Toward a run-free financial system

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Abstract

The financial crisis was a systemic run. Hence, the central regulatory response should be to eliminate run-prone securities from the financial system. By contrast, current regulation guarantees run-prone bank liabilities and instead tries to regulate bank assets and their values. I survey how a much simpler, rule-based, liability regulation could eliminate runs and crises, while allowing inevitable booms and busts. I show how modern communications, computation, and financial technology overcomes traditional arguments against narrow banking. I survey just how hopeless our current regulatory structure has become.

I suggest that Pigouvian taxes provide a better structure to control debt issue than capital ratios; that banks should be 100% funded by equity, allowing downstream easy-to-fail intermediaries to tranche that equity to debt if needed. Fixed-value debt should be provided by or 100% backed by Treasury or Fed securities.

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1. Introduction and overview

At its core, our financial crisis was a systemic run. The run started in the shadow banking system of overnight repurchase agreements, asset-backed securities, broker-dealer relationships, and investment banks. Arguably, it was about to spread to the large commercial banks when the Treasury Department and the Federal Reserve Board stepped in with a blanket debt guarantee and TARP (Troubled Asset Relief Program) recapitalization. But the basic economic structure of our financial crisis was the same as that of the panics and runs on demand deposits that we have seen many times before.

The run defines the event as a crisis. People lost a lot of money in the 2000 tech stock bust. But there was no run, there was no crisis, and only a mild recession. Our financial system and economy could easily have handled the decline in home values and mortgage-backed security (MBS) values—which might also have been a lot smaller—had there not been a run.

The central task for a regulatory response, then, should be to eliminate runs.

Runs are a pathology of specific contracts, such as deposits and overnight debt, issued by specific kinds of intermediaries. Among other features, run-prone contracts promise fixed values and first-come first-served payment. There was no run in the tech stock bust because tech companies were funded by stock, and stock does not have these run-prone features.

The central regulatory response to our crisis should therefore be to repair, where possible, run-prone contracts and to curtail severely those contracts that cannot be repaired. "Financial crises are everywhere and always due to problems of short-term debt" is a famous Doug Diamond (2008) aphorism, which we might amend to "and its modern cousins." Well, then, let us purge short-term debt from the system and base regulation on its remaining truly necessary uses.

When they failed, Bear Stearns and Lehman Brothers were financing portfolios of mortgage-backed securities with overnight debt at 30:1 leverage. For every thirty dollars of investment, every single day, they had to borrow a new twenty-nine dollars to pay back yesterday's lenders. It is not a surprise that this scheme fell apart. It *is* a surprise that our policy response consists of enhanced risk supervision, timid increases in bank capital ratios, fancier risk weighting, macroprudential risk regulation, security-price manipulation, a new resolution process in place of bankruptcy, tens of thousands of pages of regulations, and tens of thousands of new regulators. Wouldn't it be simpler and more effective to sharply reduce run-prone funding, at least by intermediaries likely to spark runs?

In this vision, demand deposits, fixed-value money-market funds, or overnight debt must be backed entirely by short-term Treasuries. Investors who want higher returns must bear price risk. Intermediaries must raise the vast bulk of their funds for risky investments from run-proof securities. For banks, that means mostly common equity, though some long-term or other non-

runnable debt can exist as well. For funds, or in the absence of substantial equity, that means shares whose values float and, ideally, are tradable.

Banks can still mediate transactions, of course. For example, a bank-owned ATM machine can deliver cash by selling your shares in a Treasury-backed money market fund, stock index fund shares, or even the bank's own shares. A bank can originate and sell mortgages, if it does not want to finance those mortgages with equity or long-term debt. Banks can still be broker-dealers, custodians, derivative and swap counterparties and market makers, providers of a wide range of financial services, credit cards, and so forth. They simply may not fund themselves by issuing large amounts of run-prone debt.

If a demand for separate bank debt really exists, the equity of 100 percent equity-financed banks can be held by a downstream institution or pass-through vehicle that issues equity and debt tranches. That vehicle can fail and be resolved in an hour, without disrupting any of the operations or claims against the bank, and the government can credibly commit not to bail it out.

I argue that Pigouvian taxes[2] provide a better structure for controlling debt than capital ratios or intensive discretionary supervision, as in stress tests. For each dollar of run-prone short-term debt issued, the bank or other intermediary must pay, say, five cents tax. Pigouvian taxes are more efficient than quantitative limits in addressing air pollution externalities, and that lesson applies to financial pollution. By taxing run-prone liabilities, those liabilities can continue to exist where and if they are truly economically important. Issuers will economize on them endogenously rather than play endless cat-and-mouse games with regulators.

1.2 Technology

The essence of this vision is not novel. Proposals for narrow banking or equity-based banking have been with us about as long as runs and crashes have been with us. The "Chicago Plan," discarded in the 1930s, is only one of many such milestones[3]

Here a second theme emerges: *Modern financial, computational, and communication technology allows us to overcome the long-standing objections to narrow banking*.

Most deeply, "liquidity" no longer requires that people hold a large inventory of fixed-value, pay-on-demand, and hence run-prone securities. With today's technology, you could buy a cup of

[2] Pigouvian taxes are designed to discourage undesirable activities, especially externalities such as pollution. Kocherlakota (2010), Jeanne and Korinek (2011), and Perotti and Suarez (2011) suggest Pigouvian taxes to limit debt. Stein (2012) explores their equivalence to a cap-and-trade proposal.

