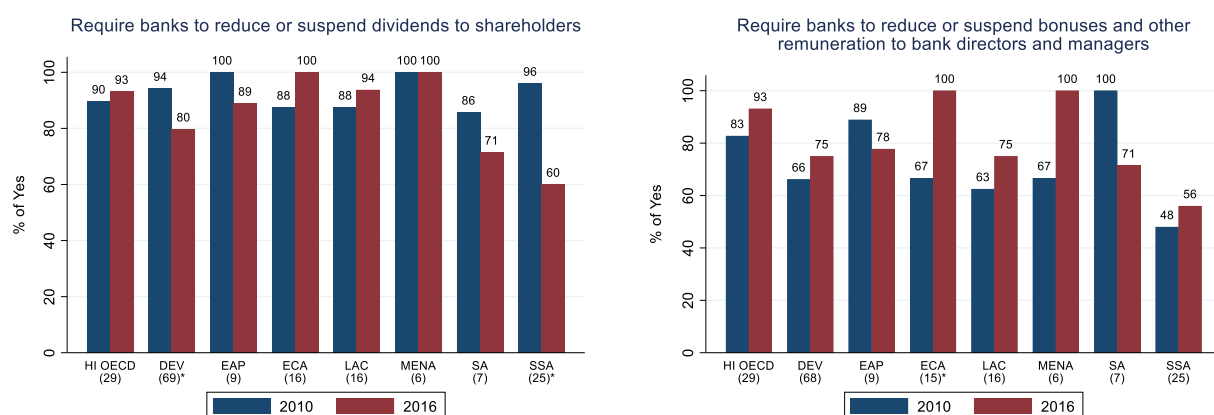
[13] However, the change was only significant in ECA.

**b. Banking supervisor can exert this power against external auditors? (% of respondents answering yes)**
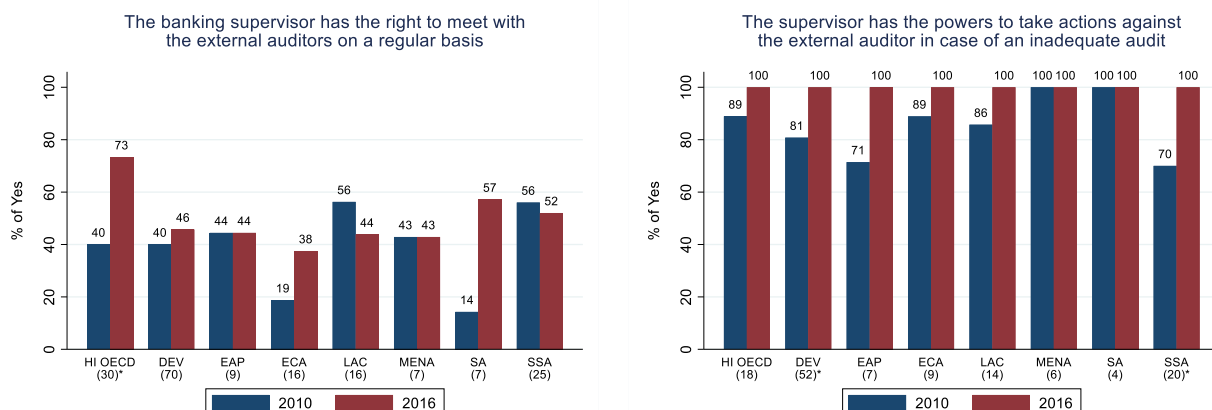


The banking supervisor has the right to meet with the external auditors on a regular basis

The supervisor has the powers to take actions against the external auditor in case of an inadequate audit

Supervisory capacity did not keep pace with growing regulations, increasing bank size, and growing complexity of bank operations. There has been a substantial increase in the number and complexity of regulations in the aftermath of the global financial crisis. Under Basel III, there has been greater emphasis placed on systemic stability and macroprudential regulation, which requires a focus not on the risk of individual financial institutions, but on an individual bank's contribution to the risk of the financial system as a whole. Following the Financial Stability Board (FSB) guidelines, new rules have been proposed and implemented for the resolution of systemically important financial institutions. The new resolution schemes in many countries provide a significant amount of discretion and flexibility to supervisors. At the same time, new macroprudential rules require continuous monitoring and stress-testing of large financial institutions.[14]  These new capital and macroprudential regulations require a sizable investment in supervisory infrastructure and personnel. Figure 12, Panel A shows the log change in the number of supervisory personnel from BRSS rounds 4 to round 5 plotted against the log change in total bank assets

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[14] See Chapter 2 of *The Global Financial Development Report 2019/2020: Bank Regulation and Supervision* for more detail.

for each country over the same period.[15] Each country group is highlighted using different colors. Although there has been a steep increase in the quantity and complexity of regulations, the figure suggests that there was not even a positive, let alone a significant, relationship between growth in bank assets and growth in number of supervisors who oversee these banks for the whole sample.[16] The same was also true for high-income OECD countries and within individual regions.

**Figure 12: Supervisory capacity**

**a. Change in number of professional bank supervisors**
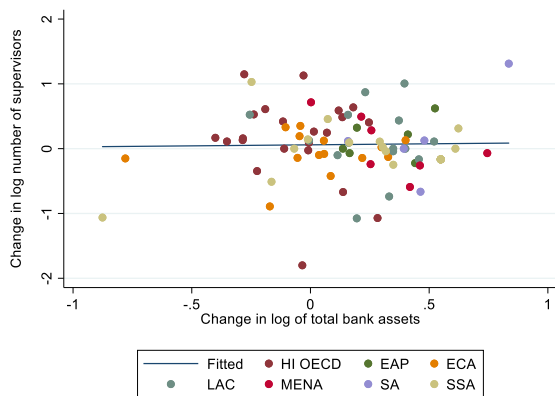


**b. Supervisors with post-graduate degrees such as MBAs, CPAs, or CFAs (% of total supervisors)**
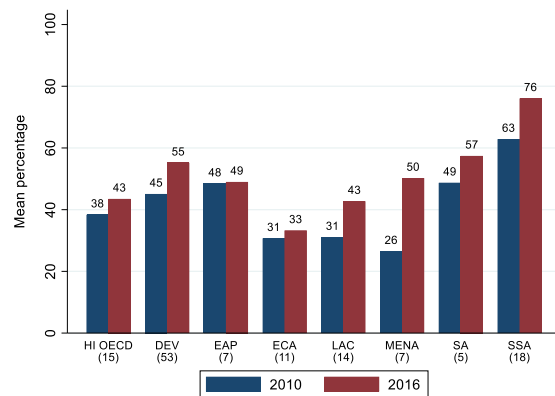


**c. Mean number of hours of on-the-job training**
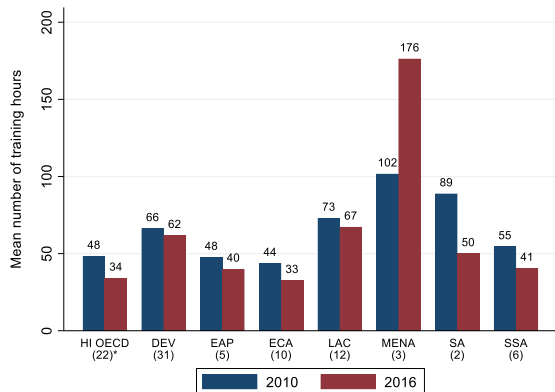


**d. Bank supervisors with more than 10 years experience in bank supervision (% of total supervisors)**
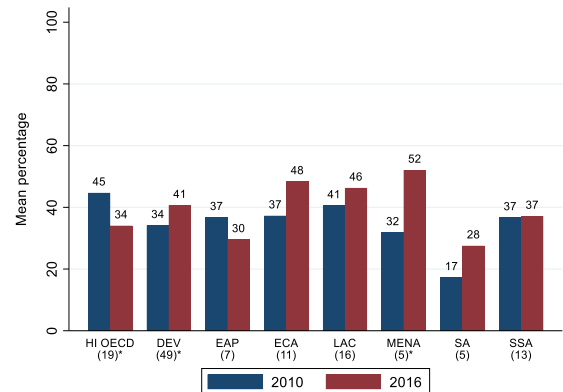


Source: Waves 4 and 5, BRSS.
Note: CFA = chartered financial analyst; CPA = certified public accountant; MBA = master's in business administration. DEV are developing countries.

[15] Note that in 2014 the ECB assumed its role as single supervisory entity in the Euro Area (18 countries at that time and 19 countries by the end of year 2016). This entailed a transfer of personnel from national central banks (i.e., the bank supervisors) to the ECB. Of the 19 Euro area countries, 17 are high income OECD countries. Therefore, figures for high income OECD countries may underestimate the real labor power of bank supervisory agencies in high income OECD countries.

[16] Although not reported here, there is also no relationship between the growth in the number of banks and growth in supervisory personnel.

The sophistication and complexity of new regulations and bank operations require highly specialized, well-trained and experienced supervisors to oversee banks.  As reported in Panel B of Figure 12, there was some improvement in the education levels of supervisory personnel as a higher share of them now hold more advanced degrees than in the previous survey for all the developing regions.[17] Conversely, on-the-job training appears to be less prevalent than in round 4 in all regions except MENA though the number of countries included in that region is low (Figure 12, Panel C).  This reduction in on-the-job training is statistically significant for high-income OECD countries. The mean percentage of bank supervisors with more than 10 years' experience in bank supervision also declined significantly in high-income OECD countries between round 4 and round 5 (Figure 12, Panel D).  In contrast, this figure increased significantly in developing countries overall and, specifically, in MENA. For all the other developing regions changes on this dimension were not statistically significant, however. Overall, despite some increases in supervisory powers and indications that supervisory personnel are better educated, the BRSS 5 survey data indicate that regulatory complexity has advanced more quickly than supervisory capacity.

## 3    Capital reforms

The global financial crisis (GFC) revealed structural weaknesses in capital regulations that were in place prior to the crisis. A significant number of financial institutions lacked high-quality capital to absorb losses, necessitating bailouts using public funds. Following policy goals set by the Basel Committee on Banking Supervision, several countries have introduced legislation and regulatory reforms to strengthen capital requirements. These reforms include increasing regulatory capital requirements as well as changes in what constitutes higher quality capital.  The reforms also included surcharges for institutions deemed

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[17] However, the changes between wave 4 and wave 5 were not statistically significant.

systemically important, both domestically and globally to help limit the economic damage posed by large financial institutions and to strengthen market discipline.

As regulations tend to be pro-cyclical (Dagher, 2018) and as crises often lead to changes in the political landscape, there is always a concern that regulatory changes implemented immediately after a crisis may not be motivated purely by economics. Political considerations and public sentiment may play an important role. As there has been a significant increase in negative public sentiment towards the global financial system after the GFC, there have been fears that governments may respond to the financial crisis by ineffective regulations driven by politics rather than addressing core issues related to capital. In particular, the GFC highlighted the crucial importance of defining bank capital narrowly to improve bank stability at times of crisis (Demirguc-Kunt et al., 2013). As we have discussed earlier, while regulatory capital requirements have increased, there were also changes in definitions as to what constitutes high quality capital.

In this section, we first examine whether countries affected by the financial crisis implemented different capital reforms compared to countries that were not affected. Using data from the BRSS survey, we analyze changes in regulatory capital ratios, simple leverage ratios as well as changes in definitions of the capital instruments that constitute Tier 1 capital. We then investigate the impact of these adoptions on bank risk. Finally, we examine the determinants of the adoption of the latest Basel III capital regulations. Our analyses contribute to recent papers that have examined the impact of the crisis on financial regulation.[18] We use the following regression models to examine changes in capital ratios and capital definitions:

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[18] Kara (2016) uses the years since the last systemic banking crisis to explain changes in the stringency of capital regulation. Masciandaro and Romelli (2018) find that recent episodes of systemic banking crisis significantly increase the likelihood that a country reforms its supervisory structure.

$$\Delta Capital_i = \alpha + \theta_1 BankingCrisis_i + \theta_2 Capital_{i,2010} + \sum_{p=1}^{4} \beta_p Macro_{i,2010}^p + \varepsilon_i \qquad (1a)$$

$$\Delta Tier1Stringency_i = \alpha + \theta_1 BankingCrisis_i + \theta_2 Tier1Stringency_{i,2010} + \sum_{p=1}^{4} \beta_p Macro_{i,2010}^p + \varepsilon_i \qquad (1b)$$

Above, $\Delta Capital_i$ are either changes in total regulatory capital (*ΔRegulatory Capital/RWA*) measured as a percentage of risk-weighted assets, changes in Tier 1 capital (*ΔTier1/RWA*) measured as a percentage of risk-weighted assets, or changes in a simple leverage ratio (*ΔEquity/TA*) measured as a percentage of total assets for the banking systems in each country. These changes are calculated for each country $i$ by subtracting the level in 2010 from its value in 2016.[19] $\Delta Tier1Stringency$ is the change from 2010 to 2016 of an index that captures the stringency of the Tier 1 capital definition. The index ranges between 0 and 8, and is based on the number of components that supervisors do not allow as part of Tier 1 regulatory capital plus the number of components that are deducted from Tier 1 capital.[20] Thus, higher values of the index indicate greater stringency. $BankingCrisis_i$ is a dummy variable that takes on a value of 1 if a country experienced a systemic banking crisis between 2007 and 2009. This variable is constructed using data on banking crises episodes from Laeven and Valencia (2018). In the regressions, we control for the initial levels of each dependent variable to capture potential mean reversion in capital ratios or capital stringency ($Capital_{i,2010}, Tier1Stringency_{i,2010}$). $Macro_{i,2010}^p$ are four country-level variables that are commonly used as controls in cross-country analyses. These controls are the natural logarithm of the GDP per capita (*ln(GDP per capita) 2010*), inflation computed using the consumer price index (*Inflation 2010*), natural

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[19] We use as reference dates for BRSS 5 and BRSS 4 the years 2016 and 2010, respectively. This is because quantitative information is recorded up to year 2010 in BRSS 4 and up to year 2016 in BRSS 5.

