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Reserve Requirements Survey¹

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Abstract

Banks have a private motive to hold some level of cash and liquid reserves, but the negative externalities of bank runs create a public interest in setting a regulatory level higher than the privately optimal level. We can think of such reserve requirements (RRs) as the original form of liquidity regulation. In this paper, we focus on 14 cases in which central banks adjusted RRs after crises hit, typically to deal with liquidity shortages in the banking system. We observe that RR adjustments have several advantages in a crisis: (1) such changes require little process, and the change for banks can be quick; (2) stigma concerns may be much lower than with emergency lending operations; (3) RRs can be used to fine-tune incentives for holding various types and maturities of assets; and (4) RR easing can complement a central bank's other liquidity support programs.

Keywords: financial crisis intervention, liquidity, liquidity regulation, reserve requirement

¹ This case study is part of the Yale Program on Financial Stability (YPFS) selection of New Bagehot Project modules considering the adjustment of reserve requirements. Cases are available from the *Journal of Financial Crises* at <https://elischolar.library.yale.edu/journal-of-financial-crises/>.

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Introductory Note: This survey is an analysis of important considerations for policymakers seeking to adjust reserve requirements in response to a financial crisis. It is based on insights derived from case studies of 14 specific reserve requirement programs the Yale Program on Financial Stability has completed and from the existing literature on the topic. While this survey can help inform a decision about whether or not to adjust reserve requirements, our main purpose is to assist policymakers who have already made that decision in designing the most effective program possible. In analyzing the programs that are the focus of this survey, we used a color-coded system to highlight certain particularly noteworthy design features.

Treatment	Meaning
BLUE - INTERESTING	A design feature that is interesting and that policymakers may want to consider. Typically, this determination is based on the observation that the design feature involves a unique and potentially promising way of addressing a challenge common to this type of program that may not be obvious. Less commonly, empirical evidence or a consensus will indicate that the design feature was effective in this context, in which case we will describe that evidence or consensus.
YELLOW - CAUTION INDICATED	A design feature that policymakers should exercise caution in considering. Typically, this determination is based on the observation that the designers of the feature later made significant changes to the feature with the intention of improving the program. Less commonly, empirical evidence or a consensus will indicate that the design feature was ineffective in this context, in which case we will describe that evidence or consensus.

This highlighting is not intended to be dispositive. The fact that a design feature is not highlighted or is highlighted yellow does not mean that it should not be considered or that it will never be effective under any circumstances. Similarly, the fact that a design feature is not highlighted or is highlighted blue does not mean that it should always be considered or will be effective under all circumstances. The highlighting is our subjective attempt to guide readers toward certain design features that (1) may not be obvious but are worth considering or (2) require caution.

Introduction

All banks have a private motive to hold some cash reserves, but the negative externalities of bank runs create a public interest in setting a regulatory ratio higher than the privately optimal level. We can think of such reserve requirements (RRs) as the original form of liquidity regulation, the practice of which has evolved from the simple ratios of the old days to the complex calculations underlying the rules of Basel III.

This paper surveys 14 cases covering the adjustment of RRs in response to a financial crisis. RR adjustments have several advantages in a crisis. Perhaps the most important advantage is speed. For the central bank, adjusting RRs requires little more than a press release; and the result for banks is automatic—they immediately have access to a potentially significant amount of liquidity that had previously been restricted or stuck at the central bank. Second, stigma concerns may be much lower than with emergency lending operations because RR adjustments typically apply to many or all banks at the same time in the same way. Third, the authorities can fine-tune incentives for financial institutions by adjusting and differentiating elements of RRs. Fourth, RR easing can complement a central bank's other liquidity support programs.

The main drawback to the use of RRs is that they are relatively weak compared to other crisis interventions. Nobody should expect that a change in RRs will fix a crisis by itself: compared to “direct” injections of liquidity or capital, changes in RR ratios are “indirect,” as they require active bank participation. Nevertheless, in combination with other interventions, RR adjustments can be a force multiplier in crisis response. Their usage in recent years, alongside the innovation of more complex liquidity rules, suggests central banks continue to see RRs as a valuable crisis-fighting tool.

