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How to Regulate Bank Capital

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In March 2009, at a hearing of the House Financial Services Committee, Treasury Secretary Timothy Geithner was asked what steps the regulators of our banking system should take to avoid another financial crisis. His answer captured the basic thinking of regulators around the world:

[T]he most simple way to frame it is capital, capital, capital. Capital sets the amount of risk you can take overall. Capital assures you have big enough cushions to absorb extreme shocks. You want capital requirements to be designed so that, given how uncertain we are about the future of the world, given how much ignorance we fundamentally have about some elements of risk, that there is a much greater cushion to absorb loss and to save us from the consequences of mistakes in judgment and uncertainty in the world.

Clearly, one of the lessons of the 2008 financial crisis was that large financial institutions need to be subjected to more effective capital requirements. But precisely what kinds of requirements, and just how to structure them, have been subjects of heated debate ever since — and with good reason.

Bank capital requirements are rules that force a firm to maintain some minimum ratio of capital (such as the bank's equity or preferred stock) to assets (such as the securities and loans it holds). The purpose is to ensure that banks can sustain significant unexpected losses in the values of the assets they hold while still honoring withdrawals and other essential obligations. The Basel Committee on Banking Supervision, established in 1974 by the central banks of the G-10 countries, has sought to standardize capital requirements in the world's major economies. Under the committee's recommendations (which have been adopted with minor modifications throughout the developed world), regulators weigh the risks involved in the different kinds of assets banks hold — assigning no risk to cash holdings, for instance, and incrementally higher risk to interbank loans, mortgages, and ordinary loans — and require a ratio of capital to these risk-weighted assets.

Before the global financial crisis of '08, the minimum capital ratio for banks under these rules was generally around 8%, with higher requirements for institutions with riskier holdings. But the crisis persuaded regulators and policymakers that these standards were insufficient. Thus politicians and regulators the world over are now crafting new rules to set higher capital-ratio requirements, especially for large banks (or so-called "systemically important financial institutions").

The Basel Committee has recommended significantly stricter requirements, including a 2.5% increase in the minimum capital ratio of the 30 or so most systemically important institutions around the world (a list that includes eight American banks — Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JPMorgan Chase, Morgan Stanley, State Street, and Wells Fargo — as well as European, Japanese, and Chinese banks). European leaders, now confronting the very real prospect of another banking crisis, are pushing their banks to implement much higher capital ratios immediately, and to structure capital mainly in the form of equity (common stock) claims rather than in riskier and more complex forms. But bankers, both in America and in Europe, are arguing that imposing higher capital requirements will result in a collapse of bank credit and lending, which will fuel economic decline and only further weaken the financial system.

There is a great deal at stake in this debate. The stability of the global financial system depends on effective and adequate capital requirements for financial institutions, and the 2008 crisis did reveal serious problems with the existing requirements. But the prospects for economic recovery, both in the United States and in

the rest of world, depend on a steady flow of credit and lending. And the available evidence suggests that a dramatic increase in capital requirements would indeed result in a serious credit crunch.

Can capital requirements be improved without undermining economic growth? Although it is impossible to avoid some adverse consequences when implementing necessary increases in bank capital requirements, stability and growth are best seen as complementary outcomes of a proper capital standard — not as alternatives to be balanced against each other. Both a healthy economy and a reliable supply of bank credit can be achieved if policymakers understand just what it was about the old rules that failed in 2008, and just what risks are involved in the reforms they are now considering. Such an understanding could point us toward an alternative to today's proposed reforms — one that would maximize the prudential effectiveness of capital requirements while also minimizing the resulting short-term contraction in the credit supply.

WHY REGULATE BANK CAPITAL?

For banks, as for other companies, capital may be best understood as a loss absorber in bad times. When the value of a bank's assets falls unexpectedly and the bank experiences sharp losses, having a sufficient amount of capital allows the bank to continue honoring withdrawals and other obligations, and so to avoid collapse. Capital therefore generally includes "unprotected" sources of financing for the bank, meaning that, in times of distress, these obligations do not have to be paid off until after the bank has paid off its other, more pressing obligations. The bank can thus draw on these financing sources as needed to address shortfalls caused by a sharp decline in asset values, providing security against a default. And the larger the ratio between these financing sources and the bank's overall assets, the better the bank is able to weather losses from loans or other risky activities.