[20] The capital instruments that might be allowed into the definition of Tier 1 capital are: a) hybrid debt capital instruments, b) asset revaluation gains, and c) subordinated debt. The instruments that might be deducted from Tier 1 capital are: a) goodwill, b) deferred tax assets, c) intangibles, d) unrealized losses in fair valued exposures, and e) investment in the capital of certain financial intermediaries. The selection of these capital instruments reflects availability of information over the two most recent BRSS surveys.

logarithm of the total population (*ln(population) 2010*), and the regulatory quality indicator from the Worldwide Governance Indicators (*Regulatory Quality 2010*). All the control variables are as per year 2010.[21]

The summary statistics are provided in Table 1, Panel A. On average countries in our sample have seen an increase in their total regulatory capital ratio of approximately 1.5 percentage points with a wide range between -12.5 percentage points and 16.2 percentage points. The Tier 1 capital ratio also increased about 2 percentage points with a range of -10.7 percentage points to 15.3 percentage points (Table 1, Panel A). The change in common equity ratios has been more muted, on average 1.2 percentage points with a range of -8.8 percentage points to 9.6 percentage points. On average, there has also been a decline in the stringency of the Tier 1 definition from 2010 to 2016. Roughly 16 percent of the countries in our sample experienced a system wide banking crisis between 2007 and 2009. Overall there is moderate correlation between the variables except between changes in total regulatory capital and Tier 1 capital, and between GDP per capita and regulatory quality which are strongly correlated (0.646 and 0.828, respectively as reported in Table 1, Panel B).

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[21] For more information on the Worldwide Governance Indicators, see https://info.worldbank.org/governance/wgi.

**Table 1: Summary statistics**

**Panel A: Macro variables**

| VARIABLES | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| ΔRegulatory Capital/RWA | 112 | 1.516 | 4.450 | -12.570 | 16.150 |
| ΔTier1/RWA | 92 | 1.854 | 4.570 | -10.704 | 15.300 |
| ΔEquity/TA | 110 | 1.116 | 2.869 | -8.775 | 9.661 |
| ΔTier1Stringency | 109 | -0.174 | 1.820 | -4.000 | 5.000 |
| Banking crisis | 159 | 0.164 | 0.371 | 0.000 | 1.000 |
| ln(GDP per capita) | 121 | 8.729 | 1.521 | 5.443 | 11.858 |
| Inflation | 121 | 3.977 | 3.253 | -2.425 | 14.470 |
| ln(population) | 123 | 15.823 | 2.011 | 10.410 | 20.986 |
| Regulatory Quality | 122 | 0.243 | 0.890 | -2.071 | 1.877 |

**Panel B: Correlations**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ΔRegulatory Capital/RWA | 1 | | | | | | | | |
| Δ Tier 1/RWA | 0.646* | 1 | | | | | | | |
| ΔEquity/TA | 0.349* | 0.220* | 1 | | | | | | |
| ΔTier1Stringency | 0.097 | -0.124 | 0.098 | 1 | | | | | |
| Banking crisis | 0.239* | 0.405* | 0.151 | -0.116 | 1 | | | | |
| ln(GDP per capita) | 0.364* | 0.447* | -0.019 | 0.095 | 0.416* | 1 | | | |
| Inflation | -0.109 | -0.225* | -0.024 | 0.251* | -0.123 | -0.392* | 1 | | |
| ln(population) | -0.219* | -0.132 | -0.119 | 0.058 | 0.114 | -0.172* | 0.292* | 1 | |
| Regulatory Quality | 0.373* | 0.375* | 0.016 | 0.134 | 0.388* | 0.828* | -0.426* | -0.074 | 1 |

* significance at the 10% level.

**Panel C: Bank level variables**

| VARIABLES | Obs | Mean | Std. Dev. | p25 | p50 | p75 |
|---|---|---|---|---|---|---|
| Z-score [4 year] | 153,353 | 66.650 | 97.006 | 14.723 | 32.502 | 72.543 |
| NPL over Total Loans | 145,983 | 2.113 | 2.890 | 0.872 | 1.408 | 2.264 |
| ln(Assets in 2012 USD) | 153,353 | 6.018 | 1.839 | 4.714 | 5.565 | 6.860 |
| Regulatory Capital/RWA | 153,353 | 17.466 | 8.877 | 12.310 | 15.010 | 19.400 |
| Tier 1/RWA | 137,163 | 15.983 | 8.694 | 10.990 | 13.600 | 17.900 |
| RWA/TA | 127,062 | 66.418 | 14.265 | 57.525 | 67.287 | 76.471 |
| Tier 1/Regulatory capital | 134,748 | 90.502 | 8.314 | 89.710 | 92.331 | 94.964 |
| Equity/TA | 153,325 | 10.675 | 5.235 | 7.937 | 9.585 | 12.000 |
| Loans/TA | 153,353 | 61.505 | 16.479 | 52.047 | 63.636 | 73.333 |
| Short-term funding/TA | 153,353 | 6.037 | 10.098 | 0.000 | 2.075 | 7.595 |
| Liquid assets/TA | 153,353 | 12.365 | 11.999 | 4.594 | 8.451 | 15.623 |
| ROA | 153,353 | 1.025 | 1.629 | 0.428 | 1.099 | 1.716 |
| Tier 1 stringency | 81,845 | 7.077 | 1.268 | 6.000 | 8.000 | 8.000 |

The results from the regressions specified in (1a) and (1b) above are reported in Table 2. In column (1) we provide evidence that banking crisis is weakly related to increases in total regulatory capital ratios. In column (2) we show that there is a positive and statistically significant association between countries

that experienced a banking crisis and increases in the Tier 1 capital ratio in its aftermath. The 2.8 percentage point increase in the Tier 1 capital ratio is both statistically significant and economically meaningful. When we examine changes using simple leverage (equity over total assets), we do not find a corresponding significant increase. These results are reported in column (3). In column (4) we examine whether countries that experienced a crisis have made changes to the definition of Tier 1 capital which could help explain the statistically insignificant relationship between banking crisis and increases in simple equity ratios. We find that countries that experienced a crisis have relaxed the definition of Tier 1 capital more than other countries as their Tier 1 stringency index declined by 0.68 points more than non-crisis countries. This decline corresponds to about 40 percent of a standard deviation of the Tier 1 stringency variable and is therefore economically significant.[22]

**Table 2: Changes in capital ratios and stringency**

| VARIABLES | (1) $\Delta$Regulatory Capital/RWA | (2) $\Delta$Tier1/RWA | (3) $\Delta$Equity/TA | (4) $\Delta$Tier1 Stringency |
|---|---|---|---|---|
| Banking Crisis | 2.136* | 2.809*** | 1.176 | -0.675** |
| | (1.190) | (0.962) | (0.840) | (0.292) |
| ln(GDP per capita) 2010 | -0.313 | -0.139 | -0.618* | -0.169 |
| | (0.679) | (0.489) | (0.354) | (0.200) |
| Inflation 2010 | 0.036 | 0.101 | 0.032 | 0.095* |
| | (0.183) | (0.142) | (0.097) | (0.054) |
| ln(population) 2010 | -0.872*** | -0.777*** | -0.518*** | -0.019 |
| | (0.251) | (0.287) | (0.141) | (0.067) |
| Regulatory Quality 2010 | 0.896 | 1.351 | -0.024 | 0.575** |
| | (0.968) | (0.985) | (0.577) | (0.262) |
| Level of dependent variable 2010 | -0.346 | -0.409*** | -0.371*** | -0.823*** |
| | (0.210) | (0.130) | (0.100) | (0.099) |
| Constant | 23.464** | 19.771** | 18.207*** | 6.299** |
| | (9.258) | (7.838) | (4.059) | (2.543) |
| | | | | |
| Observations | 91 | 80 | 97 | 90 |
| R-squared | 0.226 | 0.389 | 0.279 | 0.515 |

Note: *, **, and *** represent statistical significance at 10%, 5%, and 1% two-tailed level, respectively. Robust standard errors for heteroscedasticity appear in parentheses. Off-shore financial centers included in the computations.

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[22] The results are qualitatively similar if we include as crisis countries in the estimations those countries that experienced a banking crisis after year 2009 according Laeven and Valencia (2018), namely Cyprus (2011), Guinea-Bissau (2014), and Moldova (2014).

The results described above highlight the importance of risk-weights and quality of capital and the effect they may have on bank risk. As capital essentially preserves solvency by absorbing liquidity, information and economic shocks, the quality of capital determines how effective it performs as a buffer. Because lower quality capital is made up of components that are more opaque and subject to information asymmetries, lower quality capital can be severely undervalued during times of distress and may not be able to absorb shocks. Risk weights on banks' assets are also an important element of risk-based capital ratios. Banks can meet capital requirements by either increasing capital or decreasing risk-weighted assets. Since the current regulations provide substantial discretion to banks in determining risk-weights, a key concern has been that individual banks may try to minimize capital requirements by underestimating the risks of assets on their balance sheets.[23] Consistent with the notion that there is significant discretion in the computation of regulatory capital ratios, Demirguc-Kunt et al. (2013) find that stock returns of banks during the financial crisis were more sensitive to simple leverage ratios using common equity than to regulatory risk-based ratios.

To test these tenets more formally, we examine how bank risk is related to the quality of capital and risk-weights using bank level data. We obtain bank level financial information by merging the now discontinued Bankscope database (1999-2014) with the Bank Focus (2015-2017) database. We limit our sample to commercial banks with at least $10 million USD in assets. Our sample includes more than 20,000 banks in 158 countries. We use the following regression models:

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[23] Jones (2000) discusses techniques that banks can use for regulatory capital arbitrage and provides evidence on the magnitude of these activities in the Unites States. Le Leslé and Avramova (2012) provide evidence of heterogeneity with respect to the calculation of risk-weights. Recent growth in financial innovation and financial engineering may have also made it easier for financial institutions to manipulate regulatory risk measures. Acharya, Schnabl, and Suarez (2013) show that banks have used various forms of securitization to reduce bank capital requirements and that these actions have led to greater concentration of risk.

$$Bank\ Risk_{i,j,t} = \alpha + \theta_1 Capital_{i,j,t-1} + \theta_2 Tier1/Regulatory\ Capital_{i,j,t-1} + \theta_3 Loans/TA_{i,j,t-1}$$

$$+ \theta_4 Shortterm\ Funding/TA_{i,j,t-1} + \theta_5 Liquid\ Assets/TA_{i,j,t-1} + \theta_6 ROA_{i,j,t-1} \quad (2a)$$

$$+ \theta_7 \ln(TA)_{i,j,t-1} + \gamma_{j,t} + \varepsilon_{i,j,t}$$

$$Bank\ Risk_{i,j,t} = \alpha + \theta_1 Capital_{i,j,t-1} + \theta_2 RWA/TA_{i,j,t-1} + \theta_3 Loans/TA_{i,j,t-1}$$

$$+ \theta_4 Shortterm\ Funding/TA_{i,j,t-1} + \theta_5 Liquid\ Assets/TA_{i,j,t-1} + \theta_6 ROA_{i,j,t-1} \quad (2b)$$

$$+ \theta_7 \ln(TA)_{i,j,t-1} + \gamma_{j,t} + \varepsilon_{i,j,t}$$

Above, the subscripts i, j, t denote a bank, country and year, respectively; *Bank risk* is measured using z-scores and non-performing loans. The Z-score is calculated as the sum of average bank return on assets (net income divided by total assets) and the bank equity to assets ratio, scaled by the standard deviation of return on assets over a four-year rolling window. A higher z-score indicates lower bank risk (Mare et al., 2017). Non-performing loans (NPLs) are computed as the ratio of non-performing loans to total gross loans. We examine three different measures of bank capital (*Capital*). Regulatory capital (*Regulatory Capital/RWA*) is the sum of Tier 1 and Tier 2 capital divided by risk weighted assets. The tier 1 capital ratio (*Tier 1/RWA*) is Tier 1 capital divided by risk-weighted assets. The simple leverage ratio (*Equity/TA*) is calculated as equity divided by total assets. All measures of bank capital are lagged by one year.

In the regressions, we control for several bank-level variables. These are: the loan ratio, which is net loans divided by total assets (*Loans/TA*); reliance on short-term funding measured as short-term funding divided by total assets (*Short-term Funding/TA*); bank liquidity which is liquid assets divided by total assets (*Liquid Assets/TA*); bank profitability measured as return-on-assets (*ROA*); and bank size (*ln(TA)*), which is the natural logarithm of total assets. All explanatory variables are also lagged by one year. In all regressions we include country-year fixed effects ($\gamma_{j,t}$) to control for all time-varying country factors. These include interest rates, inflation, other macroeconomic variables, differences in levels of economic development and quality of bank regulation and supervision, and differences in accounting and regulatory standards. Time varying fixed effects greatly reduce concerns about possible omitted variables. The summary statistics for the bank level variables are provided in Table 1, Panel C.

The results are reported in Table 3. All capital ratios (*Capital/RWA*, *Tier 1/RWA*, and *Equity/TA*) are statistically significant and economically meaningful in reducing bank risk. These results are reported in columns (1) to (3). In the regression reported in column (4), we include the *Tier 1/Regulatory Capital* variable as an additional covariate. Since we control for the overall level of regulatory capital, the coefficient on this variable provides the marginal impact of having a greater proportion of capital in the form of Tier 1. Similarly, in the regression reported in column (5), we include the *RWA/TA* variable as an additional covariate. The coefficient on this variable quantifies the impact of having a higher proportion of bank assets with higher risk-weights, above and beyond the size effect measured by the natural logarithm of total assets.

**Table 3: Impact of risk-weights and capital quality on bank risk**

|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| VARIABLES | | | Z-score [4 year] | | | NPL over Total Loans | |
| ln (Assets in 2012 USD) | -0.964 | -1.054 | -1.856** | -0.720 | -1.290** | 0.125*** | 0.156*** |
|  | (0.674) | (0.662) | (0.736) | (0.620) | (0.496) | (0.036) | (0.033) |
| Loans/TA | -0.441*** | -0.452*** | -0.509* | -0.434*** | -0.255*** | -0.002 | -0.014*** |
|  | (0.125) | (0.098) | (0.271) | (0.088) | (0.077) | (0.003) | (0.004) |
| Short-term funding/TA | -0.407*** | -0.414*** | -0.253** | -0.406*** | -0.412*** | 0.000 | 0.001 |
|  | (0.100) | (0.118) | (0.122) | (0.114) | (0.106) | (0.005) | (0.003) |
| Liquid assets/TA | -1.025*** | -1.082*** | -0.883*** | -1.072*** | -1.078*** | 0.001 | -0.001 |
|  | (0.182) | (0.167) | (0.286) | (0.154) | (0.170) | (0.002) | (0.002) |
| ROA | 6.256*** | 7.385*** | 3.881* | 7.242*** | 8.035*** | -0.129* | -0.153** |
|  | (2.028) | (1.663) | (1.983) | (1.603) | (1.511) | (0.066) | (0.065) |
| Regulatory Capital/RWA | 1.378*** |  |  | 1.406*** | 1.275*** | -0.002 | 0.003 |
|  | (0.204) |  |  | (0.173) | (0.164) | (0.003) | (0.003) |
| Tier 1/RWA |  | 1.475*** |  |  |  |  |  |
|  |  | (0.175) |  |  |  |  |  |
| Equity/TA |  |  | 0.637*** |  |  |  |  |
|  |  |  | (0.215) |  |  |  |  |
| Tier 1/Regulatory capital |  |  |  | 0.511*** |  | -0.023*** |  |
|  |  |  |  | (0.066) |  | (0.009) |  |
| RWA/TA |  |  |  |  | -0.447*** |  | 0.025*** |
|  |  |  |  |  | (0.092) |  | (0.003) |
| Observations | 153,353 | 137,884 | 205,857 | 134,748 | 127,062 | 152,925 | 144,751 |
| R-Squared | 0.041 | 0.047 | 0.019 | 0.048 | 0.05 | 0.028 | 0.042 |
| Number of Country_Year | 2,523 | 2,006 | 3,227 | 1,943 | 1,759 | 2,078 | 1,801 |

Note: *, **, and *** represent statistical significance at 10%, 5%, and 1% two-tailed level, respectively. Standard errors clustered at country level appear in parentheses. Off-shore financial centers included in the computations.