Figure 1 shows all the cases covered in this survey. We use country names and a date or crisis acronym to refer to the cases in the text.

Figure 1: Programs Covered in This Survey

Case title	Reference
Argentina: Reserve Requirements, 1994–1995	Leonard 2022
Brazil: Reserve Requirements, GFC	Fulmer 2022
China: Reserve Requirements, GFC	Mott 2022a
China: Reserve Requirements, 2015–2016	Mott 2022b
Colombia: Reserve Requirements, GFC	Leonard and Decker 2022
Czech Republic: Reserve Requirements, 1997	Hoffner 2022a
India: Reserve Requirements, GFC	Nunn and Mott 2022
Jamaica: Reserve Requirements, GFC	Runkel 2022a
Malaysia: Reserve Requirements, AFC	Decker 2022
Peru: Reserve Requirements, GFC	Fulmer and Decker 2022
Russia: Reserve Requirements, 1998	Hoffner 2022b
Russia: Reserve Requirements, GFC	Hoffner 2022c
Thailand: Reserve Requirements, AFC	Runkel and Vergara 2022
Venezuela: Reserve Requirements, GFC	Runkel 2022b

Sources: Decker 2022; Fulmer 2022; Fulmer and Decker 2022; Hoffner 2022a; Hoffner 2022b; Hoffner 2022c; Leonard 2022; Leonard and Decker 2022; Mott 2022a; Mott 2022b; Nunn and Mott 2022; Runkel 2022a; Runkel 2022b; Runkel and Vergara 2022.

Key Design Decisions

1. Purpose: What was the purpose of adjusting RRs?

Outside financial crises, central banks use RRs for several purposes, most often to “lean against the wind” and promote financial stability during credit expansions. In many cases in this survey, the reversal of such tightening was an early response to an acute crisis. For example, before the Global Financial Crisis of 2007–2009 (GFC), Colombia and India used RRs to curtail excessive credit growth but then reversed course to release liquidity tied up at the central bank. Similarly, in the mid-1990s, the central bank of Russia managed RR policy to support its primary objective of supporting ruble stability; when the Ruble Crisis hit in 1998, it lowered RRs to provide liquidity to domestic banks and restore the functioning of the payment system (CBR 1998; 1999, 6–7). Later, in the early 2000s, Russia’s central bank used RRs to limit domestic banks’ exposure to foreign borrowings and to maintain banking sector stability; when the GFC erupted, the central bank lowered RRs so the banks could use funds released from reserves to maintain liquidity and settle payments. The central bank of Peru used RRs to lengthen the maturity of banks’ liabilities because short-term liabilities are typically more vulnerable to runs or sudden capital outflows. It responded to a surge of

capital inflows in September 2007 by removing RRs on banks' long-term external liabilities to promote long-term, rather than short-term, capital inflows; five months later, it began a series of RR hikes on other liabilities to strengthen the banking sector. When the GFC unfolded, the central bank reversed RR hikes to release banks' liquidity. Several central banks also used RRs during the GFC to redistribute liquidity in the banking system. For example, Brazil's central bank observed that the GFC did not cause deposits to leave Brazil systematically—rather, the crisis concentrated deposits among a few large institutions that depositors considered relatively safe. Through RR adjustments, the central bank attempted to reverse this accumulation of deposits among the largest banks of Brazil.

Authorities can use RR adjustments as an expression of government policy support for certain types of companies or industries, both in normal times and when specific sectors are under unique stress. For example, China adopted two-tier RRs with higher ratios applied to the largest commercial banks and lower ratios to smaller commercial banks and urban and rural credit cooperatives. The central bank initially tested the two-tier RRs in response to a series of natural disasters in 2008. During the GFC, the central bank explained that the tiered RR structure was part of a broader principle of “differentiated treatment to different sectors,” which included credit allocation to the agricultural sector (PBOC 2009, 51).