Generally, these unprotected financing sources take three forms. The first is equity, or common stock, which is an ownership share in the bank and can therefore be drawn upon to cover losses in the event of financial trouble. The second is preferred stock, which is a fixed-income obligation of the bank; it must be paid before common stock is paid off, but after the bank's debts, and a failure to pay it does not result in a bankruptcy. Preferred stock is therefore also available to cover losses in times of financial trouble. The third form is unprotected debt, such as contingent convertibles, often called CoCos, which are essentially bonds that automatically convert to equity in times of economic distress. When some pre-established trigger is reached (like when the company's stocks reach a certain low price, or when its ratio of equity to debt reaches a certain low level), a CoCo conversion automatically occurs. Thus CoCos, too, are available to offset losses in a crisis.

All companies need to maintain adequate capital to help them survive financial distress, so why do banks — unlike other firms — have formal capital requirements imposed by government regulators? For most companies, the market is the regulator that encourages them to maintain adequate capital: Firms that choose too low a capital ratio will pay higher interest on their debts, as the holders of those debts judge them to be riskier investments because their capital might prove inadequate in a time of financial difficulty. This used to be true of banks as well, but has not been since at least the middle of the 20th century, thanks in part to several government policies implemented in response to the Great Depression. As a consequence of government deposit insurance (like that provided in the United States by the Federal Deposit Insurance Corporation) and other government policies that protect debt holders from losses, bank-debt holders in most countries today typically do not bear losses when the banks they have invested in (or deposited in) fail. That removes the incentive for debt holders to charge higher interest rates for the higher default risk assumed when banks maintain inadequate capital. The assumption that large banks in particular will be bailed out by their governments if they approach failure — an assumption confirmed by prominent rescues over the past few decades, and of course by more recent events — has further reduced the market's incentive to discipline banks through higher interest rates.

For these reasons, investors do not monitor or attempt to discipline banks as they do other kinds of companies. Regulators must therefore step in and do the job, and minimum capital ratios are among their most important tools of oversight.

In this environment, capital-ratio requirements, if enforced properly, are extremely important in limiting the potential for bank distress and failure, and in giving banks effective incentives to continuously manage risk. Because a properly capitalized bank's stockholders (among whom are often the bank's managers), rather than taxpayers, will bear the costs of asset losses, the bank's managers have every reason to keep the risks they take in check.

Recent studies of the financial crisis have highlighted the importance of such ongoing risk management. Perhaps surprisingly, on average, the banks that suffered the most in 2007-2009 had somewhat higher capital ratios in 2006 than other banks. Why did they fail? Because those higher initial capital ratios diminished as losses mounted. If the failed banks had begun with higher levels of capital and, even more important, had been required to *maintain* those capital ratios by replacing lost capital in a timely fashion, they would not have failed.

Regulating the adequacy of bank capital is thus necessary both for limiting the costs of distress and for improving banks' incentives to manage risk. But establishing effective capital requirements is not merely a matter of setting the required ratio high enough. It also requires a disciplined regulator, a reliable way to measure capital, and a clear understanding of the purpose of the rules. It was a set of failures on these fronts, as much as an inadequate minimum ratio, that made the recent financial crisis possible.

REGULATORY FAILURE

Regulatory capital requirements are not all equally effective, mainly because of two important pitfalls to which they are susceptible: the familiar problem of discretionary bailouts by government, and discretionary loss recognition by both banks and regulators.

Discretionary loss recognition involves the use of accounting practices that distort the meaning of capital. Rather than using market-based concepts (like the price of bank stock) to measure risk and establish the need for capital, regulators rely on accounting concepts: They look at a bank's books, not at the market's assessment of the value of what the firm holds. Regulatory capital is thus a so-called accounting residual: It is defined as the difference between the accounting value of assets and the accounting value of debts.

Of course, accountants' book values are subject to strict legal requirements. But those requirements provide both banks and regulators with a great deal of discretion, particularly with regard to timing, allowing them to choose when to report losses and therefore allowing them to delay acknowledging problems and acting to address them. And neither bankers nor regulators tend to fully recognize losses during bad economic times. Bankers often prefer the delay tactic of "evergreening" — that is, re-lending money to delinquent borrowers so that those borrowers can repay ballooning debt-service costs with yet more debts to mask their troubles (and therefore the bank's troubles). For their part, bank regulators — always craving stability in the system — often prefer "forbearance": In order to avoid precipitating or worsening a crisis, they find ways to use their allotted discretion to pretend that losses are smaller than they are so that banks do not have to replace lost capital.