[3] My discussion has much in common with Kotlikoff (2010), Chalmley, Kotlikoff and Polemarchakis (2012), Admati and Hellwig (2012). It also builds on Cochrane (2010, 2011). The larger points in this essay build on Cochrane (2013b).

coffee by swiping a card or tapping a cell phone, selling two dollars and fifty cents of an S&P 500 fund, and crediting the coffee seller's two dollars and fifty cents mortgage-backed security fund. If money (reserves) are involved at all—if the transaction is not simply netted among intermediaries—reserves are held for milliseconds. In the 1930s, this was not possible. We could not instantly look up the value of the S&P 500 (communication). There was no such thing as an index fund, so stock sales faced informational illiquidity and large bid-ask spreads (financial innovation). And transactions costs would have ruled out the whole project (computation, financial innovation). Closer to current institutions, electronic transactions can easily be made with treasury-backed or floating-value money-market fund shares, in which the vast majority of transactions are simply netted by the intermediary. When you buy something, your account loses an electronic dollar and the seller's account gains one, and no security actually changes hands.

On the supply end, $18 trillion of government debt is enough to back any conceivable remaining need for fixed-value default-free assets. Three trillion dollars of interest-paying reserves can easily be $6 trillion of reserves. We can live Milton Friedman's (1969) optimal quantity of money, in which the economy is awash in liquidity. This optimal quantity will have financial stability benefit far beyond its traditional elimination of shoe-leather costs. Again, technology has fundamentally changed the game: instant communication means that interest-paying money is now a reality, so we can have the optimal quantity without deflation. Our government should take over its natural monopoly position in supplying interest-paying money, just as it took over a monopoly position in supplying nineteenth-century bank notes, and for the same reason: to eliminate crises, which have the same fundamental source.

The quantification of credit risk, the invention of securitized debt, long-only floating-value mutual funds, and the size and liquidity of today's markets mean that financial flows needed to finance home and business investment can come from everyday saver/investors who bear risk rather than hold traditional deposits.

So, the most fundamental objection is met: that society "needs" a large stock of money-like assets, more than can be supplied by other means, so banks must try to "transform" maturity, liquidity, and risk, both to supply adequate assets for transaction-type needs and to provide adequate credit for real investment. I treat a wide range of additional common objections below.

1.3 Current policy

Our current regulatory response to financial crises is based on a different basic vision that evolved piecemeal over more than a century. In order to stop runs, our government guarantees debts, implicitly or explicitly, and often ex-post with credit guarantees, bailouts, last-resort lending, and other crisis-fighting efforts. But guaranteeing debts gives the borrowers (banks and similar institutions) an incentive to take on too much asset risk and an incentive to fund those

risks by too much debt. It gives depositors an incentive to ignore bank risks when lending. So our government tries to regulate the riskiness of bank assets and imposes capital requirements to limit banks' debt funding. Then banks game their way around regulations, take on more risk, and skirt capital requirements; shadow banks grow up around regulations; and another crisis happens. The government guarantees more debts, expands its regulatory reach, and intensifies asset regulation.

Less heralded, but no less important, this regulatory approach demands strong limits on competition and innovation, even before banks try to capture it. If regulators let new institutions circumvent regulated ones, the problems erupt again. Too big to fail means too big to lose money, and too big to lose money means too big to compete.

Thus, Dodd-Frank regulation and its international cousins are not a radical new approach. They are just a natural expansion of a longstanding philosophy. Each new step follows naturally to clean up the unintended consequences of the last one. The expansion is nonetheless breathtaking. Beyond massively ramping up the intensity, scope, and detail of financial institutions and markets regulation, central banks are now trying to control the underlying market prices of assets, to keep banks from losing money in the first place.

The little old lady swallowed a fly, then a spider to catch the fly, a bird to catch the spider, and so on. Horse is on the menu. Will we eat?

1.4 Comparison

The insight that the crisis was a systemic run, that we can fix runs by fixing and removing run-prone financial contracts, and that new financial and communication technology addresses the classic objections, liberates us from this Rube Goldbergian (or Orwellian?) regulatory project.

We do not have to fix every actual and perceived fault of the financial system in order to protect against future crises. We do not have to diagnose and correct the sources of the crisis, Fannie Mae and Freddie Mac, the community reinvestment act, so-called predatory lending, no-documentation loans, perceived global imbalances or savings gluts, Wall Street "greed," executive compensation, perceived bubbles (whether thought to be caused by irrational speculation or too-low interest rates), and so on. We do not have to fix credit card fees, disparate-impact analysis, student loans, or hedge fund fees. We don't need to micromanage over-the-counter versus exchange-traded derivatives, swap margins, position limits, the bloated Basel bank regulation mess, the definition of risk-weighted assets, the internal process and regulatory designation of S&P and Moody ratings, the treatment of off-balance-sheet credit guarantees, and on and on and on. The thousand pages of the Volker rule alone can start a nice bonfire. If a crisis is a run, and we can remove or fix run-prone securities, none of these steps is either necessary

(whew) or sufficient (ouch) to stop a future crisis. A narrower regulatory approach that can stop runs, and hence crises, without requiring these Herculean (or Sisyphean?) tasks, no matter how desirable each one might be, is much more likely to succeed.

If financial institutions' *liabilities* no longer can cause runs and crises, we don't have to try to micromanage institutions' *asset* choices or the market prices of those assets. Nor do we have to stop entry by new and innovative institutions. Rather than dream up a financial system so tightly controlled that no important institution ever loses money in the first place, we can simply ensure that inevitable booms and busts, losses and failures, transfer seamlessly to final investors without producing runs.

Zero cost is not the standard. The financial crisis was, by most accounts, a hugely expensive event. Dodd-Frank regulation and its international cousins are not cheap, either. The challenge is only to show that my vision, which narrowly focuses on eliminating the poison in the well—run-prone assets—stops crises more effectively and costs less than these alternatives.