During the Asian Financial Crisis (AFC) of the late 1990s, the Bank of Thailand repeatedly expanded the list of reserve assets that healthy banks could use to satisfy the RR to meet several policy purposes. Early on, it encouraged healthy banks to support illiquid banks by allowing them to count their loans to a government liquidity fund as reserve assets. Later, it adjusted its definition of eligible reserve assets for broader policy purposes beyond liquidity provision—to encourage banks to provide funding to restructured banks and to government agencies and state enterprises, which ultimately included the Export-Import Bank of Thailand. Although this form of intervention has some risk attached, we believe it is an interesting strategy to be considered in cases when the central bank is constrained in direct liquidity provision.

In the early stages of the GFC, investors sold Jamaican-dollar assets in favor of foreign currency assets seen as safe stores of value amid uncertainty and following the downgrades of Jamaican national debt by the three major rating agencies. The sales of Jamaican-dollar assets created “extraordinary foreign exchange needs” for Jamaican financial and nonfinancial businesses (BOJ 2008). Around the same time, the maturation of Bank of Jamaica (BOJ) and Government of Jamaica securities yielded further Jamaican-dollar liquidity to bondholders. The BOJ sought to discourage those bondholders from swapping Jamaican dollars for foreign currencies, which would have put further pressure on the value of the Jamaican dollar. To do so, the BOJ raised reserve requirements for banks' holdings of Jamaican-dollar assets on three occasions.

2. Part of a Package: Did the central bank have lender-of-last-resort authority to back up liquidity provision through RR adjustments? Did any other interventions accompany the RR adjustments?

Banks may be more willing to use built-up liquidity buffers, such as reserves, if the central bank provides liquidity backstops at the same time (BIS 2012). Many jurisdictions in our survey directly injected liquidity when lowering RRs. For example, Peru expanded its repurchase agreement (repo) operations, introduced a new swap facility, and repurchased certificates of deposit (CDs) from banks. During the GFC, Russia also provided emergency lending, but this initiative required additional legislation by the parliament, thus taking longer to launch than the RR adjustments.

In 1998, Russia reduced individual banks' RRs on a case-by-case basis to facilitate three multilateral clearing operations that reduced banks' interbank liabilities. The central bank had information on each bank's outstanding liabilities to clients, other banks, and the government. With this information, over a weekend, the central bank provided participants with an overnight loan to settle end-of-day balances. If a bank still needed funds to settle, it could draw down the reserves it held at the central bank. The central bank did not make foreign currency available to banks while the multilateral clearing operations took place, to prevent banks from immediately selling the additional ruble funds they received for settling balances on the foreign exchange market.

In some cases, jurisdictions imposed relatively high RRs to make up for a relatively weak lender-of-last-resort (LOLR) authority. Also, central banks with limited ability to act as LOLR or offer deposit insurance used RR adjustments as their main tool to provide liquidity in crisis times. For example, heading into the Mexican Peso Crisis of 1994–1995, Argentina's central bank had limited LOLR capacity—up to 20% of the monetary base, which the central bank nearly exceeded during the crisis—and did not have deposit insurance; that facility was introduced only later into the crisis. Therefore, authorities relied on RR adjustments to release liquidity quickly.

In Brazil, RR policy was the central bank's main tool for providing liquidity at the onset of the GFC. Legislation prohibited the central bank from using public money to rescue financial institutions unless it was extending discount window loans with maturities of less than 360 days. Regardless, central bank officials said political pressure and scrutiny from the National Congress and the public had discouraged the use of LOLR policy. The central bank was not formally an independent institution, and central bank officials were liable for their actions for up to five years after leaving office—a threat of legal action the officials took seriously due to precedents. This structure greatly constrains an effective crisis response.

3. Legal Authority: Which body had the legal authority to adjust RRs?

Generally, central banks had discretion in their enabling legislation to adjust RR policy. However, a small number of central banks required the government's approval.

In China, the central bank required the State Council's approval to adjust RRs. However, some sources suggest that the approval process was not as rigorous for RR operations as for other

monetary policy decisions under the central bank's authority. Malaysia's government also required the central bank to obtain the finance minister's approval before raising RRs.