When these practices are carried out on a large scale, the results can be disastrous. In the buildup to the crisis of 2008, for instance, the combination of these two practices led to a failure to replace lost bank capital in a timely fashion, which intensified the eventual meltdown. The large financial institutions that failed or were bailed out did not deplete their capital overnight: Many months passed between the initial financial shocks of the crisis — the first revelations of trouble in the spring of 2007, the August 2007 run on asset-backed commercial paper, the Bear Stearns bailout of March 2008 — and the systemic collapse of mid-September 2008. Nor were the markets for raising capital closed in that period: During the year or so leading up to the systemic collapse, roughly \$450 billion of capital was raised by global financial institutions. Clearly, global capital markets were open, and there were many willing investors, especially hedge funds and private equity funds, as well as wealthy individuals willing to invest in banks. But many of the financial institutions most deeply affected by the crisis prior to September 2008, despite persistent and

significant declines in the *market* values of their equity relative to assets, chose not to raise sufficient capital.

They were able to avoid doing so because the *accounting* values of their equity and assets did not fall as sharply. For instance, Citibank — which eventually received a large government bailout — had a capital ratio (according to the accounting values used by regulators) of 11.8% at roughly its low point in December 2008, when the stock-market capitalization of Citibank's holding company was about 2% of its total assets. All of the banks that required bailouts in the crisis reported high (and obviously exaggerated) levels of capital in the period before the intervention.

A top executive at a crisis-troubled institution confessed to me during the summer of 2008 that, despite the need to replace lost equity, the price of his stock was too low at that point to consider offering new equity into the market. Issuing significant equity in the summer of 2008 would have substantially diluted existing stockholders (including management), driving down share values as new stock was issued and priced by the market. So he preferred to wait it out, assuming either that conditions would improve (causing asset prices to rise again) or that, if the situation deteriorated sufficiently, the government would step in. On balance, the best strategy was to wait and hope for the best.

The temptation of forbearance remains a constant challenge for regulators, who often find themselves under political pressure to delay bank-loss recognition. Those pressures often lead them to play for time rather than to enforce capital-adequacy requirements. Britain's Financial Services Authority, which was widely regarded as one of the most effective and forward-looking regulators in the world, provided a particularly egregious example of forbearance with its oversight of Northern Rock — a British bank that collapsed in the early stages of the global crisis, in 2007. Just a few months before the bank collapsed, the supervisors authorized it to adopt the Advanced Measurements Approach to risk-weighting its mortgages, which reduced its required capital by 30%.

Recent actions in Japan show that, even after a decade of economic stagnation (worsened by the postponed recognition of losses in Japan's banks), politicians still pressure regulators to forbear whenever they see a short-term political advantage. In 2008, in an effort to assist banks and small- and medium-sized companies, Japan passed a law saying that delinquent loans from banks to such companies did not have to be considered delinquent for regulatory accounting purposes (thus avoiding recognition of lost capital) so long as the delinquent company had a plan to cure the delinquency. In 2009, that law was revised to allow forbearance on delinquent loans so long as the borrower had a plan to have a plan.

Beyond explicit (and often mutual) decisions by banks and regulators to understate losses, bankers can be very creative in their use of complex transactions to disguise losses on securities. Regulatory supervisors face serious challenges in detecting and preventing manipulation of accountants' book values through so-called "gains trading" — the common practice of recognizing capital gains on positions that are held at book value, while deferring the recognition of losses. The bankruptcy of Lehman Brothers revealed another device for circumventing capital-adequacy measures — the so-called "Repo 105" or "Repo 108" transactions that disguised repurchase agreements (a kind of loan in which the borrower sells the lender a security with an agreement to buy it back at a later time for a higher price) as removals of assets. This was basically a way to report a loan as though it were a sale of assets, and therefore a reduction in the size of the balance sheet (and in the level of assets counted in the capital-to-asset ratio).

Banks have enormous financial incentives to engage in such gimmickry, and their agility in doing so makes it unlikely that regulators will ever be able to keep up. Thus, while capital requirements are essential, their design matters enormously. Regulators must therefore find ways to structure these requirements so that they minimize the incentive for avoiding the recognition of losses, while also creating powerful incentives against gaming the system.