We find that the quality of capital is strongly associated with a reduction in bank risk. Consistent with the notion that capital that is not Tier 1 can be severely undervalued during times of distress and not able to absorb shocks, we find that capital is less strongly associated with reduced bank risk if a higher proportion of it is in the form of Tier 2 capital. This effect can be related to a crowding out of higher quality capital when banks satisfy a larger fraction of their capital requirement with Tier 2 capital. We also find that higher regulatory risk-weights (as reflected in a higher *RWA/TA ratio*) are associated with greater bank risk. This finding suggests that risk exposure calculations under Basel rules reflect riskiness of assets. However, as we will discuss next, there is high cross-sectional variation in the relationship between bank risk and risk-weights, and this relationship is muted for larger banks. For robustness, we use *NPLs* as an alternative measure of bank risk. The results are reported in columns (6) and (7). Consistent with our earlier findings, a greater proportion of Tier 2 capital holdings and higher risk-weights (*RWA/TA*) are associated with higher *NPLs*, again holding the overall capital ratio and bank size constant.

In Table 2, we showed that countries that experienced a financial crisis increased their Tier 1 capital ratios more than non-crisis countries, but these countries also decreased more the stringency of what constitutes Tier 1 capital. We elaborate further on these findings and examine whether greater stringency imposed by supervisors can increase the strength of the association between bank risk and the *RWA/TA* and *Tier1/Regulatory Capital* variables. If supervisors can limit what can be included as Tier 1, we would expect a greater proportion of Tier 1 capital to have a greater impact in reducing risk. To test this conjecture, we interact both the risk-weights (*RWA/TA*) and the proportion of Tier 1 (*Tier1/Regulatory Capital*) variables with the capital stringency index. We would expect the impact of these variables on risk to increase with greater stringency. The results are reported in columns (1) and (2) in Table 4. We find that the effects of both risk-weights and the Tier 1 proportion on bank risk are amplified with greater supervisory stringency.

**Table 4: Impact of risk-weights and capital quality on bank risk**

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | | Z-score [4 year] | | |
| ln (Assets in 2012 USD) | -0.972 | -1.351 | 9.497** | -7.943*** |
| | (0.726) | (0.971) | (4.677) | (1.387) |
| Loans/TA | -0.15 | 0.105 | -0.428*** | -0.211** |
| | (0.105) | (0.096) | (0.084) | (0.085) |
| Short-term funding/TA | -0.287*** | -0.252*** | -0.400*** | -0.406*** |
| | (0.079) | (0.073) | (0.116) | (0.106) |
| Liquid assets/TA | -0.849*** | -0.753*** | -1.077*** | -1.044*** |
| | (0.142) | (0.189) | (0.159) | (0.185) |
| ROA | 6.365*** | 6.992*** | 7.278*** | 7.925*** |
| | (1.516) | (1.500) | (1.577) | (1.519) |
| Regulatory capital/RWA | 1.174*** | 1.053*** | 1.357*** | 1.227*** |
| | (0.169) | (0.168) | (0.161) | (0.170) |
| Tier 1/Regulatory capital | -1.158 | | 1.367*** | |
| | (0.947) | | (0.422) | |
| (Tier 1/Regulatory capital)* Tier 1 stringency | 0.279* | | | |
| | (0.146) | | | |
| (Tier 1/Regulatory capital)* ln(TA) | | | -0.116** | |
| | | | (0.057) | |
| RWA/TA | | 1.284*** | | -1.111*** |
| | | (0.287) | | (0.164) |
| RWA/TA * Tier 1 Stringency | | -0.249*** | | |
| | | (0.037) | | |
| RWA/TA * ln (TA) | | | | 0.103*** |
| | | | | (0.018) |
| | | | | |
| Observations | 61,090 | 59,789 | 134,748 | 127,062 |
| R-squared | 0.038 | 0.039 | 0.048 | 0.051 |
| Number of Country_Year | 870 | 942 | 1,943 | 1,759 |
| Marginal Effect at mean | 2.026 | -0.524 | 0.669 | -0.491 |

Note: *, **, and *** represent statistical significance at 10%, 5%, and 1% two-tailed level, respectively. Standard errors clustered at country level appear in parentheses. Off-shore financial centers included in the computations.

It is particularly easier for larger banks to reduce risk-weights (for instance, through securitization) and to issue lower quality securities that can be used as Tier 1 capital (for instance, subordinated debt). We would, therefore, expect the *RWA/TA* and *Tier1/Regulatory Capital* variables to have a lower impact in reducing risk for large banks. We test this hypothesis by interacting these two variables with bank size. The results are reported in columns (3) and (4) of Table 4. For larger banks, it is indeed the case that the relationship between risk-weights and the Tier 1 ratio and bank risk is significantly weaker. Our results highlight the importance of higher quality capital and the dangers of over-reliance on risk-weights. These findings are especially important for larger banks which have the capacity and resources to have greater

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discretion in meeting regulatory capital requirements and are often allowed to use the internal ratings-based (IRB) approach to compute capital requirements. As the failure of larger banks can have systemic consequences and pose public externalities, our results have important policy implications.

We further investigate whether countries are influenced by neighbors while adopting capital regulation. Several studies have found strong peer country effects in financial regulation. Demirgüç-Kunt, Kane and Laeven (2008), for instance, show that adoption of explicit deposit insurance increases with the proportion of neighboring countries that introduced explicit deposit insurance at the same time. We examine peer country effects in three new capital regulations that have been implemented in the aftermath of the global financial crisis. Specifically, we analyze whether countries have adopted Basel III, countercyclical capital buffers or capital conservation buffers. Using data from the latest round of the BRSS, we create three dummy variables corresponding to each of the three regulations and set them to one if a country has adopted these new capital rules. We use the regional adoption rate to capture peer effects.[24] This variable reflects the extent to which these new capital regulations are believed to be best practice by countries in the region. As more countries adopt a regulation in a given region, we expect other neighboring countries to follow suit and adopt the new regulations. We use the following model to test these conjectures:

$\mathbf{I}(Regulation\ Adopted = 1)_i$

$$= 1/(1 + \exp(\alpha + \theta_1 Banking\ Crisis_i + \theta_3 Region\ Average_i + \sum_{p=1}^{4} \beta_p Macro_{i,2010}^{p})) \quad (3)$$

In the logit regression, we use the same set of controls as described in Equation (1a) above. The dependent variable is an indicator variable set to one if a given country has adopted a new capital regulation. The Region Average is the proportion of countries in each region (excluding the given country) that have adopted these new capital regulations. The results from the logit regressions are reported in Table 5. We find strong evidence of a positive association between region peer effects and the adoption of the new Basel III capital regulations. These reforms have been adopted regardless of whether the countries have

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[24] The regional peer variables are calculated as the average of the regulation dummy variables in each regional group described in section 2 of the paper.

experienced a crisis (as indicated by the insignificant coefficient on the banking crisis variable). We also observe that more developed and more populous countries are more likely to adopt Basel III capital regulations, even after controlling for regional peer effects.

**Table 5: Peer effects and the adoption of capital regulations**

| VARIABLES | (1) Basel III adoption - Yes =1 | (2) Countercyclical capital buffer adoption - Yes =1 | (3) Capital conservation buffer adoption - Yes =1 |
|---|---|---|---|
| Banking Crisis | -1.039 | 0.458 | -0.318 |
| | (0.811) | (0.897) | (0.700) |
| Average dependent variable - Region | 3.947*** | 4.669*** | 3.382** |
| | (1.314) | (1.360) | (1.380) |
| ln (GDP per capita) 2010 | 0.975*** | 0.099 | 0.642 |
| | (0.361) | (0.397) | (0.440) |
| Inflation 2010 | 0.114 | -0.184* | -0.235** |
| | (0.082) | (0.095) | (0.095) |
| ln(population) 2010 | 0.824*** | 0.758*** | 0.573*** |
| | (0.209) | (0.192) | (0.164) |
| Regulatory Quality 2010 | 0.775 | 0.715 | -0.144 |
| | (0.654) | (0.542) | (0.506) |
| Constant | -23.707*** | -14.111** | -15.247*** |
| | (4.810) | (5.532) | (5.331) |
| | | | |
| Observations | 117 | 98 | 98 |

Note: *, **, and *** represent statistical significance at 10%, 5%, and 1% two-tailed level, respectively. Robust standard errors for heteroscedasticity appear in parentheses. Off-shore financial centers included in the computations.

## 4    Summary and conclusions

In this paper we summarize recent developments in bank regulation and supervision across 159 economies. Three main conclusions follow from the analysis of the World Bank's 2019 BRSS. First, reforms after the crisis led to an increase in capital requirements and regulatory capital holdings at financial institutions. However, these increases were accompanied by shifts toward asset categories with lower risk weights. The accuracy of those risk weights is therefore crucial for understanding whether increases in regulatory capital holdings are a reliable signal of greater banking stability. The quality of capital may not have improved significantly, as most authorities now allow a wider array of instruments to satisfy Tier 1

capital requirements. Using bank-level data, we show bank solvency risk is more sensitive to regulatory capital ratios when greater stringency in the definition of Tier 1 capital is imposed by domestic supervisors.

Second, the GFC led to unprecedented government interventions to rescue distressed banks. Deposit insurance systems around the world have become more generous, expanding in both scope and coverage. These expansions may have reinforced investor expectations of government support for financial institutions, thus reducing the long-term incentives of depositors to monitor and discipline banks.

Finally, bank supervision became stricter and more complex after the crisis. But supervisory capacity did not improve to match the greater complexity of bank regulations. These capacity constraints can significantly hinder the enforcement of new reforms that were put in place after the GFC. The availability and quality of information disclosed as part of bank supervision has also not improved significantly. As information is key to effective public and private monitoring, greater information asymmetries may undermine market discipline in the long run.

# References

Acharya, V. V., Schnabl, P., Suarez, G., 2013. Securitization without risk transfer. J. financ. econ. 107, 515–536. https://doi.org/10.1016/j.jfineco.2012.09.004

Anginer, D., Can Bertay, A., 2019. Deposit insurance, ifo DICE Report (No. 17(1)). Munich, Germany.

Anginer, D., Demirgüç-Kunt, A., 2018. Bank runs and moral hazard: a review of deposit insurance, Policy Research Working Paper (No. WPS8589). Washington, DC.

Anginer, D., Demirgüç-Kunt, A., 2014. Bank capital and systemic stability, Policy Research Working Paper (No. WPS6948). Washington, DC.

Anginer, D., Demirgüç-Kunt, A., Zhu, M., 2014. How does deposit insurance affect bank risk? Evidence from the recent crisis. J. Bank. Financ. 48, 312–321. https://doi.org/10.1016/j.jbankfin.2013.09.013

Barth, J.R., Caprio, G.J., Levine, R., 2013. Bank regulation and supervision in 180 countries from 1999 to 2011. J. Financ. Econ. Policy 5, 111–219. https://doi.org/10.1108/17576381311329661

Barth, J.R., Caprio, G.J., Levine, R., 2012. Guardians of finance: making regulators work for us. MIT Press, Cambridge.

Barth, J.R., Caprio, G.J., Levine, R., 2008. Bank regulations are changing: for better or worse?, Policy Research Working Papers (No. WPS4646). Washington, DC. https://doi.org/10.1057/ces.2008.33

Barth, J.R., Caprio, G.J., Levine, R., 2006. Rethinking bank regulation : till angels govern. Cambridge University Press.

Barth, J.R., Caprio, G.J., Levine, R., 2001. The regulation and supervision of banks around the World: a new database, Policy Research Working Papers (No. WPS2588). Washington, DC.

Basel Committee on Banking Supervision, 2011. Basel III: A global regulatory framework for more resilient banks and banking systems. Basel. https://doi.org/10.1021/jp0268617

Caprio, G., Demirgüç-Kunt, A., Kane, E.J., 2010. The 2007 Meltdown in structured securitization: searching for lessons, not scapegoats. World Bank Res. Obs. 25, 125–155. https://doi.org/10.1093/wbro/lkp029

Cihak, M., Demirgüç-Kunt, A., Martinez Peria, M.S., Mohseni-Cheraghlou, A., 2013. Bank regulation and supervision in the context of the global crisis. J. Financ. Stab. 9, 733–746. https://doi.org/10.1016/j.jfs.2013.10.002

Čihák, M., Demirgüç-Kunt, A., Mohseni-Cheraghlou, A., Martinez Peria, M.S., 2012. Bank regulation and supervision around the world: a crisis update, Policy Research Working Papers (No. WPS 6286). Washington, DC.

Dagher, J., 2018. Regulatory cycles: revisiting the political economy of financial crises, IMF Working Paper (No. 18/8). Washington, DC.

Demirguc-Kunt, A., Detragiache, E., Merrouche, O., 2013. Bank capital: lessons from the financial crisis. J. Money, Credit Bank. 45, 1147–1164. https://doi.org/10.1111/jmcb.12047

Demirgüç-Kunt, A., Kane, E.J., Laeven, L., 2008. Determinants of deposit-insurance adoption and design. J. Financ. Intermediation 17, 407–438. https://doi.org/10.1016/j.jfi.2007.03.009

Djankov, S., McLiesh, C., Shleifer, A., 2007. Private credit in 129 countries. J. financ. econ. 84, 299–329. https://doi.org/10.1016/j.jfineco.2006.03.004

Flannery, M.J., 2001. The faces of "market discipline." J. Financ. Serv. Res. 20, 107–119. https://doi.org/10.1023/A:1012455806431

Haldane, A.G., 2011. Capital discipline, in: Speech given at the American Economic Association. Denver, p. 22.