Occasionally, laws constrained central banks' ability to adjust RR policy by limiting how much they could adjust the RR at one time. For example, in Jamaica, the central bank could adjust a RR only once a month and by no more than 200 basis points (bps); as a result, the central bank needed three months to raise RRs by 500 bps in 2008–2009. Russia's central bank could not change a RR more than 500 bps at a time.

4. Administration: What was the process for adjusting RRs?

Generally, central banks followed independent internal processes in deciding whether to alter RRs. A minority of countries' central banks needed to coordinate with other government entities. For example, China's central bank administered RR policy under the guidance of the State Council. Malaysia's central bank administered changes to the RR with approval from the finance minister. The finance minister had authority to issue binding directives against the central bank's proposed actions, and if the central bank objected to the finance minister's override, the House of Representatives heard both sides' reasoning. It remains unclear who made the final decision.

In Brazil, the National Monetary Council set RR policy. Its members consisted of the minister of state for finance; minister of state for planning, budget, and management; and the president of the central bank. However, the central bank president was the main driver of RR decisions.

In some cases, regulated financial entities were involved in setting RR policies. For example, in Russia, the central bank's board of directors administered RRs in coordination with the central bank branches and with some participation from the Association of Russian Banks, an interest group of Russian commercial banks. Certainly, any input from regulated institutions must be treated with caution.

5. Governance: Did the body responsible for adjusting RRs have any legal mandate on reporting, or did it receive any oversight on the process of adjusting RRs?

Most central banks were not subject to mandated reporting obligations or oversight for RR adjustments. Regardless, some central banks incorporated accountability into their practices. For example, although the Reserve Bank of India Act, 1934, did not formally prescribe oversight or accountability policies, the central bank employed various practices to ensure its policymaking was transparent. This approach included publicizing its policy rationale and potential or expected outcomes. The governor of the central bank also held a quarterly press conference after every policy review.

A minority of central banks were obligated to report to their legislatures about their RR operations. In Argentina, the central bank reported annually on its operations to the Congress. In China, the central bank submitted reports on monetary policy operations to the Standing Committee of the National People's Congress and recorded its monetary policy decisions and procedures for the State Council.

6. Communication: How was the adjustment of RRs announced to the market or public?

The central banks in the cases surveyed were clear in communicating that they intended RR adjustments to deal with sudden stress in the financial system from the onset of a financial crisis. Some—Argentina, India, Malaysia, and Russia—emphasized the temporary nature of such policy changes at the announcement of the RR adjustment.

7. Assets Qualifying as Reserves: What types of assets satisfied RRs?

Reservable assets generally consisted of cash in local or foreign currency and sometimes included treasuries or other assets like cash. The relative proportions of cash held at the bank, cash and securities held at the central bank, and other reservable assets at the bank are important to consider when evaluating the impact of RR adjustments. The proportions differed in each jurisdiction. Some countries—China, Czech Republic, Malaysia, Venezuela—required all RR funds to be held with the central bank. Some—Peru, Thailand—required financial institutions to hold a specific portion of their required reserves with the central bank and allowed them to hold the remainder in various acceptable reserve assets. Others—Argentina, India, Jamaica—employed an additional liquidity requirement that essentially functioned in the same way.

Sometimes, central banks expanded the assets that qualified as reserves when adjusting RR. For example, India allowed banks to count as reserve assets their holdings of assets funded with the government's Liquidity Adjustment Facility.

Early in the AFC, the central bank of Thailand encouraged healthy banks to support illiquid banks by allowing them to count their loans to a government liquidity fund as reserve assets. As the crisis deepened, a newly created state-owned bank and new financial company absorbed the failed banks and financial companies. After this consolidation, the central bank expanded assets satisfying the RR to include the debt of these new entities. After the crisis, it also added the Export-Import Bank of Thailand to the list to promote the export sector.

8. Reservable Liabilities: Against which liabilities could financial institutions hold the liquid assets under RRs?

In calculating RRs, often liabilities included or excluded from the calculation were explicitly listed in the relevant regulations. Generally, the reservable liabilities consisted of time, savings, and checking deposits. They often excluded subordinated debt. Shareholder capital is not a liability, by definition, but several central banks, to avoid confusion, explicitly noted that banks were not required to hold reserves against it.