THE COSTS OF CAPITAL REQUIREMENTS

Effectively designed capital requirements must not only overcome the inadequacies of existing rules: They must also take account of the social costs involved in raising such requirements, and find ways to minimize them.

The costs of higher capital requirements come primarily in the form of reduced banking activity — especially reduced lending (in other words, a "credit crunch") that can result from a large, sudden increase in capital requirements. After all, a capital requirement is a ratio of capital to assets, which means that a higher ratio can be achieved both by increasing the amount of capital in the numerator of the ratio and by *reducing* the quantity of assets in the denominator — that is, by reducing lending.

Some economists argue that banks will not forego profitable lending just because they have to meet higher capital-ratio requirements. That argument begins with a theoretical proposition known as the Modigliani-Miller (M&M) theorem, which states that a firm's activities should be invariant to its financing structure. In other words, regardless of how a bank is financed, the degree of its lending should be driven by its understanding of market conditions and incentives. This suggests that it should not matter to banks whether they raise money by issuing stocks or by issuing debt. This theorem needs qualifying, of course, when debt and equity finance are treated differently for tax purposes — since equity finance is more costly than debt finance, as a result of the deductibility of interest on debt.

But different tax treatment is not the only reason the M&M theorem turns out to be inaccurate. The theorem assumes that investors in debt and in equity can observe the value and the riskiness of the assets of the bank — but the past 30 years of theory and evidence regarding the financial structure of banks have shown that this assumption does not hold. Equity finance is relatively disadvantaged by the fact that it is difficult for investors to properly assess the value of a bank, so it tends to be harder for banks to sell equity than to raise debt finance. An important consequence of this reality is that banks tend to respond to higher required capital ratios mainly by curtailing their lending rather than by raising new capital. Thus, despite the benefits of banking-system stability that may accompany higher capital requirements, there are significant downsides in the associated contraction in the supply of bank credit.

There is a great deal of empirical evidence supporting this view. The literature on bank "capital crunches" demonstrates that shocks to bank-equity capital, holding constant the required capital ratio, have large contractionary effects on the supply of lending. In other words, capital is costly to replace when it is lost. Other studies show that, for a constant amount of capital, an increase in capital requirements leads to a contraction in lending. Some of those studies analyze banks' lending behavior around the time of system-wide regulatory changes, while others analyze cross-sectional differences in lending by banks that differ according to their regulatory circumstances. All, however, point to the same conclusion.

Two recent studies exploit features of the regulatory regimes of the United Kingdom and Spain, using individual bank data to identify how banks react to changes in bank-specific capital requirements. Like other countries' banks, U.K. banks are subject to minimum capital-ratio requirements of around 8% of risk-weighted assets. But to ensure an adequate buffer against losses related to credit risk, British regulators have at times added further capital requirements relating to their perceptions of the interest-rate risk exposures or operational risks (like poor managerial practices) of individual banks. This has resulted in substantial variation in capital-ratio requirements above the 8% level among British banks.

In a 2011 paper, using a sample of banks from 1998 to 2007, Shekhar Aiyar, Tomasz Wieladek, and I examined British banks' reactions to capital-requirement changes, taking into account variation in loan demand and other influences that could affect credit-supply contraction. We found that increases in bank-specific capital-ratio requirements resulted in large contractions in credit supply: A 10% increase in the capital-ratio requirement (say, from a 10% requirement to an 11% requirement) resulted in a 9% contraction in the supply of bank credit.

Another 2011 study, by Gabriel Jiménez, Jesús Saurina, Steven Ongena, and José-Luis Peydró, examined the consequences of increases in capital requirements using data from the recent experience of Spain. This

study, too, was able to isolate the effects of loan demand, and found similarly dramatic effects on the supply of bank credit. The study found that increases in dynamic-provisioning requirements — essentially, requirements that banks increase their regulatory reserves for loan losses, which is akin to, but less costly to banks than, an increase in capital-ratio requirements — showed responses roughly half the size of those observed in the study of the United Kingdom. That smaller magnitude is consistent with the findings for the U.K., since an increase in a capital-ratio requirement should have a larger effect than a similarly sized increase in a dynamic-provisioning requirement.