Hasan, I., Fang, Y., Liu, L., Zhang, G., 2017. Deposit insurance and the 2008-2009 Global Financial Crisis.

Jones, D., 2000. Emerging problems with the Basel Capital Accord: regulatory capital arbitrage and related issues. J. Bank. Financ. 24, 35–58. https://doi.org/10.1016/S0378-4266(99)00052-7

Kara, G.I., 2016. Bank capital regulations around the World: what explains the differences? Financ. Econ. Discuss. Ser. 2016, 1–40. https://doi.org/10.17016/feds.2016.057

Laeven, L., Valencia, F., 2018. Systemic banking crises revisited (No. WP/18/206), IMF Working Paper. Washington, DC.

Le Leslé, V., Avramova, S., 2012. Revisiting risk-weighted assets. Why do RWAs differ across countries and what can be done about it ? (No. WP/12/90), IMF Working Paper. Washington, DC.

Mare, D.S., Moreira, F., Rossi, R., 2017. Nonstationary Z-Score measures. Eur. J. Oper. Res. 260. https://doi.org/10.1016/j.ejor.2016.12.001

Masciandaro, D., Romelli, D., 2018. Central bankers as supervisors: Do crises matter? Eur. J. Polit. Econ. 52, 120–140. https://doi.org/10.1016/J.EJPOLECO.2017.05.005

The World Bank, 2012. Global Financial Development Report 2013: rethinking the role of the state in finance. The World Bank, Washington, DC.

The World Bank, 2019. Global Financial Development Report 2019/2020: bank regulation and supervision: the decade after the Global Financial Crisis. The World Bank, Washington, DC.

**Appendix I: Jurisdictions participating in the 2019 Bank Regulation and Supervision Survey by country grouping**

| **High-income OECD (33)** | Philippines | Nicaragua | **South Asia (7)** |
|---|---|---|---|
| Australia | Singapore | Paraguay | Bangladesh |
| Austria | Taiwan, China | Peru | Bhutan |
| Belgium | Thailand | Suriname | India |
| Canada | Tonga | Trinidad and Tobago | Maldives |
| Chile | Vietnam | Uruguay | Nepal |
| Czech Republic | **Europe & Central Asia (21)** | **Middle East & North Africa (9)** | Pakistan |
| Denmark | Albania | Djibouti | Sri Lanka |
| Estonia | Armenia | Jordan | **Sub-Saharan Africa (32)** |
| Finland | Azerbaijan | Kuwait | Angola |
| France | Belarus | Morocco | Benin |
| Germany | Bosnia and Herzegovina | Oman | Botswana |
| Greece | Bulgaria | Qatar | Burkina Faso |
| Hungary | Croatia | Saudi Arabia | Burundi |
| Iceland | Georgia | Tunisia | Cabo Verde |
| Ireland | Kosovo | West Bank and Gaza | Comoros |
| Israel | Kyrgyz Republic | **Offshore financial center (25)** | Congo, Dem. Rep. |
| Italy | Lithuania | Antigua and Barbuda | Côte d'Ivoire |
| Japan | Moldova | Aruba | Eswatini |
| Korea, Rep. | Montenegro | Bahrain | Gambia, The |
| Latvia | North Macedonia | Belize | Ghana |
| Luxembourg | Romania | Bermuda | Guinea-Bissau |
| Netherlands | Russian Federation | British Virgin Islands | Kenya |
| New Zealand | San Marino | Cayman Islands | Lesotho |
| Norway | Serbia | Cook Islands | Liberia |
| Poland | Tajikistan | Costa Rica | Madagascar |
| Portugal | Turkey | Cyprus | Malawi |
| Slovak Republic | Ukraine | Gibraltar | Mali |
| Slovenia | **Latin America & Caribbean (19)** | Guernsey | Mauritania |
| Spain | Argentina | Jersey | Mozambique |
| Sweden | Bolivia | Lebanon | Namibia |
| Switzerland | Brazil | Liechtenstein | Niger |
| United Kingdom | Colombia | Macao SAR, China | Nigeria |
| United States | Curaçao | Malta | Rwanda |
| **East Asia & Pacific (13)** | Dominican Republic | Marshall Islands | Senegal |
| China | Ecuador | Mauritius | South Africa |
| Fiji | El Salvador | Montserrat | São Tomé and Príncipe |
| Hong Kong SAR, China | Guatemala | Panama | Tanzania |
| Indonesia | Guyana | Samoa | Togo |
| Malaysia | Haiti | Seychelles | Uganda |
| Palau | Honduras | Turks and Caicos Islands | Zimbabwe |
| Papua New Guinea | Mexico | Vanuatu | |

Notes: Offshore financial centers according the classification of the Financial Stability Board (2010), in line with the methodology presented in the latest assessment by the International Monetary Fund (see https://www.imf.org/external/np/ofca/ofca.aspx).

**Appendix II: The survey results, section by section**

In the following pages, we report a selected number of questions from the latest round of the 2019 BRSS, focusing on the areas where emerging markets and developing economies (henceforth developing countries) and high-income countries are mostly different. Unless differently stated, the figures refer to year 2016. We define developing countries as upper-middle, middle, and low-income countries following the 2018 classification of the WDI. From both groups, we exclude the economies classified as Offshore Financial Centers (OFC) in groups II and III by the Financial Stability Board (2010).[25] In addition, when we use a regional classification, we compare the high-income countries that are members of the Organisation for Economic Co-operation and Development (OECD) and countries included in the other World Bank developing regions.[26]

*Section 1: Entry into Banking*

This section contains 26 questions covering bank licensing and entry requirements, the existence of entry restrictions for foreign entities, the number of applications from foreign banks for entry into the local banking market during 2011-2016 and the country of origin of the foreign banks for which application for entry into the local banking market was accepted. Eight new questions have been introduced since the last survey wave to account mainly for the country of origin of applications from foreign banks received and approved for entering the local banking market.

A higher percentage of high-income countries tie minimum capital entry requirements to the type of banking business and permit that the initial disbursement or subsequent injections of capital to be done with instruments other than cash or government securities. A higher proportion of developing countries require the sources of funds to be verified by the regulators/supervisory authorities.

High-income OECD countries accepted a higher proportion of the applications received for banking licenses from domestic entities between 2011 and 2016 (87 percent), followed by EAP (80 percent), MENA (80 percent), SSA (76 percent) and ECA (54 percent). LAC and SA had the lowest percentage of accepted applications. South-Asia had also the highest proportion of denied applications (76 percent).

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[25] For the complete list of countries, see http://www.fsb.org/wp-content/uploads/pr_000526.pdf .

[26] For the regional classification, we refer to the classification followed by the World Bank - World Development Indicators (WDI). Notice that in this case, the regional values reflect also information from high-income countries.

**Figure A1: Licensing and entry into banking (% of Yes)**

**Licensing and capital entry requirements (% of Yes)**
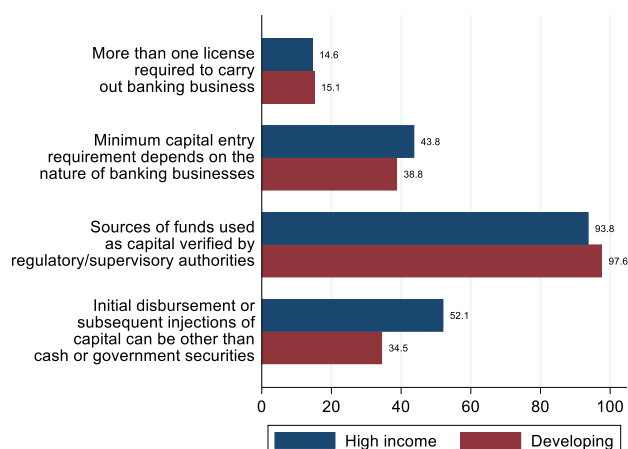


**Applications for banking licenses from domestic entities (2011-2016; % received)**
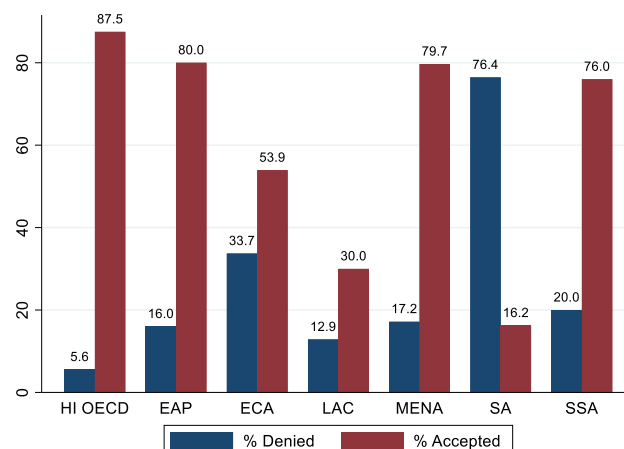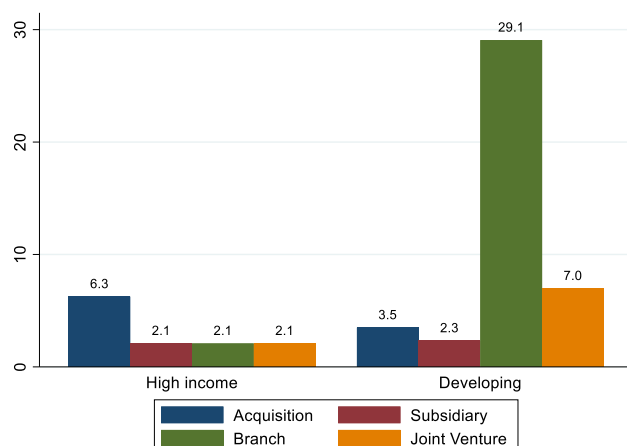


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016. The figure representing the percentage of applications for banking licenses from domestic entities does not include information on the percentage applications that were withdrawn.

A higher proportion of developing countries prohibited foreign banks to enter the local banking market, especially through branches (29 percent) and joint venture (7 percent). SSA had the highest fraction of denied applications for acquisition of a domestic bank by a foreign bank (26 percent), followed by MENA (20 percent), and ECA (10 percent). MENA and SSA had the highest percentage of denied applications to enter the local domestic banking market through a new subsidiary (100 percent and 17 percent, respectively). SA and MENA had the highest percentage of denied applications to enter the local domestic banking market via opening a branch by a foreign bank (37 percent and 29 percent, respectively). HI OECD had in general a low proportion of denied applications to enter the local domestic banking market by foreign banks, but also a relatively low percentage of accepted applications. EAP and ECA had relatively high percentages of accepted applications and relatively low percentage of applications denied for entry by foreign banks.

## Figure A2: Foreign banks entry into local banking market

**Foreign banks prohibition to enter the local banking market (% of Yes)**



**Applications for acquisition of a domestic bank by a foreign bank (2011-2016; % received)**
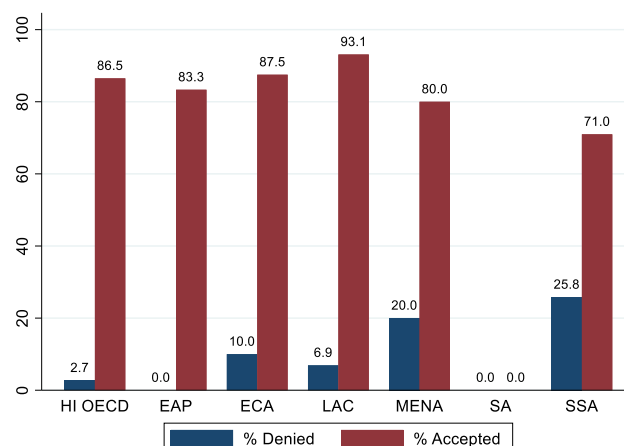


**Applications to enter through a new subsidiary by a foreign bank (2011-2016; % received)**
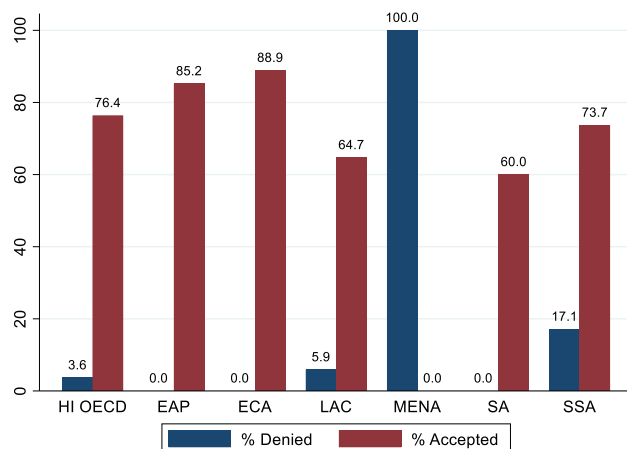


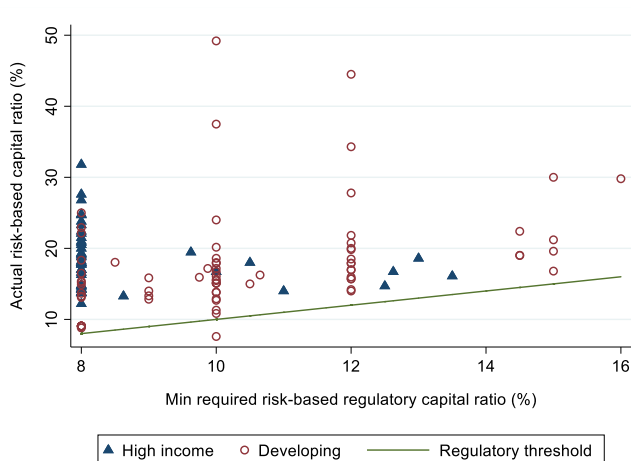**Applications to enter by opening a branch by a foreign bank (2011-2016; % received)**
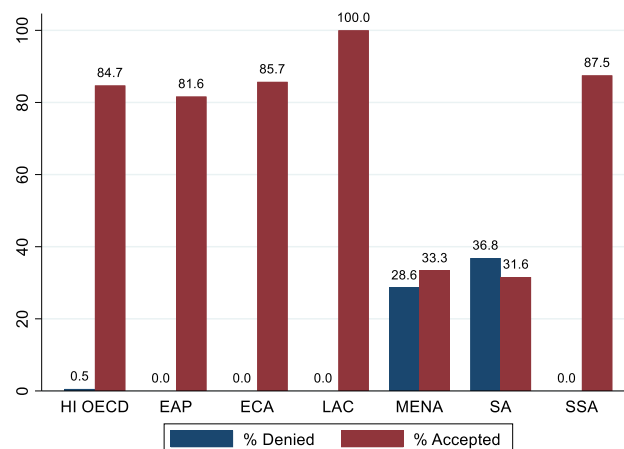


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.
Notes: Notice that the numbers do not add up to 100% because the question offers an additional option – withdrawn – not reported in the graph.