India, Thailand, and Venezuela required banks to hold reserves against various types of nondeposit liabilities. India included external debts. Thailand included short-term foreign liabilities and other borrowings with index-linked returns or embedded financial derivatives. Venezuela included debts to export finance companies and public housing funds.

During a crisis, central banks could change the reservable liabilities composition to motivate lending to a certain sector. For example, China's central bank differentiated RRs by business type or lending portfolio; it applied lower RRs to agricultural banks and required banks to have a certain portion of agricultural loans in their portfolios to qualify for lower RRs.

The composition of reservable liabilities may affect the behavior of banks in normal times and sometimes affect the ability of RR adjustments to provide liquidity during crisis times. For example, in Brazil, time deposits have been the most important source of domestic funding for Brazilian banks since the 1990s, partly because the central bank has applied high rates to demand and savings deposits.

In Argentina, a similar kind of migration to funding with a lower or no RR during normal times affected the ability of the central bank to use an RR adjustment to provide appropriate liquidity during crisis times. The central bank relied on lowering the RR as the main tool to provide emergency liquidity. However, the RR applied to time deposits was much lower than the RR applied to checking and overnight savings accounts in normal times; this disparity created an unequal distribution of liquidity. When the crisis hit, time deposits showed a higher propensity for runs. The central bank concluded that the unequal imposition of RRs in normal times had parked liquidity in the wrong place. Also, the interbank market proved to be a poor channel for transmission of liquidity across institutions in a systemic crisis because time deposits were held mostly by investment banks.

If a central bank plans to rely on RR adjustments as a major tool for providing emergency liquidity, it should ensure that the RR framework accurately reflects the potential risks in the financial system to build up funds where they will be most needed, and unequal imposition of RRs does not create a migration of funding to riskier sources.

9. Computation: What elements went into calculating RRs?

Central banks expressed ordinary RRs as the ratio of required reserve assets to a bank's reservable liabilities. As Figure 2 shows, jurisdictions differed in how they calculated the RR (Della Valle, King, and Veyrune 2022). Some elements considered included:

- (i) How long the maintenance period should be. The maintenance period is the length of time during which financial institutions must maintain the specified level of required reserve funds.
- (ii) Whether to require financial institutions to meet the RR on a specific date or on average over the maintenance period. Averaging gives financial institutions the flexibility to allow their reserves to sometimes fall below the requirement during the maintenance period.
- (iii) Whether to calculate the reserve requirement based on financial institutions' liabilities over the same time as the maintenance period (contemporaneous accounting) or over an earlier period (lagged accounting). With lagged reserve accounting, financial institutions can be certain about their required reserves; in a contemporaneous framework, they may have an incentive to set aside more

reserves than necessary to make sure they don't fall below their requirements. (Montoro and Moreno 2011, 56)

Figure 2: RR Computation Pre-crisis

Case	Averaging	Maintenance period	Lagged	Notes
Argentina 1994–1995	Yes	1 month	No	
Brazil GFC	Yes	1–2 weeks (depended on deposit type)	Yes	Half-lagged to lagged measure; also depended on deposit type
China GFC	No	10 days	Yes	
China 2015–2016	Yes ^(a)	10 days	Yes	
Colombia GFC	Yes	2 weeks	Yes	
Czech Republic 1997	Yes	2 weeks	N/A ^(b)	
India GFC	Yes	2 weeks	N/A	Likely lagged, but unclear
Jamaica GFC	Yes	1 month	N/A	Likely lagged, but unclear
Malaysia AFC	Yes	2 weeks	N/A	
Peru GFC	Yes	1 month	No	
Russia 1998	Yes	25 days	Yes	Between the 5th and 30th day of the month
Russia GFC	Yes	1 month	No	Central bank could require banks to compute RR ratios before the official reporting deadline
Thailand AFC	Yes	1–2 weeks (depended on institution type)	No	
Venezuela GFC	N/A	N/A	N/A	

(a) In September 2015, the central bank changed from a time-point framework to an averaging method.

(b) N/A = not available.