2. Runs and run-prone assets

Demand deposits offer the paradigmatic example of a run-prone contract. If I suspect trouble at the bank, I have an incentive to get my money out first. You, seeing me run, have an incentive to get your money out before someone else. Based on this simple description, we can sketch the essential characteristics of a run-prone security. Obviously, I'm building on Diamond and Dybvig (1983) here:

- The contract promises a fixed value, payable in full on demand or on very short notice.
- Failure to pay triggers bankruptcy.

Fixed-value short-maturity promises, like "lend me five dollars, I'll pay you tomorrow," invoices, trade credit, and so forth are not run-prone contracts, because one cannot force the firm into bankruptcy for failure to pay immediately. If the firm has the right to delay payment, suspend convertibility, or pay in part, it is much harder for a run to develop.

Runs also require specific types of issuers. A run can't develop if the issuing institution can easily sell assets to meet creditor demands or get money elsewhere:

- Runs require that the assets of the issuing institution are illiquid and cannot quickly be sold to meet redemption demands.
- Runs require that the issuing institution cannot borrow or issue equity to meet redemptions.

These assumptions are bandied about all the time as facts. But as we think about reforming the financial system, it's important to question them. Really? Why? There are a vast number of unleveraged, deep-pocket investors around sniffing for bargains, including endowments, Warren Buffets, sovereign wealth funds, hedge funds, and so on. If a bank is really "illiquid" but not "insolvent," then just why will these investors not lend or buy equity, especially at a nice discount?

Debt overhang is a common story. When a firm's value falls, the market value of its long-term debt falls, so new equity in the first instance just raises the market value of long-term debt. But banks routinely issue equity after losses, and many companies with outstanding long-term debt are able to issue equity. The deals by which the entire firm is sold to new owners over a weekend are really just equity infusions, in which presumably the new owner's overpayment to rescue debt is matched by the greater profitability of a better managed or combined company.

Equity issues—especially on terms that force current equity to restore bondholders—also dilute current equity's option value for the firm's recovery and dilute the value of prospective bailouts and debt guarantees. Banks were paying dividends and big bonuses in fall 2008. Why, if they were undercapitalized? Observers suggested that they had to signal strength and retain talent. Lack of desire to issue new equity and bet the farm instead, rather than the impossibility of obtaining new equity, is a distinct possibility. Bear Stearns' existing equity holders were the ones to object to the deal, not the prospective buyers.

Similarly, why can't banks sell assets? Well, they are said to find "fire sales" of unwilling buyers, but again just why are the deep-pocket investors and market-timers, usually facing the buying opportunity of a lifetime, so unwilling?

Here, too, banks are often unwilling rather than unable to sell. Assets booked as "hold to maturity" can be counted at cost, not market value. Selling them forces the bank to acknowledge the loss. Selling illiquid assets can force the bank to acknowledge that actual prices are in fact less than even mark to market values, so selling one asset can depress the declared value of others. None of these are genuine economic impediments to asset sales, and could be fixed by changes in accounting and regulation.

I will not pursue this line, but it certainly is worth asking just why markets for new equity or bank assets are so bad and what can be done to improve them. There is a tendency to allude to frictions, to take them as gospel, without really questioning their source, and then to design policies around them, or to exploit them, rather than questioning whether we could fix the frictions instead.

A key characteristic:

- A run requires that if one investor pulls out, the firm is closer to bankruptcy, giving a second investor greater incentive to pull out.

This is the core externality of run-prone debt. My action to pull out alters your incentives. Externalities do suggest a need for regulation, even once all the unintended disincentives and subsidies have been fixed.

If bankruptcy were costless, consisting of a smooth recapitalization in which debt becomes equity the moment firm value is one cent below debt's promises, there would be little incentive to run.

- Runs require significant bankruptcy costs.

Without bankruptcy costs, runs would also incur little social cost. If an institution shuts down and a bunch of investors lose money, that's just a transfer unless something real is affected. For runs to be a social problem, Diamond and Dybvig (1983) imagine real projects that are abandoned after a run.

- Runs are more likely if the institution's assets are nebulous and hard to value.

Not for nothing have most runs been sparked by an accounting scandal or fraud. If we knew exactly what the bank's assets were worth at all times, there would be little incentive to run. Even if the assets were illiquid, lenders could always know when the bank was insolvent. The fact that illiquidity and insolvency are essentially indistinguishable in a crisis is a key component of runs.

- Runs require that a substantial fraction of the firm is funded by run-prone securities.

If an institution is 95 percent financed by equity, there is little chance of bankruptcy, and thus little chance of a run. That's why capital ratios are popular. Alas, the measurement of capital, the measurement of the risk and illiquidity of a bank's asset portfolio, and the effort to find an exact number—one side of which is safe and the other side of which is risky—has not proved successful.

2.1 Shadow-banking runs

The concept that the financial crisis was, centrally, a run in the "shadow banking system," and the features of the financial contracts that suffered runs, are well described by Darrell Duffie (2010a, 2010b) and Gary Gorton and Andrew Metrick (2012).