*Section 2: Ownership*

This section of the survey contains 16 questions of which four are new compared to the previous survey wave. The focus is on the regulation of bank ownership. A higher percentage of developing countries impose a maximum percentage of a bank's equity that can be owned by a single owner (34 percent vs 10 percent). High-income countries are relatively more likely to provide bank supervisors with the power of refusing approval of the ultimate owner (100 percent vs 90 percent) and require public disclosure of the ultimate owner and controller (57 percent vs 48 percent). In terms of the requirements for evaluation and

approval of significant bank shareholders, a higher proportion of high-income countries evaluate some of the key dimensions except for the assessment of education, criminal record and bankruptcy record.

**Figure A3: Bank ownership requirements**

**Requirements on owners/shareholders (% of Yes)**
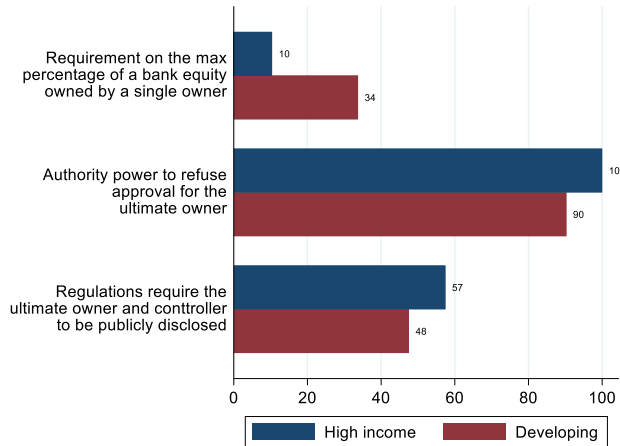
**Requirements for evaluation / approval of significant bank shareholders (% of Yes)**
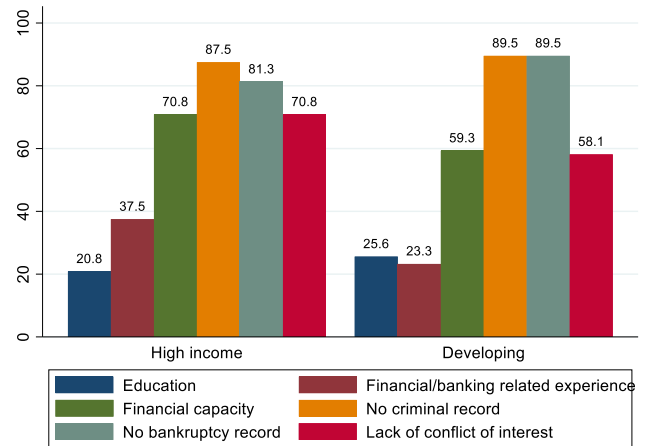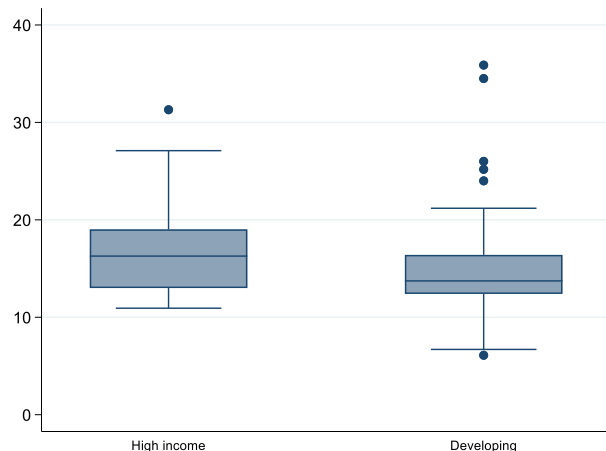


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

In regard to ownership of banks by non-bank firms, 85 percent of high-income countries allows non-bank financial firms to own 100 percent of the voting shares in banks with prior authorization, compared to 70 percent of developing countries. In the same vein, 85 percent of high-income countries allows non-financial firms to own 100 percent of the voting shares in banks with prior authorization compared to 69 percent of developing countries.

**Figure A 4: Non-bank voting rights in banks**

**Non-bank financial firms own equity with voting rights in banks (% of Yes)**
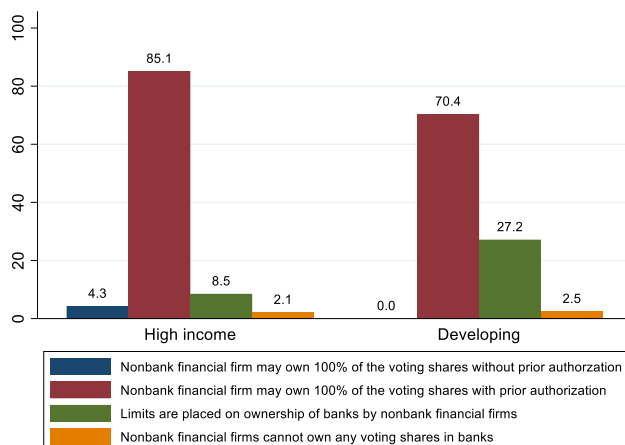
**Non-financial firms own equity with voting rights in banks (% of Yes)**
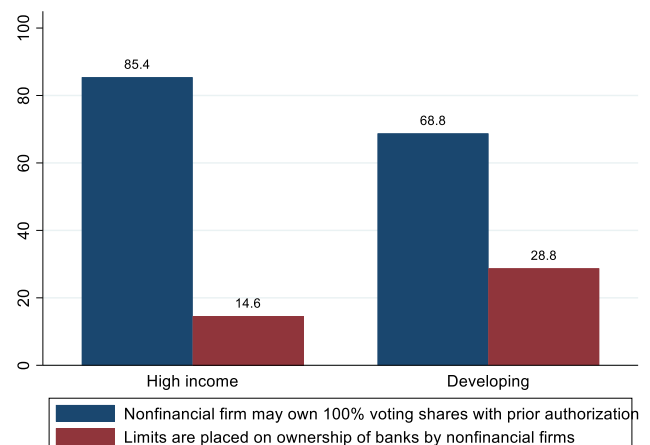


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

*Section 3: Capital*

This section of the survey contains 34 questions covering bank capital regulation. Nine new questions have been introduced since the last survey wave accounting mainly for the new regulations introduced by the Basel III capital framework.

The distribution of minimum capital requirements in high-income countries showed less variability than the one of developing countries, with most countries setting 8 percent as minimum requirement. The distribution of actual holdings of regulatory capital in high-income countries showed also less variability than the one in developing countries, with median values higher for high-income countries than for developing countries.

**Figure A5: Actual risk-based capital ratio vs minimum required regulatory capital (%, 2016)**



Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016. The regulatory threshold (green line) corresponds to the minimum level of actual risk-based capital holdings a country should hold according to the capital requirements, e.g. 12 percent. Observations below the green line denote under-capitalization according to the regulatory capital requirements.

The median value of Tier 1 capital holdings was higher in high-income countries than in developing countries, though this indicator is not recorded in many developing countries and in all countries where Basel I regulations are in force. As per end of 2016, two more developing countries enforced leverage ratio regulation than in high-income countries. There are also significant differences in the definition of Tier 1 regulatory capital, as a higher proportion of high-income countries permit the inclusion of a broader set of capital instruments and at the same time impose deductions in the computation of this regulatory ratio.
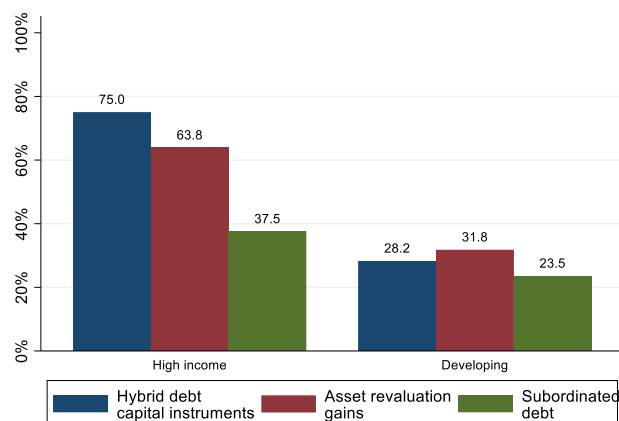
**Figure A6: Capital quality**

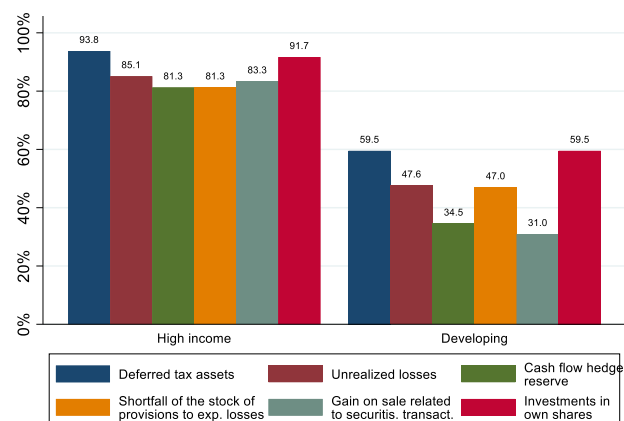**Tier 1 regulatory capital holdings distribution**



**Number of countries adopting a leverage ratio framework**
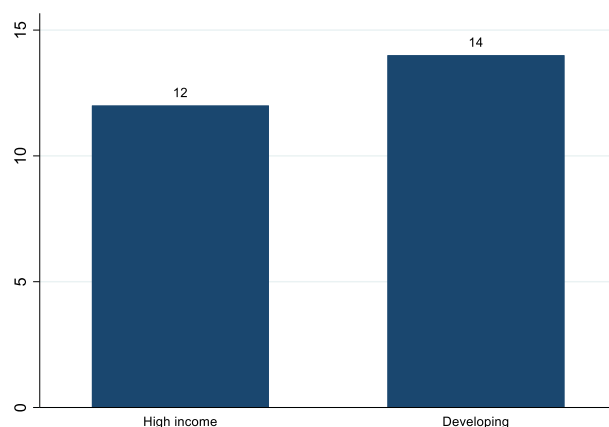


**Items allowed as part of Tier 1 regulatory capital (% Yes)**



**Selected items deducted from Tier 1 reg. capital (% Yes)**
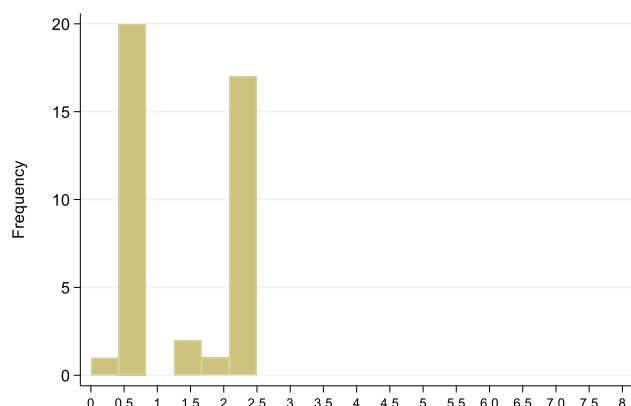


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

A higher number of high-income countries (41) introduced capital conservation buffers than developing countries (31) but the median value for developing countries (1.25 percent) was twice the one of high-income countries (0.625 percent). Similarly, a higher number of high-income countries (36) introduced countercyclical capital buffers than developing countries (20), though most of the countries in both groups set the regulatory threshold to zero.

**Figure A7: Basel III capital buffers**

**Capital conservation buffer – High-income (% RWA)**



**Capital conservation buffer – Developing (% RWA)**
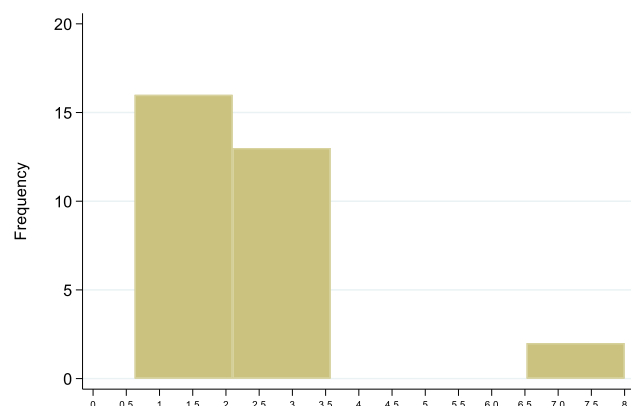


**Countercyclical capital buffer – High-income (% RWA)**
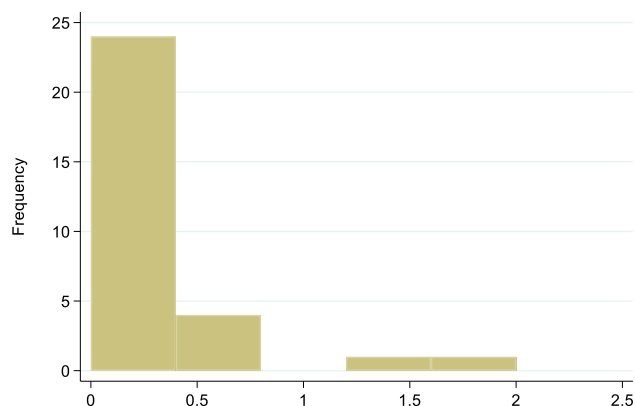


**Countercyclical capital buffer – Developing (% RWA)**
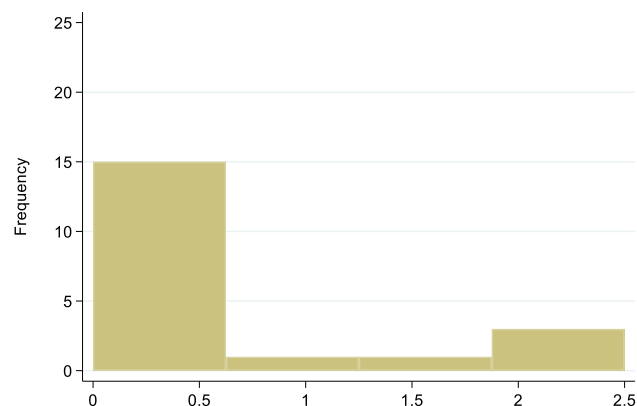


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.
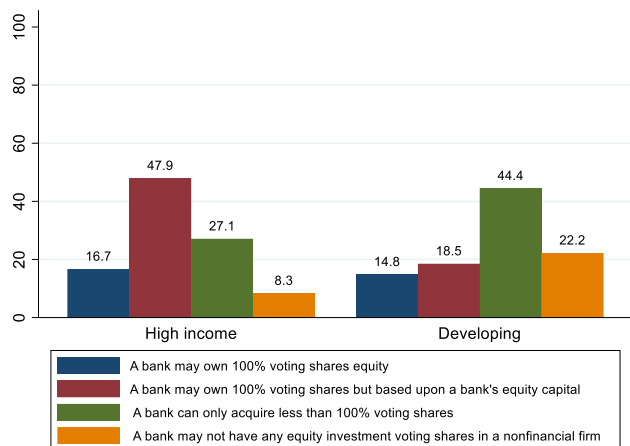
*Section 4: Activities*

This section of the survey contains 10 questions covering the financial activities that banks could undertake. Four new questions have been introduced since the last survey gathering information on the process of authorization for carrying out new financial activities.