Source: Authors' analysis.

In response to a crisis, authorities can provide liquidity not only by changing the RR itself but also by adjusting a certain part of the ratio calculation. For example, in Malaysia during the AFC, the central bank gave banking institutions more flexibility in their daily liquidity operations by widening the band for the permissible daily variation in the average balances required to meet the RR. During the GFC, Russia raised and expanded its averaging ratio,⁶

⁶ Banks kept most required reserve funds in idle accounts with the central bank, which allowed banks that met certain prudential criteria to meet a maximum percentage (the averaging ratio) of their RR ratios using the monthly average balance of their correspondent accounts with the central bank. Correspondent accounts were liquid accounts at a local central bank branch that banks used for interbank payments.

which gave eligible banks access to some of their otherwise idle required reserve funds as a source of additional liquidity.

Central banks also could set marginal reserve requirements. In these cases, the RR ratio denominator was the change in a bank's liabilities over a set time or above a threshold level of liabilities. For example, Colombia in 2007 introduced a marginal RR on deposit liabilities above the level of May 7, 2007, to lean against credit growth then eliminated this marginal RR in the second half of August 2008 at the onset of the GFC. Similarly, Peru introduced a marginal RR to temper short-term capital inflows and reinforce the banking sector for increases in domestic currency-denominated liabilities but eliminated this marginal RR during the GFC. Venezuela also cut its marginal RR during the GFC to increase bank liquidity.

10. Eligible Institutions: Which financial institutions were subject to RRs and RR adjustments?

All central banks' RRs applied to commercial banks and other depository institutions. Other financial institutions could also be obligated to satisfy RRs. Venezuela required money market mutual funds to hold reserves with the central bank. Peru applied its RRs to a wide category of financial institutions, including municipal funds and small and microenterprise development entities.

Argentina included investment banks and mortgage banks. However, attempts to use RR cuts to promote liquidity during a crisis revealed some shortcomings of the RR framework. Lowering RRs did little to resolve liquidity problems because the institutions experiencing runs were investment banks offering time deposits. Although the liabilities of investment banks were included in the RR framework, these bore low or no RRs. The central bank then had to *increase* RRs on banks in the middle of a crisis to raise funds to lend to the troubled investment banks.

Among the financial institutions required to hold reserves, those with a greater need for liquidity often saw deeper central banks cuts to the RR. For example, in 2015–2016 the Chinese central bank reduced RRs for all deposit-taking institutions but applied a lower RR to small and rural institutions, as they had a greater need for liquidity, among other reasons. During a later period of RR easing, China again cut RRs for all banks, but the Agricultural Bank of China received a greater reduction to its RR.

In some instances, the central banks differentiated RRs on an individual-institution basis. During the Ruble Crisis, Russia applied a specific RR for each bank while performing multilateral clearing operations. The multilateral clearing operations are discussed in more detail in Key Design Decision No. 2, Part of a Package.

11. Timing: As the crisis hit, when did the authorities use RR adjustments?

RR adjustment is often the first measure a country takes in response to a potential financial crisis, a run, or other stress in the banking system. For example, Argentina during the Mexican Peso Crisis quickly acted to adjust RRs when its peso devalued sharply in December 1994. During the GFC, Russia, China, Brazil, and Colombia adjusted their RRs in the same

month or right before Lehman Brothers filed for bankruptcy. RR adjustments in Peru, India, Thailand, and Venezuela came slightly later—however, when their central banks felt the repercussions of the GFC hit their jurisdictions, they soon reduced their RRs. Colombia had a two-month gap between the announcement of the RR adjustments and the date they took effect. In Jamaica, where the central bank faced limits on the size of monthly RR changes, the central bank had to adjust the RR over three months to reach its targeted ratio.

Malaysia did not cut the RR until the second phase of its crisis. In its initial response, the central bank cut the policy rate and the government attempted, without success, to borrow on international capital markets. Only later, during a period of tightened fiscal and monetary policy to contain inflationary pressures, did the central bank, having noticed disruption to corporate borrowers' access to credit, lower RRs to encourage financial institutions to finance productive economic activity.