Duffie shows how the contract structures of the shadow banking system have the same run-inducing features as conventional uninsured bank deposits. As Duffie describes, leaving securities with your broker-dealer is not like leaving your car in the repair shop, where the car transparently belongs to you if the dealer goes bankrupt. The broker-dealer may have used your securities as collateral for borrowing to fund the dealer's proprietary trading, so you cannot

seamlessly retrieve them after the dealer's bankruptcy. In turn, if you do retrieve your securities from the dealer, the dealer no longer has that collateral, and may have to unwind trades at a loss. Thus, if you remove your securities from a broker-dealer, the dealer is closer to bankruptcy. Derivatives contracts, though senior in bankruptcy, also cause problems for lenders and are a source of cash for the dealer. Most of all, though overnight repurchase agreements would seem exquisitely engineered to protect the lender in case of default, their protection is not in fact perfect. Some jurisdictions treat repurchases as collateralized lending, putting the borrower in line during bankruptcy. Many lenders are not legally eligible to hold the collateral, so those lenders may have to dump it immediately upon receipt. Having to unload a large portfolio of securities on the Monday afternoon of Lehman's bankruptcy is not a picnic. Better to refuse rolling over the loan on Friday.

As one reads through Duffie's analysis, an insistent voice springs up, "I can fix that!" Does rehypothecation of securities make broker-dealer relations a run-prone contract? Then hold securities with a custodian. Yes, that may cost a few basis points, but those basis points are, in the end, coming from taxpayers. Being able to use client securities as collateral for proprietary trading is not such a huge social gain that it's worth going through another financial crisis.

2.2 Systemic Runs

A run on an individual institution is not a crisis, however. To be a crisis, the run has to affect the financial system and, ultimately, the real economy. We need to understand what makes for "contagion" or a "systemic" run.

Gorton and Metrick (2012) fill in this part of the picture. Seeing a run on institution A, investors in institution B question its finances, and are sparked to run there as well. The system as a whole promises more cash than is available, so a simultaneous run threatens systemic insolvency.

In Gorton and Metrick's vision, short-term debt is normally an "information-insensitive" security. When the bank is far from default, the value of its debt, especially short-term debt, is essentially the same for a wide range of values for the bank's assets. Debt holders therefore don't need to investigate the company's finances. In turn, this feature means that the short-term debt of companies and banks far from bankruptcy is highly liquid. If I offer to sell you such debt, you don't have to worry that I know something you don't know, because nobody can really have much information about the value of such debt. As a result, bid-ask spreads, which derive from asymmetric information, are tiny. Such debt can circulate as easily as money. But it pays interest, a crucial advantage until the era of interest-paying reserves.

This is the point of highly rated and, especially, short-term debt. It is designed to be information-insensitive and therefore liquid, bought and sold easily with little investigation of underlying value.

Once a bank is closer to bankruptcy, however, its debt becomes information-sensitive. Information about the bank's prospects changes the value of its debt substantially. Now, anyone selling the bank's debt is suspected of having information about the bank's prospects. Buyers are unwilling to take such debt without a lot of due diligence, a steep price discount, and a large bid-ask spread. Traditional buyers may not be willing to buy it at all. Traders and institutions that are not set up to do information-sensitive market-making just bow out. The sudden illiquidity of the bank's debt can lead to a rollover crisis and run long before actual next-morning bankruptcy fears become an issue.

This process provides a central mechanism of perceived contagion: how trouble at one bank turns into a systemic run. Creditors, learning that one bank's or mortgage-backed security's assets are suddenly revealed to be bad, start worrying about other similar banks and securities. This shift of attitudes would not make sense if we thought of all active investors as constantly monitoring and forming opinions about the value of a bank, as we think of stock investors. But investors in short-term highly rated debt are not paying attention. That's the whole point. Until they do.

Gorton (2010) tells a nice story. We usually assemble ingredients from a salad bar without investigating their individual safety. If somebody says she read a news story about E. coli in some vegetable, rather than investigate just which ingredient is risky and avoid it, it's easier to shun them all and have a hamburger instead. Chamley, Kotlikoff, and Polemarchakis (2012) tell an even more vivid story. "Eight bottles of Tylenol laced with cyanide, sold in a Chicago drugstore, instantly transformed 31 million bottles of Tylenol located in stores all over the globe into toxic assets that could find no buyers." It's just not worth investigating each bottle.

The information-sensitivity story applies to securities as well as to bank debt. Long-lived securities, including highly rated tranches of mortgage-backed securities, collateralized debt obligations, and corporate bonds, are information-insensitive and therefore liquid. Cash-like liabilities of special-purpose vehicles, auction-rate securities, or other structures that issue short-term debt to hold long-lived or illiquid securities and thus emulate banks are so as well. As long as the assets are complex, illiquid, hard to value, or subject to large price shifts (important qualifications), securities of this sort can suddenly become information-sensitive and much less liquid.

This process leads to the systemic "run on repo" that Gorton and Metrick (2012) document. A bank may have used information-insensitive securities, such as AAA tranches, as collateral to finance borrowing. People who want collateral only want liquid, information-insensitive securities, and they suddenly will not take the previously liquid securities as collateral, or they

require a large “haircut,” i.e., much more collateral than the loan is worth. Now the bank is in a bind. With inadequate collateral (and inadequate equity, and all the above-cited restraints on finding new equity or new sources of borrowing), the bank must sell some of the assets it has financed at just the worst possible moment. The repo haircut works analogously to reserve requirements in generating a collateral multiplier. If the haircut rises substantially, a whole chain of debts must be unwound.

The sudden illiquidity leads to a second mechanism of contagion. Suppose Bank B was holding a lot of Bank A debt, or A-type securities. When that debt or those securities suddenly become illiquid, Bank B can no longer count on selling liquid securities to raise cash to pay its creditors in case of a run. So bank or security A's problems can spark bank B's run.

The sudden illiquidity means that the run-prone characteristics I listed above are heavily state-contingent. Assets that are liquid and willing equity investors can disappear quickly, so a reasonable plan to pay creditors falls apart when it is most needed.