The implication of these studies is that increases in capital requirements, even if they are carried out carefully and well, are not cost-free. But this fact does not in turn imply that increases in capital requirements should be avoided. The empirical literature on banking crises uniformly suggests that allowing banks to operate without adequate capital is even more costly for limiting bank-credit growth than an increase in capital-ratio requirements. The combination of government protection and undercapitalized banking tends to result in excessive risk-taking and systemic banking collapses — both of which have far worse consequences for the supply of credit over the medium and long terms, as well as for economic growth, than the more modest, and more predictable, contractions of credit that result from requiring adequate capital. The key, then, is to properly understand the nature of the credit-supply costs of increasing capital requirements, so that policy decisions about the structure and timing of capital-requirement increases can take those costs into account.

A BETTER WAY

What would an approach to regulating bank capital that took these various concerns into account look like? Such an approach would have to involve three crucial elements: establishing an appropriate structure and level of required capital; implementing complementary measures to strengthen or reinforce the requirement; and phasing in the new requirement predictably and gradually to avoid sudden disruptions of bank-credit supply.

The approach I propose for achieving these goals is quite different from the one endorsed by the Basel Committee and by American regulators charged with enforcing the Dodd-Frank bill enacted in 2010. Both of these plans continue to rely on failed accounting measures of capital, inadequate minimum capital ratios, and regulatory enforcement protocols that allow banks to delay replacing lost capital until it is too late.

To their credit, the latest Basel proposals — the so-called Basel III reforms, intended to take effect over the next few years and set to be implemented alongside Dodd-Frank in the United States — do propose to raise overall capital requirements modestly. Under this general requirement, the rules also specify an increase in the amount of required equity capital, especially for "systemically important" financial institutions (although the precise size of those increases remains uncertain). These reforms also introduce "macro-prudential" variations in the size of capital-ratio requirements — that is, rules that change in response to the business cycle so as to limit credit growth during booms and relax constraints on credit growth during recessions. Basel III also introduces new liquidity requirements intended to reduce banks' exposure to liquidity risk (potential problems that banks can face in rolling over debts backed by illiquid assets).

While increases in the quantity and quality of required bank capital ratios are a welcome improvement in prudential regulation — and while enhancing bank liquidity is an important complement to capital regulation — the Basel-Dodd-Frank approach does nothing to encourage timely loss recognition, and does not sufficiently incentivize banks to improve their risk-management practices. Furthermore, the liquidity-regulation aspects of Basel III are based on complex and opaque criteria, and are intended to reduce systemic liquidity risk; they do not address the more fundamental problem of bank-default risk.

To better meet the goals of effective and prudential bank regulation, policymakers should start by reconsidering the basic *form* of capital requirements. Form matters because it can affect cost as well as efficacy. As already noted, equity capital is a very useful form of finance in bad times, since it is sold with the understanding that it is unprotected. But it is also the most costly form of capital for banks to raise.

To significantly increase the capital available in a crisis while minimizing the increase in cost — and therefore the likelihood of a credit crunch — regulators should seek to combine equity capital with a less expensive, but still reliable, form of capital. The contingent convertible is an obvious candidate: Sold as debt, it is cheaper for banks than raising equity capital in normal times; because it converts into equity in times of financial distress, however, it provides a capital cushion if trouble hits. Requiring a combination of equity capital and CoCos — if that combination is properly designed — can provide a large and credible buffer against loss, while also reducing the costs of raising capital. I suggest the imposition of a 20% capital-ratio requirement, consisting half of equity and half of CoCos.

The key to the use of CoCos as part of such a capital requirement is not simply that they would convert to equity if the risk of insolvency loomed (and thus play the same role as additional equity capital). Rather, in a properly designed regulatory system, using CoCos would create a powerful financial incentive for the bank to issue more equity capital long *before* a financial failure that would trigger the conversion of CoCos into equity. The threat of triggering a large conversion of CoCos — thereby severely diluting the value of the common stock held by shareholders, often including bank officials themselves — would provide institutions with a powerful motive to strengthen risk management and take remedial measures to raise equity well in advance of a crisis, rather than masking losses and colluding with regulators to delay action. (In a 2011 paper, Richard Herring and I provide the details of a CoCo requirement that would achieve this objective.)