12. Changes in Reserve Requirements: What elements in the RRs changed?

Figure 3 lists the RR adjustments in the surveyed cases. Some countries differentiated RR adjustments among currency, maturity, and types of liabilities. Further discussion on the denominator of RR ratio calculation may be found in Key Design Decision No. 8, Reservable Liabilities. Argentina, instead of cutting the RR, lowered its minimum cash requirement for the RR, to release liquidity. In Venezuela, the central bank cut only the marginal RR.

Figure 3 also shows the amount of liquidity released based on data the central bank or International Monetary Fund supplied. In some cases, a proxy for banking sector liquidity is used; for example, China in 2015–2016 released a figure for the actual decline in bank reserves after the RR cut. The actual impact of the liquidity, however, depends on other factors including conditions around reservable assets and remuneration on those assets held at the central bank, and therefore does not directly translate into the amount of liquidity banks made available to the market or themselves through the RR adjustments. For example, during the GFC, various industry officials in the country stated that the Reserve Bank of India's policy rate cuts, including the reduction to the RR, had not led to adequate credit expansion, and the then-commerce and industry minister remarked that fresh liquidity released had not reached "cash-starved industry and consumers" (Dhasmana 2009).

Figure 3: RR Changes and Liquidity Released

Case	RR range	Eligible Liabilities	Liquidity released (USD)
Argentina 1994–1995 ^(a)	43%–30% 3%–1%	demand and savings deposits time deposits	4 billion
Brazil GFC	53%–42% 30%–20% 8%–9%	demand deposits savings deposits time deposits	71 billion
China GFC	17.5%–15.5%	headline rate for large financial institutions	117 billion
China 2015–2016	20%–17.5%	headline rate for large financial institutions	330 billion ^(b)
Colombia GFC	40%–11% 35%–11% 7.5%–4.5%	checking accounts savings accounts time deposits	—
Czech Republic 1997	11.5%–9.5%	all	0.66 billion ^(c)
India GFC	9%–5% 25%–24%	cash reserve requirement statutory liquidity ratio	40.9 billion
Jamaica GFC	9%–14% 23%–28%	cash liquid assets	(0.17 billion) ^(d)
Malaysia AFC	13.5%–4%	all	9.7 billion ^(e)
Peru GFC	9%–6% 40%–0%	ordinary RR marginal RR	0.75 billion
Russia 1998	16%–5% 13%–5% 10%–5%	demand and time liabilities up to 30 days time liabilities of 31–90 days time liabilities of more than 90 days	2.8 billion ^(b)
Russia GFC	8.5%–0.5% 6.5%–0.5% 5.5%–0.5%	liabilities to foreign banks other liabilities liabilities to individuals in rubles	14.1 billion
Thailand AFC	7%–6%	all	1.52 billion
Venezuela GFC	30%–17%	marginal RR	2.8 billion

(a) These changes apply to the minimum cash requirement within the RR. The authorities announced that these resulted in an indirect average RR cut of 21% to 14% for all deposits.

(b) These figures are not specifically liquidity released but a decline in bank reserves (China 2015–2016) and a decline in required reserve account balances (Russia 1998), representing the amount actually drawn down through the cuts to RRs.

(c) This figure reflects the May 1997 cut only; the central bank cut the reserve requirement ratio three more times during July 1998–October 1999. About half of this figure was sterilized through requiring importers to deposit a certain percentage of the value of their imports with the central bank.

(d) Jamaica increased the RR to prevent its currency from sharply depreciating; the figure presented represents liquidity absorbed. This is the only case in the survey covering a country that increased the RR.

(e) Out of USD 9.7 billion, the first RR adjustment released USD 5.8 billion, which was sterilized, and the later adjustment released USD 3.9 billion, which was not sterilized.

Source: Authors' analysis.

13. Changes in Interest/Remuneration: Were changes made to remuneration on assets held in an account with the central bank as required reserves?