In short, when a systemic run breaks out—when one institution's or asset class's troubles bring into question many others—we see a events that are colorfully, if confusingly, described as flight to quality, fire sales, frozen markets, and illiquidity. There is a dramatic shift in total demand toward government debt and money and away from private debt.

2.3 Real effects

Not only must a run be systemic to be a crisis, a crisis only matters if the systemic run has real effects.

As the tech bust example made clear, and as much macroeconomic research confirms[4],simple wealth effects from a decline in asset values have limited macroeconomic repercussions. In part, declines in values of existing assets are mostly redistributional: if home values fall by half, those planning to sell large houses and downsize lose, but young people can spend half as much on housing, and thus a lot more on other things. Houses are only durable goods, after all, and a decline in value by half is a different event than half of the houses in the country being washed away by a tsunami.

There are two central competing stories for why the systemic run of the financial crisis had, apparently, such a large macroeconomic effect.

One view thinks it's "financial constraints." The central story here is that banks in the fall of 2008 lost asset values and so were undercapitalized—the decline in asset value lowers the value

[4] For example, see Ludvigson, Steindel and Lettau (2002).

of equity, so the ratio of equity capital to debt is now too low. In this story, banks could not raise new capital, they could not lower capital-draining dividend and bonus payments or acquisitions, they could not sell lending operations to better capitalized investors—all for various complex reasons. And despite their claims to meet regulatory requirements, they were undercapitalized by internal metrics. They resorted to asset sales and certainly were not making additional loans. In addition, banks do not matter. The banking and financial *system* matters. In this view, better capitalized banks or other financial institutions could not come in and take the new-lending business that existing troubled banks were abandoning and borrowers could not switch to other markets.

In short, this theory goes, banks *wanted* to keep lending at the same rate, people and businesses *wanted* to keep borrowing at the same rate, but internal or regulatory capital ratios forced banks to stop lending and other banks and institutions could not fill the gap, so the otherwise healthy economy (healthy demand for investment) was starved of funds[5].

Bernanke (1983) really started the modern credit constraints view. In his analysis, banks in the Great Depression failed, and then the human and organizational capital that knew how to make relationship loans vanished as well. The result was a great wedge between savers and borrowers. However, perhaps partly due to the same Bernanke's actions, there simply was not a wave of bankruptcies at large commercial relationship-lending banks in 2008. There was a large wave of Federal Deposit Insurance Corporation (FDIC)-run failures at smaller banks, but the lending operations were preserved and transferred to new owners. However powerful in the Great Depression, this mechanism is not really a candidate for 2008-2009.

Another view focuses on "aggregate demand." The run provoked a massive shift in demand away from private securities corresponding to physical investment and toward government debt, including money (cash and reserves) but also longer maturity government debt. But someone has to hold the existing assets, so this demand shift ends up simply changing prices. Government bond prices rose (interest rates declined) while prices on private securities dropped (risky interest rates, including low grade bonds and commercial paper, rose dramatically). This rise in interest rates, along with a similar decline in stock prices (a rise in the equity premium), a rise in risk aversion, and economic forecasts of poor conditions ahead led to a sharp drop in consumption and investment demand. Tying these ideas together, the aggregate budget constraint says that aggregate nominal demand for goods and services must add up to demand for nominal government debt. The only way to consume less and invest less is to pile up government debt. So a "flight to quality" and a "decline in aggregate demand" are the same thing. The rise in demand for money and short-term government debt, perfect substitutes at zero interest rates, is deflationary, and we saw a short, sharp deflation. Sufficient deflation might provide the

[5]Bernanke and Gertler (1989, 1995) are two classic examples of this view. Bernanke, Gertler, and Gilchrist (1999), and Gertler and Kiyotaki (2011) are two good summaries. Gambacorta and Marques-Ibanez (2011) is an excellent survey of the lending channel view of the 2008 crisis.

government debt people want to hold, but add some sticky prices and you have a theory of a real recession.

The two mechanisms are more different than they appear. Fundamentally, the question is whether "institutional finance" or fundamental investor-based finance matters for the connection of asset prices to business cycles. In the former view, fundamental investors and borrowers such as homeowners and firms didn't change views or behavior, but the machinery connecting them broke down. In the latter view, the run fundamentally happened across the economy. Completely unlevered final investors—including endowments, pension funds, sovereign wealth funds, family offices, and so forth—panicked every bit as much as leveraged intermediaries, which is why the former were not there when the latter wanted to sell assets. Firms and households didn't want to borrow as much as before.

The controversy over these questions continues, in part because the glass is surely neither completely empty nor full. Many models mix both ingredients—for example, Bernanke, Gertler, and Gilchrist (1996). There is compelling cross-sectional evidence that some businesses and people were credit-constrained in the chaos of fall 2008. But is that the key causal mechanism for the economy as a whole, or was it a distributional sideshow to a recession that would have happened anyway? Many unconstrained businesses contracted dramatically as well—and, moreover, did not expand to take over the business of the unfortunate constrained businesses. A small taste: Chari, Christiano, and Kehoe (2008) document that bank lending overall did not decline early in the crisis—it declined later, when the recession was well under way. Highly rated nonfinancial companies were able to issue lots of commercial paper at low rates. They remind us that most investment comes from retained earnings and that 80 percent of corporate debt does not come from banks anyway. Ivashina and Scharfstein (2010) counter, however, that much new lending was simply borrowers drawing down credit lines and that banks in worse shape cut lending more than banks in better shape. But this is a long way from showing that the financial system as a whole refused to lend to clearly profitable *new* investments. Dell'Ariccia, Detragiache, and Rajan (2008) show that sectors more dependent on external finance fall more during the recession following a financial crisis. But sectors not at all so dependent also fall, and external financial dependency is endogenous, which one can never fully control for. Cochrane (2011) argues for the view that a coordinated rise in risk premiums, even in completely un-intermediated markets and even after intermediation frictions washed away, was the major characteristic of financial markets.