To produce the strongest incentive for banks to issue equity pre-emptively, the size of the CoCo requirement should be large; the trigger should be credibly and observably based on market prices and set at a high trigger ratio of equity to assets (one that would be reached long before serious concerns about insolvency arose); and the conversion ratio (that is, the amount of value in new equity that the holders of CoCos would receive for the bonds they surrendered) should be sufficiently dilutive of existing common shareholders. This last requirement is key, as the CoCo conversion ratio needs to be painful enough that it makes the prospective dilution from issuing pre-emptive equity into the market appear very desirable by comparison. A CoCo requirement of 10% would be large enough to have this effect, particularly if combined with a conversion ratio that ensured that holders of CoCos were left with at least as much value in new equity as the principal of the bonds they surrendered. At the same time, however, it would minimize the up-front costs to the banks, and therefore minimize the danger of a severe credit crunch.

The trigger for the conversion of CoCos to equity should be based on the market's valuation of a bank's debt-to-equity ratio — which is a more reliable measure of the bank's financial condition than the accounting measures now used by regulators. For example, the trigger could be set so that CoCos would convert from debt to equity if the ratio of the market value of the bank's equity relative to the sum of the market value of its equity plus its debt fell to an average of, say, 9% over a 90-day period. (The ratio should be measured as a 90-day average to avoid the risk of investors forcing a CoCo conversion through a coordinated bear run on the bank's stock.)

Such a combination of a large CoCo requirement, a market-based trigger, and a painful conversion ratio would result in a greater dilution of common stockholders than the alternative pre-emptive stock offering. Under these conditions, a large financial institution experiencing significant losses and approaching the neighborhood of dilutive conversion would choose to issue equity into the market, thereby avoiding the even more costly conversion trigger and also avoiding a significant risk of insolvency or regulatory intervention.

As an added benefit, CoCos designed to result in substantial dilution upon conversion would have an enormous practical advantage as *debt* instruments: The strong incentives for management to avoid conversion would mean that CoCos would be likely to almost never convert, and thus to trade more like fixed-income instruments than like ordinary convertible securities. They could be sold more like relatively stable debt (bonds) than like comparatively volatile equity (stocks). Thus coupons paid on CoCos that follow the design features outlined here should qualify for tax deductibility; furthermore, apart from tax considerations, CoCos would likely hold greater appeal to institutional investors, such as pension funds, which tend to prefer low-risk debt instruments.

Under these circumstances, CoCo conversion would be a bank CEO's nightmare. Not only would existing stockholders who were diluted by the conversion be calling for his head: He would also face an onslaught of sophisticated new holders of stock (such as the institutional investors who were formerly CoCo holders) who would likely be eager to sack senior management for its demonstrated incompetence. This threat would only add to the incentive for management to pre-emptively issue equity to avoid conversion, as well as to maintain high initial ratios of capital to assets, accurate measures of risk, and effective controls on risk. Such powerful financial incentives would be much more effective than a set of rules that banks can circumvent with clever financial instruments, to say nothing of requirements that both regulators and financial institutions can easily put on hold when the rules prove inconvenient.

This new capital requirement would overcome many of the problems that have bedeviled such attempts at regulation in the past, but it needs further policy reinforcement. Though capital regulation is an important mechanism for ensuring the stability of our financial system, it cannot succeed by itself. Indeed, in recent times, regulators' excessive reliance on capital requirements has caused them to neglect other prudential tools that can be even more effective.

The most obvious and historically important of these additional prudential tools is the cash-reserve requirement, under which banks must maintain actual cash reserves at some minimum fraction of deposits or assets. Over the past three decades in the United States and many other developed economies, however, this requirement has fallen by the wayside. The Basel Committee has recommended new liquidity requirements (requiring banks to maintain stocks of "high-quality liquid assets" sufficient to cover their net cash outflows for 30 days), but these are complex, opaque, and not linked to observable and predictable holdings of cash by banks.

Instead, a portion of bank assets should be required to take the form of cash deposited in a nation's central bank, earning interest. Cash deposited in a central bank is continuously observable, and therefore not subject to the danger of so-called "window dressing": the use of accounting practices to create the appearance of cash assets at particular dates — like just before public quarterly reports are due to regulators — without having actually invested in cash (as happened in the recent MF Global collapse).

Cash and capital offer complementary means of insulating government-protected deposits from the losses that arise from risky, non-cash assets. Capital absorbs losses, while investments in cash reduce losses by cutting the share of risky assets financed by deposits. But cash is not an equal alternative to capital on the asset side of the balance sheet: Unlike capital (the value of which depends on accurate measurement of the value of risky assets), the value of cash reserves held at the central bank is continuously and accurately known. That makes cash a more credible buffer against loss than capital. Furthermore, as Florian Heider, Marie Hoerova, and I show in a new study, because cash is essentially riskless and not subject to manipulation, requiring a significant amount of cash to be held as a fraction of assets improves bank executives' incentives to better manage the risks that banks take on, particularly in the wake of losses on risky assets, as during a recession.