A higher share of high-income countries allowed banks to own up to 100 percent of voting shares equity in non-financial firms (17 percent vs 15 percent) and, in general, a higher percentage of developing countries impose restrictions on owning voting shares in non-financial firms. A higher percentage of developing countries also imposes stricter regulation for undertaking new financial activities (20 percent vs
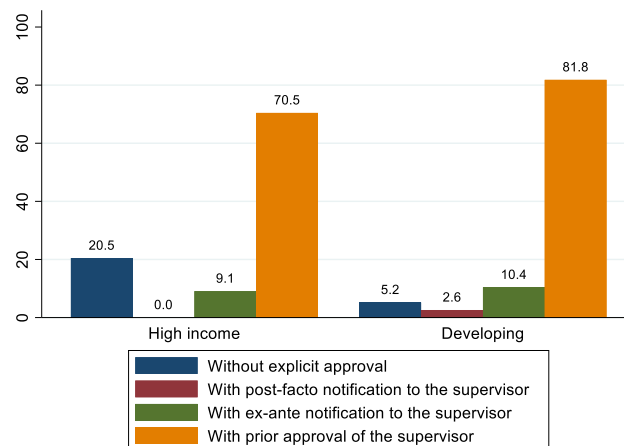
5 percent) and, in general, a higher percentage of developing countries require banks to receive the approval of the bank supervisor to undertake new activities (82 percent vs 70 percent).

**Figure A8: Regulation of bank activities**

**Banks own voting shares in non-financial firms? (% of Yes)**

**Banks undertake new activities… (% of Yes)**



Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

*Section 5: External auditing requirements*

This section of the survey contains 20 questions of which one is new compared to the previous survey wave. The main differences observed between high-income and developing countries concern requirements imposed on banks regarding external auditing and regulation of auditors. For instance, a higher proportion of developing countries imposed that banks reported to the banking supervisor any change of external auditors. A higher proportion of high-income countries were instead requiring that auditing firms promptly informed banking supervisors when they intended to issue qualified opinions on the accounts.

## Table A1: External Auditing Requirements: Selected Responses (% of Yes)

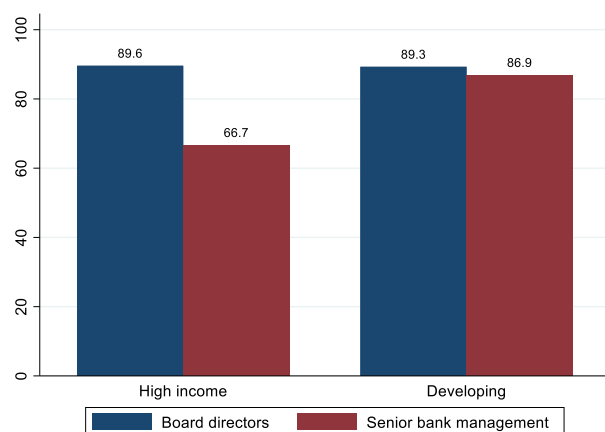|  | High-income | Developing |
|---|---|---|
| Are specific requirements for the extent or nature of the audit spelled out? | 80.4 | 91.6 |
| Are banks required to promptly report to the banking supervisor any change of external auditor and the reasons for the change? | 83.3 | 95.0 |
| Are banks required to nominate more than one external auditor? | 14.6 | 21.4 |
| Do laws or regulations require auditors to conduct their audits in accordance with International Standards on Auditing (ISA)? | 85.4 | 92.2 |
| Do regulations explicitly prohibit auditing firms from providing non-audit services to the banks whose financial accounts they audit? | 68.8 | 61.4 |
| Are auditors required to promptly inform banking supervisors when they intend to issue qualified opinions on the accounts? | 72.9 | 47.0 |
| Are auditors required to promptly inform banking supervisors when they identify information that could affect the safety and soundness of a bank? | 87.5 | 81.0 |
| Are auditors required to communicate directly to the supervisory agency any presumed involvement of bank directors or senior managers in illicit activities, fraud, or insider abuse? | 72.9 | 77.4 |

Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.
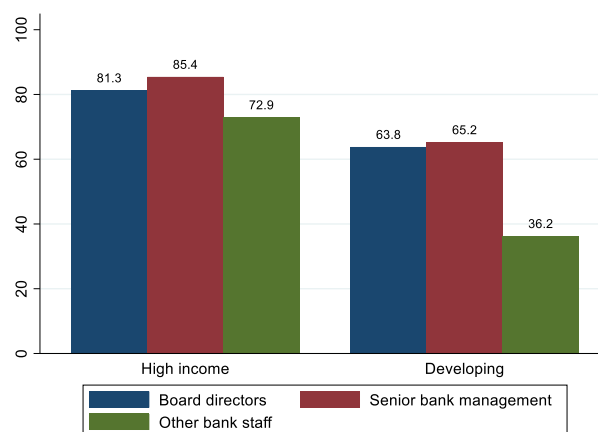
*Section 6: Bank governance*

This section of the survey contains 11 questions of which one is new compared to the previous survey wave. A larger share of developing countries required that bank supervisors approved the appointment of bank senior management. High-income countries were instead more likely to evaluate the remuneration or compensation of bank staff at all levels of seniority.

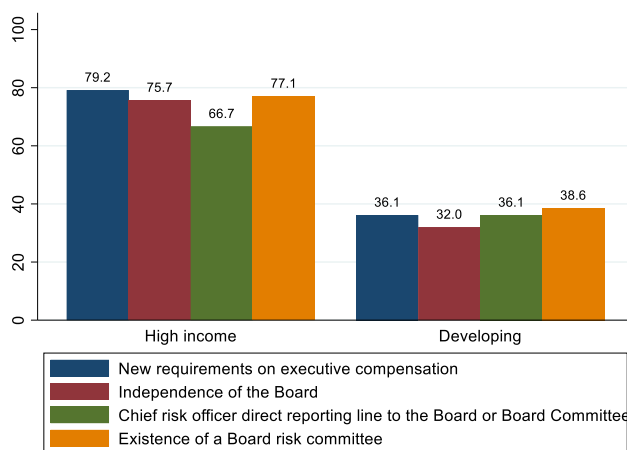## Figure A9: Supervision of bank corporate governance



Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

Bank governance has been reformed since the GFC, especially in high-income countries. This group of countries was more likely to have introduced new requirements on executive compensation, required independence of the Board, imposed direct reporting of the chief risk officer to the Board, and established a risk committee at the Board level. There are also differences between high-income countries and developing countries in the powers given to the banking supervisory agency to blacklist staff at the highest seniority level (44 percent versus 62 percent), remove board members and senior management from banks (94 percent versus 93 percent), and require banks to obtain bank supervisors' approval or no-objection for appointment of "key staff" (56 percent versus 68 percent).

**Figure A10: Changes to the bank governance framework after the Global Financial Crisis and supervisory power**

**Changes introduced to the bank governance framework as a result of the GFC (% of Yes)**



**Can the banking supervisor agency… (% of Yes)**
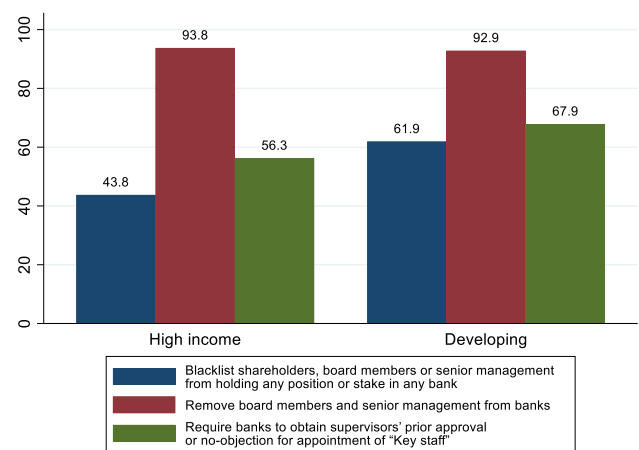


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

*Section 7: Liquidity & diversification requirements*

This section of the survey contains 18 questions covering regulations on liquidity and diversification requirements. Eight new questions account for the new liquidity requirements introduced by the Basel III capital framework.

A higher share of developing countries set stricter requirements on concertation and diversification, probably reflecting the degree of severity of this issue in this group of countries. High-income countries were instead more likely to impose stricter liquidity requirements attaining: a) the diversification of funding sources, which is more prominent in these countries because of the presence of well-developed capital

markets and interbank markets; b) contingency funding plans which are now a core element of banking regulation following the liquidity dry-ups witnessed during and after the GFC; and stress testing which is a now core tool for bank supervisors to assess how severe crisis scenarios would affect the value of bank portfolios. High-income countries were also more likely to have in place separate liquidity requirements (71 percent versus 59 percent), regulatory minimum ratios on liquid assets (73 percent versus 70 percent), and maturity mismatch/gap limits (42 percent versus 40 percent). The central bank's role as lender of last resort and liquidity provider was instead relatively more prominent in developing countries, as a higher share of this group of countries imposed reserve and/or deposit requirements (89 percent versus 75 percent). In regard to the new Basel III liquidity requirements, a higher share of high-income countries adopted both the liquidity coverage ratio (85 percent versus 30 percent) and the net stable funding ratio (13 percent versus 3 percent).

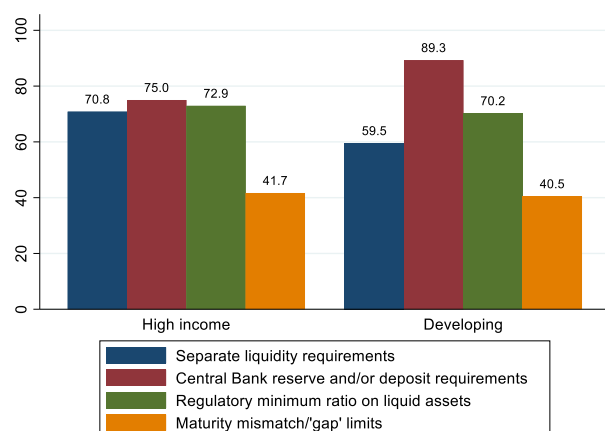## Figure A11: Liquidity and diversification requirements
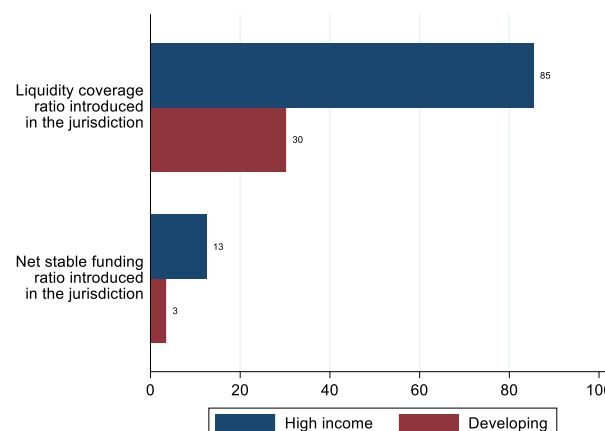
**Concentration and diversification (% of Yes)**
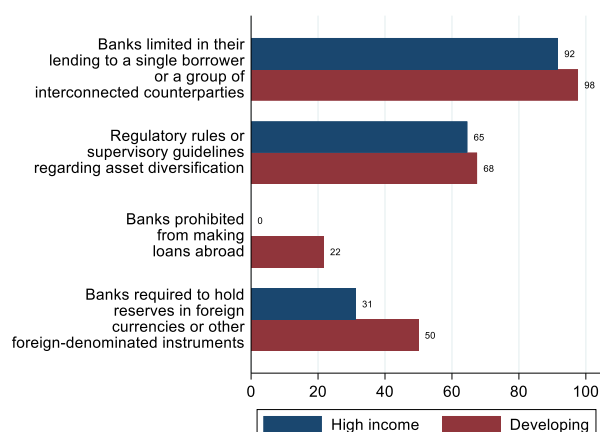


**Liquidity requirements (% of Yes)**
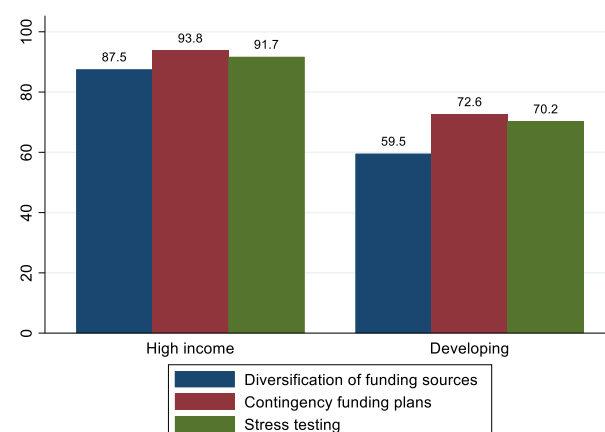


**Liquidity requirements (% of Yes)**



**Basel III Liquidity Requirements (% of Yes)**



Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.
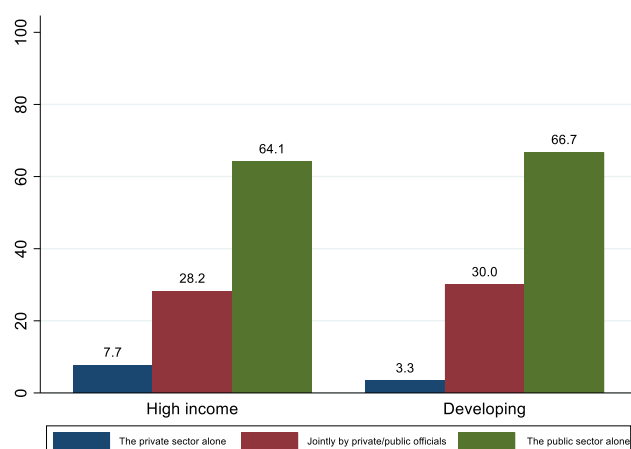
*Section 8: Depositor (Savings) protection schemes*

This section of the survey contains 35 questions covering several aspects of depositor protection schemes, such as the powers provided to the deposit insurance agency, the membership and coverage requirements for the deposit insurance scheme, and other deposit insurance design features. Six new questions seek to provide more detail on deposit insurance schemes.