All of this matters, for several reasons. Again, if crises do not cause recessions or other real economic damage, we don't care. Well, crises do cause real damage, but *why* they cause economic damage illuminates what a crisis is in the first place, what steps we might take to avoid crises, how costly crises really are, and thus how much cost we should tolerate from anti-crisis policies, which put-out-the-fire policies are important to contain economic damage, and what structural reforms we might undertake to limit economic damage.

If the essential link from run to macroeconomy is undercapitalized intermediaries, then the final form of the TARP—recapitalizing intermediaries—should have solved the macroeconomic problem. That it did not do so is one piece of evidence in my mind against this view, but one can always argue that even more capital was needed.

If the essential link from run to macroeconomy is a flight to quality, then lender-of-last-resort institutions and massive exchanges of government debt for private debt are more promising fire extinguishers. The lender-of-last-resort theory has always preached to accommodate shifts in money demand versus other assets by large lending, with the limitations of "against good collateral" and "at a penalty rate" open to question. One can argue that, in our crisis, the government should simply have exchanged trillions (more) of government debt for trillions of private securities that people did not want to hold. Of course, the question of "good collateral" and the moral hazard of this extreme central-banker's put option will limit the idea.

Both views, I think, pose an unresolved challenge to the project of an expensive regulatory response. If, as Keynesians believe, aggregate demand is the only link from anything to recessions, and it can easily be managed with sufficient fiscal and monetary stimulus, then in fact we only need to fix macro policy and leave the banks alone; crises really are not by themselves a social problem. (I don't see any Keynesians advocating this position, but it is a logical consequence of belief in aggregate demand and stimulus.)

If the main link from crisis to real activity is a sort of clogging of the arteries of existing banks, with layers and layers of additional frictions required to keep still-optimistic investors from getting money to still-optimistic firms, then one could suffer runs far more easily with faster and more effective recapitalization.

In both views, we should be paying a lot more attention to the hazily-described "frictions." If price stickiness is the bottom of recessions, then why are economists who write such models not outraged at the government's efforts to make prices and wages stickier, and why are they not campaigning to fix price stickiness? If inadequate capital and frictions in the way of private recapitalization are the key problem, fixing capital-raising frictions would seem to be at the top of the agenda, rather than amassing larger options for ex-post bailouts and recapitalizations.

Aside from that weakness, however, both views point to large macroeconomic effects and important benefits from stopping systemic runs in the first place. Those who think undercapitalized banks led us to five years of GDP falling $1 trillion below potential should be in the front of the queue demanding much, much more capital to begin with.

2.4 Stock again

Common equity is the paradigmatic example of a corporate liability that is immune from runs. When an equity-funded company is in trouble, you can try to sell stock, and stock values can crash. But you cannot run to the company and demand your money back and you cannot drive the company into bankruptcy should it fail to pay. When you sell stock, you do not do anything to push the company closer to insolvency. Seeing your investment crash, your neighbor, invested in another company, can't demand his money back and cause that company to fail either.

One might feel that stock price crashes represent fire sales, irrational fads, or otherwise socially suboptimal phenomena. Stock market crashes can come with important shifts in investment and other economic outcomes. But stock market crashes are not runs and they are not crises. Investors bear risk for their returns directly and inescapably. My decision to sell—even if unwise, even if it provokes a price decline—does not pose an externality to you. If anything, the opposite is true: my fire sale is your buying opportunity.

An exchange-traded fund (ETF) is a paradigmatic example of a run-proof intermediary. When asset values fall, the liability values of an exchange-traded fund fall automatically and the fund itself cannot go bankrupt.

For this reason, the tech boom and bust of the late 1990s is a good comparison. The decline in tech stock value was similar to the decline in subprime mortgage-backed security value by September 2008. But there was no crisis and only a mild recession in the early 2000s. Why? Because tech losses were held in stock, and when stock falls you can't run. Housing losses were held in fragile, run-prone securities.

Yes, the Great Depression was heralded by a stock market crash. But financial turmoil came from defaults by intermediaries who had borrowed to invest in stock and by the subsequent bank runs and bank failures. These are failures of debt, not of equity.

Long-term debt occupies an intermediate spot. It does make fixed promises, but only at periodic intervals. On suspecting bad news, like equity, there is nothing you can do immediately to avoid losses. Long-term debt leads to crises when it isn't quite long enough, when it needs to be refinanced in large chunks. The Greek debt crisis came when Greece needed to refinance long-term debt, not when it could not borrow for one year's spending.

2.5 Things that don't matter

The view that the financial crisis was, at heart, a systemic run is as—or more—important for clarifying things that are *not* important in the quest to avoid another crisis as it is for clarifying what is important.

The source of losses does not matter. So fixing the (deplorable, in my view) federal interventions in housing finance, or fixing the various abuses, predations, and irrational behavior others see in housing, is neither necessary nor sufficient to stop crises. The next panic may start with losses on sovereign debts: perhaps a new European crisis or a US state debt and pension crisis. The whole long argument over whether supposed global imbalances can fuel a savings glut, and whether policymakers are wise enough to detect and prevent such things, is pointless. If such events exist but savings are held in floating-value non-runnable assets, then, yes, big price drops (buying opportunities!) and exchange rate changes can happen—but not a crisis.