A cash requirement, like the proposed CoCo requirement, would improve incentives for good risk management, because cash holdings dull bankers' incentives to game the regulatory system. In essence, more cash holdings have the effect of increasing the downside risk exposure borne by bank stockholders: They will have more to lose if things go wrong. Combining minimum required ratios of cash and capital relative to assets would more credibly limit bank risks than would relying on capital alone.

Although there are no "magic numbers" for just the right ratios to require, based on a review of successfully regulated banking systems of the present and the past, I believe a "20-20" combination of minimum requirements — requiring at least 20% of risk-weighted assets to be financed by capital (half in equity and half in CoCos), and requiring at least 20% of risk-weighted assets to be held in interest-bearing cash reserves — would be an excellent starting point for enabling an effective, prudential regulatory system.

Such requirements would have to be gradually phased in, to avoid cost shocks that might set off a credit crunch. The most costly feature of this plan, in terms of its likely consequences for credit supply, would be the 10% equity-capital requirement. Because banks already hold substantial Treasury securities and reserves, the cash requirement would affect the *composition* of those assets more than the amount. CoCos would be priced and treated much like debt, limiting the costs of compliance with this new requirement. But raising substantial new equity would be costly, particularly in today's highly uncertain environment.

For that reason, the implementation of this approach should not be too sudden, and should ensure predictability, so that banks can plan their affairs accordingly. Allowing banks to phase in the new requirements over, say, a five-year period (rising evenly each year over five years) should properly balance the need for credibility with the desire to avoid a collapse of credit supply.

SMARTER RULES

Before banks' debts were protected by government deposit insurance and bailouts, markets ensured that banks maintained adequate amounts of capital and cash assets, and rewarded bankers who engaged in better risk management with lower costs for raising funds. In today's world, however, government protection has removed the incentives for market participants to play that role. Prudential regulators, therefore, have had to devise rules for capital and cash adequacy to ensure that bank owners, rather than taxpayers, absorb losses related to the risks banks take.

But the regulatory system that was developed over the past several decades, in the U.S. and in many other countries, has failed repeatedly to provide effective, prudential regulations that limit taxpayer financing of bank losses. The recent financial crisis of 2007-2009 is just the latest (and most severe) in a long line of episodes that demonstrate the terrible costs of combining government protection of banks with ineffectual regulation. Since 1980, more than 100 countries have experienced banking crises (defined as episodes in which the negative net worth of failed banks exceeds 1% of annual gross domestic product); across those episodes, the negative net worth of failed banks averaged 16% of GDP. Such frequency and severity of bank loss are historically unprecedented, and are clearly consequences of the brave new world of government protection of bank debts. Consider that, a century earlier, from 1874 to 1913, banks were at least as important to the financing of trade and industry — and yet I have been able to identify only four episodes of bank-insolvency crises worldwide during those years, with an average negative net worth of 6% of GDP.

Existing regimes for regulating capital — and the reforms of those regimes that have been enacted thus far by the Basel III system and the Dodd-Frank bill in the United States — not only require too little capital, but also fail to provide bank officials with incentives to manage their risks and to act in advance of bank failures. And these policies persist in protecting banks from the consequences of their own recklessness, essentially enabling and formalizing the practices that made the recent crisis possible.

A proper understanding of the dynamics of the recent crisis — of how rules interacted with incentives to make excessive risk far too attractive and to give bankers no reason to behave responsibly — can point us toward a set of rules that offer far better protection at relatively low cost to all involved.

Of course, moving to such a system would not be entirely without costs, especially since the supply of bank credit today is already meager and higher capital requirements will further limit short-term credit growth. But as we have learned all too painfully, allowing banks to expand credit on an inadequate base of capital delivers short-term credit growth at the expense of medium-term credit collapse and economic disaster. It is time to recognize at last that rules that fail to account for financial incentives are bound to fail, and that harnessing the disciplining power of markets — rather than replacing it with the supposed cleverness of regulators — is the only way to prudently keep our banks in check while also enabling economic growth.

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