Developing countries were more likely to have the insurance fund managed by the public sector alone (67 percent versus 64 percent). High income countries were more likely to use the deposit insurance fund to provide liquidity support (35 percent versus 30 percent) and/or resolve distressed banks (91 percent versus 80 percent), and/or recapitalizing weak banks (26 percent versus 25 percent).

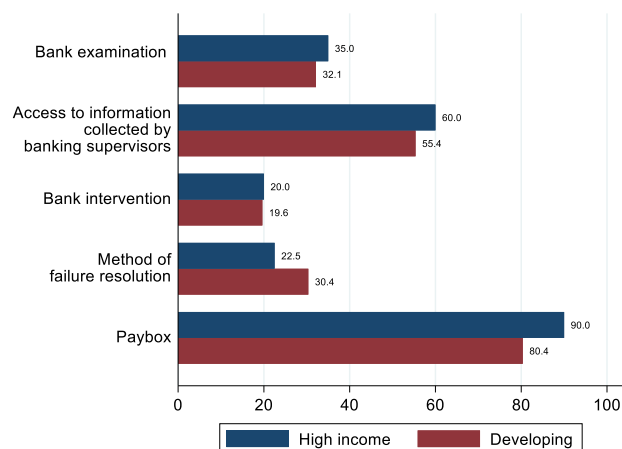**Figure A12: Management and use of deposit insurance fund**
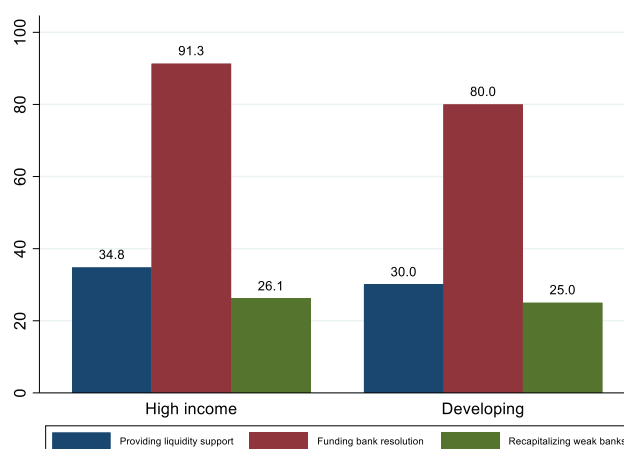


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

When it comes to the powers attributed to the deposit insurance agency, overall there were relatively minor differences in the shares of countries that provided the insurance agency with such tools. An exception was the power to use the deposit insurance fund as a paybox as a meaningfully higher share of high-income countries provided the deposit insurance agency with such power (90 percent versus 80 percent).

With regard to enforcement, overall fewer than half of the countries in both groups provided the deposit insurance agency with the power to cancel or revoke deposit insurance for any participating bank and take legal action for violations against laws. It was also noticeable the low percentage of countries that took actions for violations against the laws.

**Figure A13: Deposit insurance agency's powers**

**Deposit insurance agency's powers (% of Yes)**



**Deposit insurance agency's enforcement (% of Yes)**
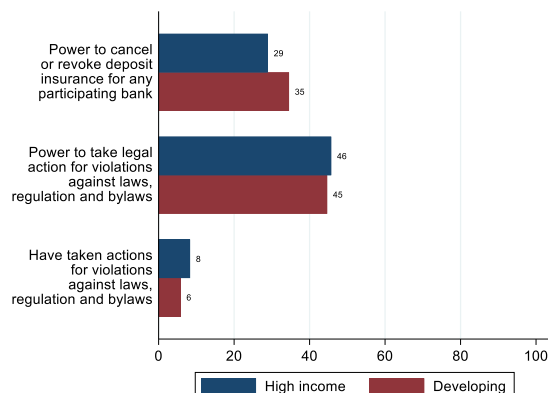


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

In terms of deposit insurance design features, a similar share of high-income and developing countries imposed the collection of ex-ante resources to cover deposit insurance claims and compensated wholly insurance depositors when a bank failed. Meaningful differences between high-income and developing countries regarded the computation of the deposit insurance premium accounting for bank risk (82 percent versus 37 percent) and the reimbursement of depositors not covered by a deposit insurance scheme at the time of failure (32 percent versus 15 percent).

**Figure A14: Deposit insurance design features**
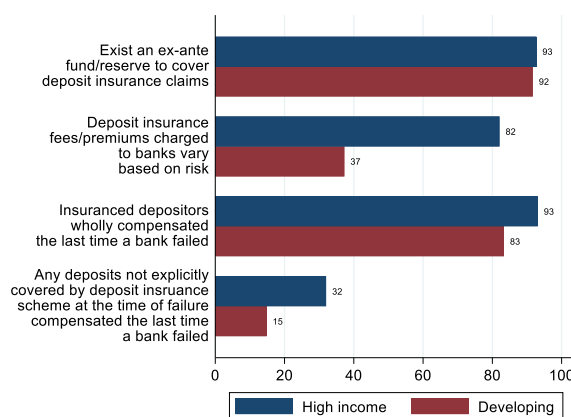


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

*Section 9: Asset classification, provisioning, and write-offs*

This section of the survey contains 19 questions covering asset classification, provisioning, and write-offs. Two new questions have been introduced since the last survey wave to reflect whether collateral influenced the asset classification of banks and whether there were clear norms when a non-performing loan could be upgraded as performing.

Developing countries were more likely to have in place an asset classification system (93 percent versus 67 percent), to allow banks to upgrade the classification of a loan following restructuring (21 percent versus 9 percent) and to set a minimum level of specific provisions for loans and advances (95 percent versus 34 percent). High-income countries were instead more likely to allow banks to include accrued unpaid interest/principal in income statements while the loan was non-performing (46 percent versus 16 percent). There were also differences in the criteria to classify loans and advances as non-performing, as in general a higher share of high-income countries classified loans and advances as non-performing depending on a diverse set of circumstances, such as breaching of contract and restructuring.

**Figure A15: Overview of asset classification and loan classification**



Overview of asset classification (% of Yes)
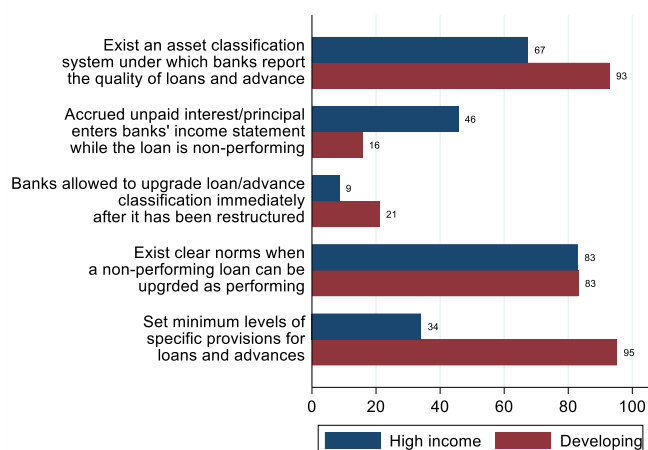
Criteria that are taken into account to classify loans and advances as non-performing (% of Yes)
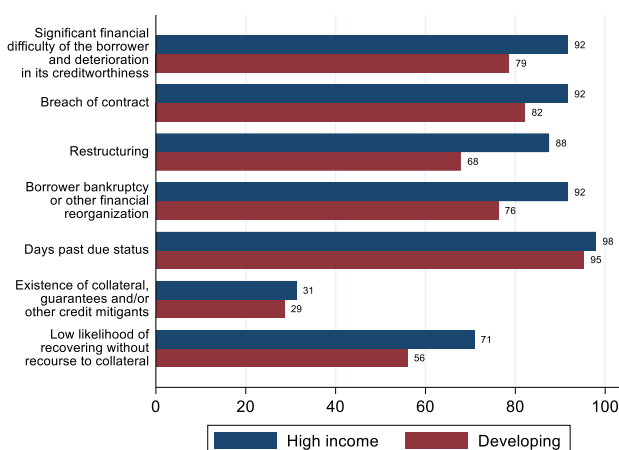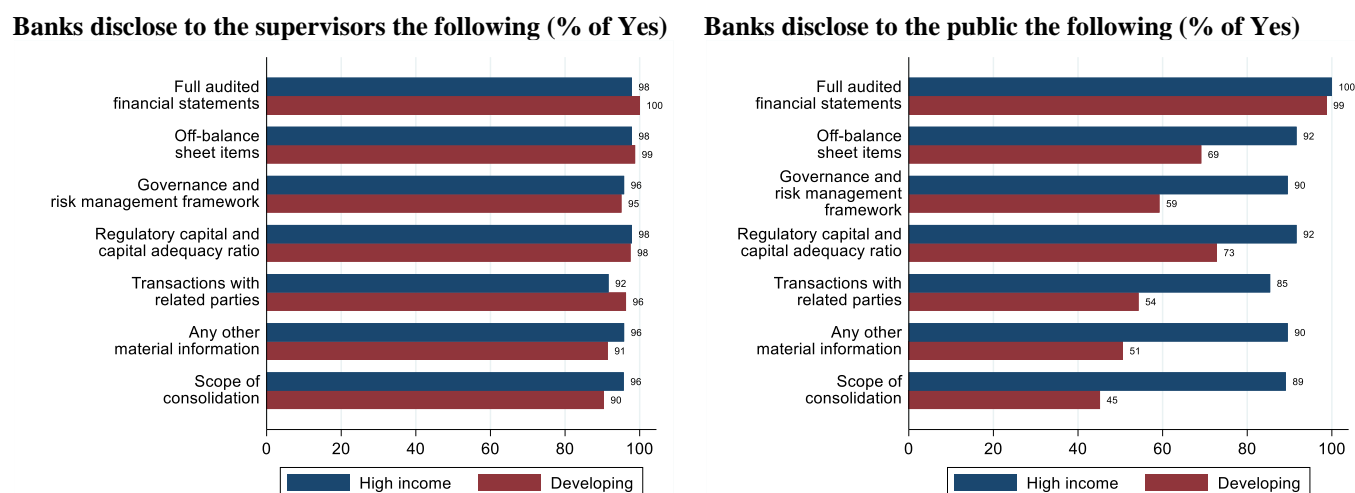
Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

*Section 10: Accounting/information disclosure*

This section of the survey contains 15 questions covering accounting standards and public disclosure standards. High-income and developing countries appeared to require banks to provide bank supervisors

with similar information. In developing countries, information was relatively less available to the public, hence investors, on off-balance sheet items, governance and risk management framework, regulatory capital and capital adequacy ratio, transactions with related parties, other material information (i.e. information which omission or misstatement could change or influence the assessment or decision of a user relying on that information for making decisions), and scope of consolidation.

**Figure A16: Disclosure of information to bank supervisors and the public**

**Banks disclose to the supervisors the following (% of Yes)**   **Banks disclose to the public the following (% of Yes)**



Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

*Section 11: Discipline/problem institutions/ exit*

This section of the survey contains 29 questions covering enforcement, resolution of domestic and international banks. Eleven new questions have been introduced since the last survey wave to reflect mainly changes to the resolution of international banks.

Bank supervisors in developing countries tended to have greater powers to resolve banks while resolution might be assigned to other agencies (e.g., court or bank restructuring agency) in high-income countries. High-income countries were instead more likely to have regulation in place to resolve banks, particularly international banks, as a higher share of countries required the bank supervisory agency to prepare resolution plans for banks (69 percent versus 36 percent), had in force a supervisory framework to resolve international banks (46 percent versus 4 percent), and designed clear rules on burden sharing in case of the resolution of an international bank (54 percent versus 8 percent).

**Figure A17: Resolution powers of bank supervisors and international cooperation**

**Bank supervisors have the power to perform the following problem bank resolution activities? (% of Yes)**

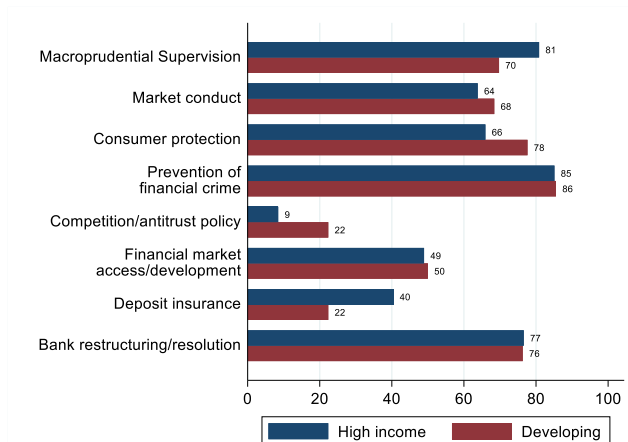**Resolution plans and international cooperation (% of Yes)**
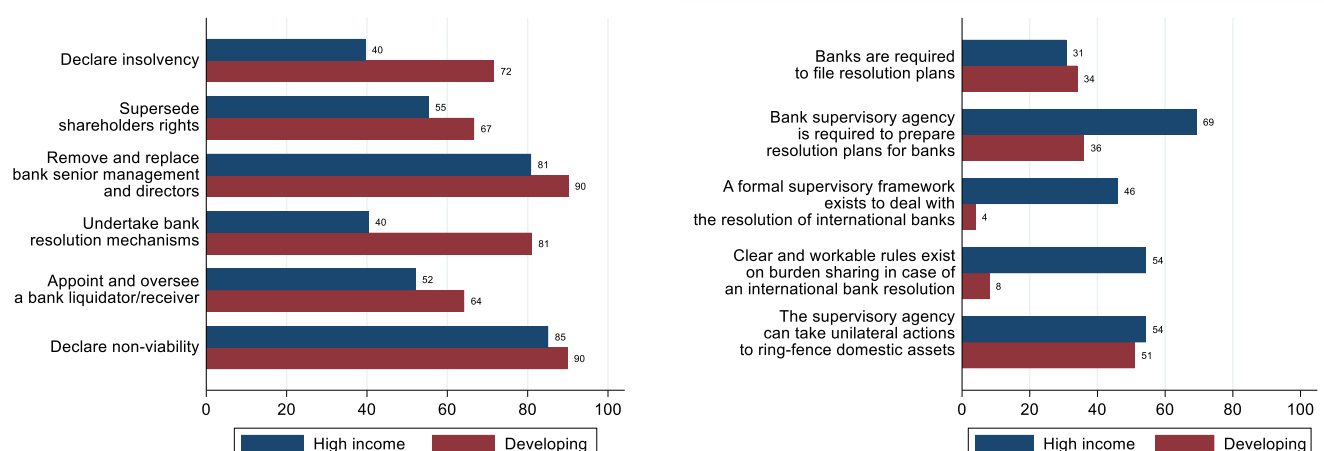


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

*Section 12: Supervision*

This section of the survey contains 73 questions covering the bank supervisor institutional structure and mandate, independence and accountability, supervisory approach, macroprudential supervision and supervisory resources. Twenty-three new questions have been introduced since the last survey wave to reflect mainly the new powers and responsibilities attributed to bank supervisors especially in the area of macroprudential supervision.