The "dominoes" or "interconnectedness" theory is a popular alternative view of a crisis: A defaults on its debts to B, so B defaults on its debts to C, and so forth. Much regulation is written against the dominoes theory—for example, the new limits on single-party exposures. But dominoes were not a major factor in our crisis or in previous crises. Companies build buffers against dominoes. If A's default is to cause B, C, and D to default, A's loss of value must exceed the combined capital and borrowing capacity of A, B, C, and D. But what happened to us was that seeing A fail, investors ran on B, C, and D, who had little unhedged direct exposure to A. The systemic run view argues that lots of "interconnectedness" regulation is fairly pointless.

3. Stopping Runs

3.1 An end to run-prone financing

If the problem is runs, and runs are identifiable features of certain kinds of contracts issued by certain kinds of intermediaries, then the focus of regulation should rather naturally be to fix run-prone contracts where possible and to strongly discourage their use when they can't be fixed.

For commercial banks, the answer is pretty simple: equity, lots more equity. How much? Well, more is better, and "enough so that it doesn't matter" or "enough that we never, ever hear again the call `recapitalize the banks'" are good answers. 100 percent is perfectly workable.

More is obviously better, because more capital puts banks further from bankruptcy and further from a run to begin with. Less obviously, all of the dynamic problems sparking runs are ameliorated by capital. If a bank has 2 percent equity capital, loses 1 percent of the value of its assets, and (as the story goes) cannot quickly issue more equity to rebuild capital, then it has to

sell half of its assets to restore its capital ratio. If the bank has instead 50 percent equity capital and loses 1 percent of the value of its assets, it only needs to sell 2 percent of its assets to get back to a 50 percent capital ratio. And if the bank is 100 percent equity-financed, it doesn't have to sell anything. If you worry about fire sales, you should like equity.

Similarly, if a bank has 2 percent equity capital and loses 1 percent of the value of its assets, it is one more such loss away from bankruptcy. Debt overhang will surely loom over any equity issues, recapitalization, or effort to sell the company. If a bank has 50 percent equity capital and loses 1 percent of the value of its assets, it is so far from bankruptcy that issuing more equity involves essentially no transfers to debt holders and can be accomplished seamlessly. If a bank is 100 percent equity-financed, it doesn't have to issue any more equity at all in response to losses. If you worry about the difficulty of issuing or hanging on to equity, you should like more equity to start with.

Many recent proposals specify debt that converts to equity under some circumstances. Examples include French et al. (2010a) and Hart and Zingales (2011). Some convertible debt has been issued. More simply, banks could be required to buy put options, giving them the right to issue new equity at predetermined prices. However, critics such as Admati and Hellwig (2012) point out, why bother? Why bother with the fig leaf that the convertible security is debt rather than equity or really an equity option? The answers mostly do not come from fundamental economic problems: to keep the tax-deductibility of interest payments, for example, or to address accounting rules. Well, if these are why we have runs, they're not that hard to fix. In addition, rumors that a conversion option might be triggered may induce turmoil as investors who really want debt and not equity try to sell in advance of the conversion. In turn, such rumors would make the convertible debt suddenly information-sensitive and its liquidity would dry up just when it is needed.

For the purpose of stopping runs, what really matters is that the value of investors' claims floats freely and the investors have no claim on the company which could send it into bankruptcy. Common equity has a variety of other rights, such as voting. Nonvoting equity or any similar floating value claim would do for this purpose. I use equity only because it is the most familiar form of non-runnable bank liability.

Long-term bank debt occupies a more nuanced middle ground. If bankruptcy-remote, it can become information-insensitive and hence potentially more liquid than equity. But current long-term debt is not long-term enough for either purpose. By having fixed maturities rather than perpetual coupons, it raises a rollover risk. By issuing many different securities across maturity dates, it lowers liquidity. If banks issued perpetual debt, it would be exactly the same security; one "bond" could be delivered in a short position that had borrowed a different "bond." In any event, the vast amount of equity trading and the uniformity of that security means that equity bid-ask spreads and liquidity are hardly a first-order social problem.

Part of the business of being a bank, of course, involves making some fixed-value promises in the natural process of buying and selling on behalf of customers, market-making, and over-the-counter securities transactions. One may object that banks will try to financial-engineer their way around restrictions on short-term debt issue, as they engineered their way around capital regulation. For example, a bank can synthesize borrowing by put-call parity in options markets.

However, there is a fundamental distinction between *financing* a large portion of bank assets by rolling over short-term debt and the sort of short-term promises to pay, in a matched book, that market-making, loan origination, and other bank-like activities imply. Detecting hidden run-prone financing will require a few regulators, but the project is an order of magnitude easier than current asset regulation, capital regulation, and stress testing.

3.2 Capital regulation

Though my main focus is describing the financial system we should strive for, rather than regulations on how to get there, this is an important exception. *How* should we increase bank capital?

The first step, of course, is to remove distortions subsidizing debt, especially short-term debt. Subsidizing debt and simultaneously trying to regulate against its use is about as smart as, oh, subsidizing energy prices and trying to regulate against its use.

The tax deductibility of interest payments versus dividends is an obvious target. However, nonfinancial corporations do not lever to the immense degree that large banks do, so this tax shield cannot be the entire answer. A second subsidy comes from the regulatory preference for (apparently) high-rated short-term debt as an asset of the acquiring institution. Intermediaries such as money market funds are required to hold short-term debt, and short-term debt carries lower risk weights for banks who hold it. This augmentation of the demand for run-prone assets encourages their supply. If the regulatory system looked uniformly at short-term debt as poison in the well, we might not have such trouble convincing banks not to issue so much of it.