Among the cases reviewed, five central banks had the authority to pay interest on the portion of reserves held at the central bank—Brazil, China, Colombia, Peru, and Venezuela. However, although Peru and Venezuela had the authority to remunerate, they did not do so. Colombia ultimately stopped remunerating reserves on July 24, 2009. Argentina amended the relevant law in 2001, after the crisis, allowing the central bank to remunerate reserves. Of course, as noted, several central banks allowed financial institutions to hold reserve assets other than cash or deposits with the central bank, such as government securities, that typically paid interest.

Brazil's RRs included ordinary reserves, which paid low or no interest; extraordinary reserves, which the Banco Central do Brasil required banks to hold in cash; and a government bond-holding requirement. Both the extraordinary cash reserves and the government bonds earned interest at the central bank's target policy rate. During the GFC, Brazil also introduced a temporary RR that forced banks to move their time deposit reserves from government bonds to unremunerated reserves unless they provided liquidity to smaller banks.

14. Other Restrictions: Did any other conditions or restrictions accompany the adjustments to RRs?

Sometimes, central banks attached additional conditions to direct liquidity released by adjustments to RRs to a specific use by the banks and financial institutions. In Russia in 1998, the central bank allowed the banks to use funds in the reserves to settle and clear interbank liabilities.

In Brazil, the central bank's RR policy had an unusual component that we didn't see in other cases: it allowed banks to deduct part of their required reserves by fixed amounts, varying for the three types of RRs. The deductibles effectively lowered the RR burden for relatively small banks. In particular, the government bond-holding RR had a high deductible that effectively exempted most small and medium-sized banks. In addition, during the GFC, the central bank allowed the largest six banks to deduct loan portfolio purchases from the remaining 97 banks from their government bond-holding RR. With this deduction, the central bank attempted to voluntarily shift reserves from large banks to smaller banks.

Argentina, India, Peru, and Russia imposed fines on banks that fell short of the RR. In Russia, the central bank waived the fine for noncompliance during the period of RR adjustment.

15. Impact on Monetary Policy Transmission: Did the release of liquidity through an adjustment to the RR have any impact on monetary or macroprudential policies, or did the authorities implement sterilizing measures for the additional liquidity released?

Generally, there was no sterilization for the additional liquidity provided by lowering RRs. However, the Czech Republic and Malaysia did attempt to sterilize. The Czech Republic partially sterilized the additional liquidity through the government's new import deposit

scheme, in which importers of select goods had to deposit 20% of their imports' value with the central bank for a six-month period. The central bank also sterilized a lowering of RRs through repo transactions.

The Malaysian central bank initially sterilized additional liquidity by reducing direct lending to the interbank market. However, its later lowering of the RR remained unsterilized as the central bank determined that its overall policy package had successfully reduced inflation.

16. Duration: Did the authorities announce an end date for the RR adjustment?

Most of the central banks in the cases surveyed did not announce an end date, although many emphasized the temporary nature of the RR adjustments. A Bank for International Settlements report suggests that banks and other financial institutions will be more willing to use the released liquidity if the authority can credibly convince the market that it is committed to keeping reserve requirements low until banks have sufficient time to rebuild buffers (BIS 2012).

In both the Ruble Crisis and the GFC, Russia explicitly stated an end date. As each crisis persisted, the central bank ultimately postponed the date at which it would return RRs to pre-crisis levels. In Argentina, the initial announcement of the RR adjustment did not include a specific end date, but the central bank did announce one a few weeks later.

Conclusion

The literature assessing the effectiveness of RR adjustments in response to financial crises is limited. Often, the RR adjustments were accompanied by other liquidity providing interventions; thus, isolating the effect of the adjustments in providing liquidity relief to financial institutions is difficult. Many central banks published the amount of liquidity they expected to release through RR adjustments. However, a bank or financial institution did not necessarily use the released funds to deal with liquidity shortages within the institution or extend loans.

Nevertheless, we find that a close examination of 14 cases suggests that RR adjustments have several advantages in a crisis: (1) they require little process, and the change for banks can be quick; (2) stigma concerns may be much lower than with emergency lending operations; (3) RRs can be used to fine-tune incentives for holding various types and maturities of assets; and (4) RR easing can complement a central bank's other liquidity support programs.

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