Most of the countries in both groups attributed to the bank supervisors the mandate of conducting macroprudential supervision, overview market conduct, protect consumers, prevent financial crime and act as the bank resolution agency. Financial market access and development was prominent in half of the countries, whereas antitrust policy and deposit insurance were less likely to be attributed to bank supervisors.

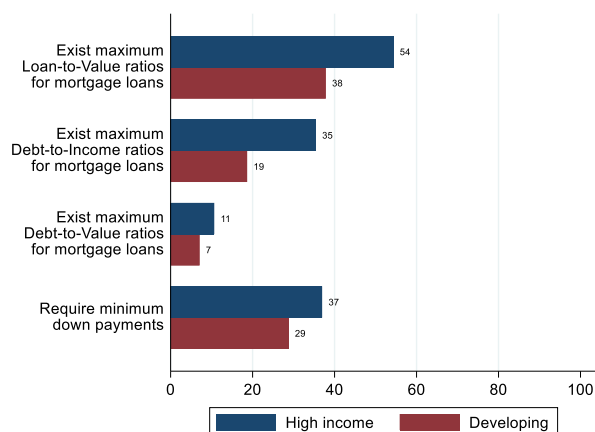**Figure A18: Financial system responsibilities of bank supervisors**



Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

High-income countries were more likely to provide bank supervisors with macroprudential tools for mortgage loans to set maximum loan-to-value ratios (54 percent versus 38 percent), debt-to-income ratios (35 percent versus 19 percent), debt-to-value ratios (11 percent versus 7 percent) and require minimum down payments (37 percent versus 29 percent). Assessing systemic risk was also a key task for bank supervisors and a higher share of high-income countries tailored supervision to the systemic importance of banks (85 percent versus 59 percent), measured a bank individual contribution to systemic risk (77 percent versus 64 percent), had distinct processes to resolve systemically important financial institutions (48 percent versus 32 percent), and monitored interconnectedness among banks and non-bank financial intermediaries (77 percent versus 59 percent).

**Figure A19: Macroprudential supervision**

**Macroprudential tools (% of Yes)**          **Systemic risk (% of Yes)**
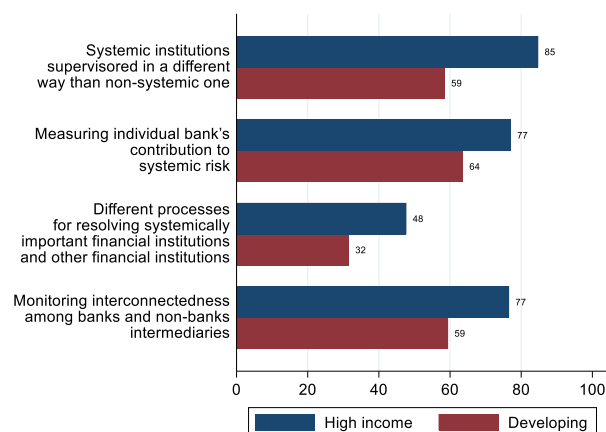


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.

*Section 13: Banking sector characteristics*

This section of the survey contains 29 questions covering banking system size, structure, performance, assets and liabilities composition and taxation. Two new questions seek to provide more detail on banking system sector characteristics.

On average, high-income countries witnessed a decrease in the number of banks operating in their banking system over time. Banking system assets share of government-controlled banks were higher on average in high-income countries than in developing countries since year 2013. Banking system's assets share of foreign-owned banks were higher on average in developing countries than in high-income countries throughout the period. Moreover, on average net interest margin as a share of average interest-bearing (total earning) assets were almost six times higher in developing countries than in high-income countries.

**Figure A20: Banking system selected characteristics**
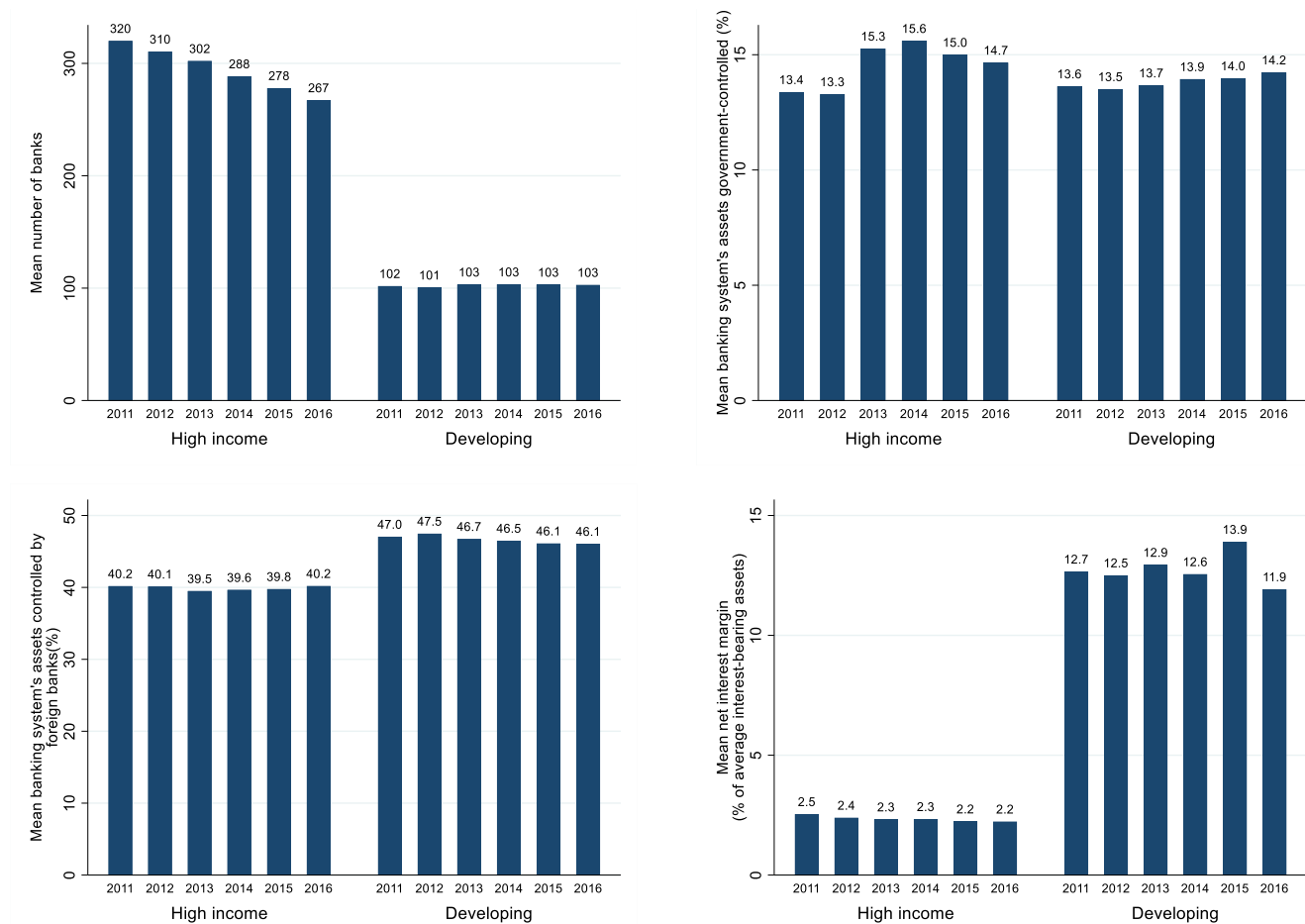


Source: Calculations based on the 2019 Bank Regulation and Supervision Survey.

*Section 14: Consumer protection*

This section of the survey contains 14 questions covering various aspects of consumer protection schemes around the world. For most of the questions there is little difference in the shares of high-income and developing countries that adopt a specific regulation. Noticeable differences were in the share of developing countries that provide the consumer protection agency with the power of issuing public notice of violations (42 percent versus 83 percent) and to withdraw the offending provider's license to operate (56 percent versus 80 percent).

## Table A2: Consumer Protection: Selected Responses

| | High-income | Developing |
|---|---|---|
| **A. What actions can the consumer protection agency take to enforce consumer protection laws and regulations?** | | |
| a. Issue warnings to financial institutions | 85.71 | 90.70 |
| b. Require providers to refund excess charges | 54.29 | 72.09 |
| c. Require providers to withdraw misleading advertisements | 91.43 | 86.05 |
| d. Impose fines and penalties | 94.29 | 93.02 |
| e. Issue public notice of violations | 82.86 | 41.86 |
| f. Withdraw the offending provider's license to operate | 80.00 | 55.81 |
| **B. By law or regulation, which of the following are part of the disclosure requirements that banks need to comply with upon signing any financial product contract:** | | |
| a. Plain language requirement (Clear and simple language that can be readily understood by any customer) | 86.84 | 90.91 |
| b. Local language requirement | 65.79 | 59.09 |
| c. Prescribed standardized disclosure format (e.g., one-page "Key Facts" document) | 68.42 | 79.55 |
| d. Clearly spell out recourse rights and processes | 71.05 | 70.45 |
| **C. By law or regulation, which of the following are part of the dis. req. that banks need to comply with upon signing a credit contract:** | | |
| a. Annual percentage rate using a standard formula | 97.37 | 90.91 |
| b. Fees | 97.37 | 95.45 |
| c. Computation method (average balance, interest) | 89.47 | 88.64 |
| d. Required insurance | 84.21 | 70.45 |
| **D. By law or regulation, which of the following are part of the dis. req. for periodic statements for deposit products?** | | |
| a. Annual percentage yield calculated using a standard formula | 42.86 | 60.00 |
| b. Amount of interest earned | 75.00 | 82.22 |
| c. Fees imposed | 71.43 | 77.78 |
| d. Account balance | 89.29 | 80.00 |
| **E. By law or regulation, which of the following are part of the dis. req. for periodic statements for credit products?** | | |
| a. All transactions concerning the account for the period covered by the statement | 90.91 | 78.43 |
| b. Annual percentage rate (applied during the period) | 72.73 | 80.39 |
| c. Interest charged for the period | 90.91 | 86.27 |
| d. Fees charged for the period | 90.91 | 82.35 |
| e. Minimum amount due | 81.82 | 60.78 |
| f. Date due | 72.73 | 64.71 |
| g. Outstanding balance | 84.85 | 64.71 |
| **F. Are there specific provisions in the existing laws or regulations that restrict:** | | |
| a. Deceptive advertising | 94.87 | 92.31 |
| b. Unfair or high-pressure selling practices | 92.31 | 82.69 |
| c. Abusive collection practices | 76.92 | 63.46 |
| d. Unauthorized use of client data or breach of client confidentiality | 89.74 | 96.15 |

Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.
Note: This table reports the percent of the number of countries answering Yes for high-income and developing countries, respectively. The numbers are in percentage.
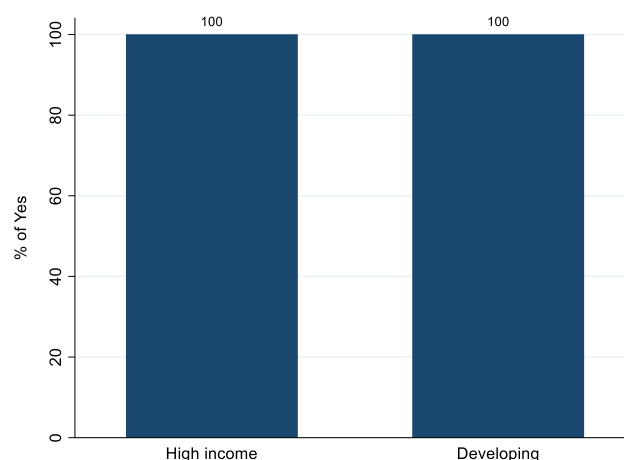
*Section 15: Islamic banking*

This section of the survey was introduced in the BRSS 2019 and contains 12 questions covering information on the characteristics and regulation of Islamic banks. Islamic banks or conventional banks offering Shariah compliant financial products and services were more likely to operate in developing countries than in high-income countries (40 percent versus 26 percent). In both country groups, Islamic banks were supervised by the same bank supervisory authority.

**Figure A21: Islamic banking - selected characteristics**

**Are there any Islamic banks or conventional banks offering Shariah compliant financial products and services in your country (% of respondents answering Yes)**
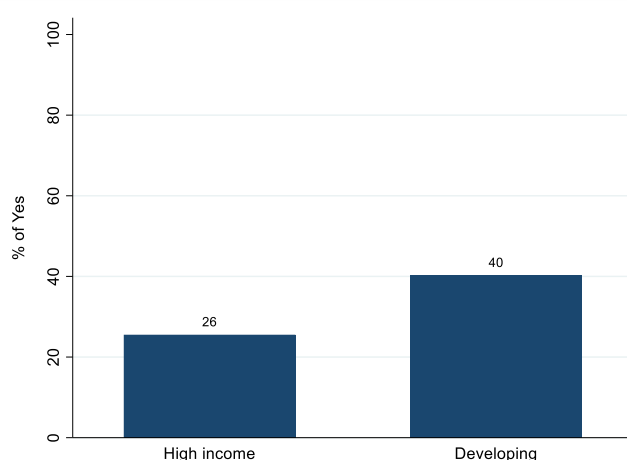


**Are Islamic banks supervised by the same Bank Supervisory Authority of conventional banks (% of Yes)**



Source: Calculations based on the 2019 Bank Regulation and Supervision Survey, which reflects values as of 2016.