The major subsidies to debt, however, are the implicit (deposit insurance) and explicit (bailouts) guarantees. These are not likely to end. Our government is not likely to eliminate deposit insurance, or want to or be able to credibly pre-commit against bailouts of other short-term creditors. In addition, though unregulated banks in the nineteenth and early twentieth centuries issued as much as 40 percent equity, in order to reassure creditors, nonetheless they failed on occasion as well.

There is a genuine externality with run-prone debt, and thus a genuine tendency for banks to issue too much and people to hold too much. So even most dedicated free-market economists

must countenance some form of regulation. Not many observers want to return to bank notes issued by private banks, recognizing the incentives for banks to over-issue notes. Short-term debt is the modern equivalent.

Pigouvian taxes

Capital regulation should, I think, take the form of Pigouvian taxes rather than a regulatory ratio. For every dollar of short-term debt that a bank or other intermediary issues, it has to pay, say, five cents tax per year. That tax could, in principle, decline smoothly with maturity, be larger depending on capital ratios and other measures of how run-prone the institution is (providing a nudge rather than a brick wall at a specific ratio), could be larger for "systemically important" institutions, and could be varied over time as macroprudential policymakers sniff trouble. On the other hand, the hard lessons of complexity, regulatory capture, regulators' human inability to see crises ahead of time, and their likely desire to prop up troubled institutions rather than cause further trouble with higher taxes (or capital ratios) suggests the simplest and most uniform tax.

Pigouvian taxes are better than quantity controls in many areas of regulation, from import tariffs versus quotas to pollution taxes versus direct emission regulation, especially when, as in this case, precise costs and benefits are hard to measure.

Quantitative capital ratio regulations quickly lead to arguments and games. Should the denominator be "risk-weighted" assets or total assets, or should the capital requirement be based on a full-value-at-risk model? The total-assets approach has a satisfying simplicity. But, as Duffie (2014) emphasizes, a binding ratio of debt to total assets leaves banks with awful incentives. It is easy to construct assets whose value is low but whose risks (betas) are large. Risk-weighting individual assets sounds better, but then we argue about risk weights. Furthermore, a first-year MBA student understands that the riskiness (chance of default) of a portfolio of assets depends on the correlations between the assets as much as on the individual riskiness, but risk weights ignore correlations. A full value-at-risk model including correlation between assets is the economically satisfying answer—but it relies on a big black box that few trust.

Most of all, where is the bright line of what capital ratio makes a bank safe? The answer "enough so it doesn't matter" is correct but unsatisfying. The fact is, there is no bright line. The top of a hill is flat. More is always safer. Why not have a regulation that says as much and that rewards banks that are safer than the minimum?

A Pigouvian tax will also allay critics who champion the economic necessity of short-term debt financing. In places where short-term debt financing is really vital, it will survive paying a

run-prone externality tax. On the other hand, if a small tax leads banks to shift toward equity finance, then those arguments will quickly be resolved.

Pigouvian taxes set a price, and maybe a wrong price, but at least then we know the shadow value of the constraint. A quantity constraint may actually have a small shadow value, especially to society or to an industry as a whole if not to an individual bank, but it's still worth the bank's lobbyists whining about it constantly. A quantity constraint may have a very large shadow value that nobody knows about and do far more damage than its advocates realize. With a Pigouvian tax we will at least learn something about the necessity of run-prone contracts. With quantity constraints, we don't learn.

3.3 Who should be regulated?

One can argue that only certain financial intermediaries should be restricted from issuing run-prone liabilities, including very short-term debt. Only systemic runs really matter, so only runs at institutions likely to spark runs at others—and at times when such sparks are likely to catch fires—really matter. Runs are a feature of institutions, as well as contracts, as I listed above. One might argue that if, say, Kraft Foods wants to issue a small amount of overnight commercial paper, why not let it do so. One might argue that such restrictions are only needed in times of systemic danger, so restrictions should vary macroprudentially. MF Global failed with no crisis.

There are strong counterarguments. If any class of institution is allowed to issue runnable debt, then surely those institutions will grow up and become systemically dangerous. We had capital requirements supposedly limiting debt issue to safe levels, but the requirements were gamed and the institutions failed. Our regulators did not fail to notice systemic dangers from a lack of wisdom. The nature of a crisis is that if anyone can see it coming, it either won't happen or it already has happened. And the nature of regulators is that they are not going to get tough when they are trying to paper things over and prop things up.

An optimal-policy trade-off balances costs and benefits. I will argue below that vast amounts of privately issued runnable debt and other run-prone contracts confer few social benefits. If that is true, then we do little damage by over-regulating them. I also am suspicious of overly complex regulations requiring lots of discretion. I acknowledge, however, that if Kraft Foods wants to finance 5 percent of its assets with market issues of short-term debt, that won't be a disaster.

3.4 Banks, quasi-banks and nonbanks

Commercial banks are a small part of the financial system. The run started in the shadow banking system, and only a sense of their greater "systemic importance" caused so much regulatory attention to big commercial banks.

Money market funds

Money market funds promise fixed values and first-come first-served redemption. "Prime" funds invest in illiquid or low-grade paper to generate higher yields than available in Treasuries. The Reserve Fund, heavily invested in Lehman Brothers debt, "broke the buck" in 2008. Subsequently, the Treasury guaranteed money market fund debts.

Such funds are "banks" with no equity. The closest to equity that many funds have is a guarantee from a sponsor, which makes those funds one more sudden drain of cash in a crisis and one more way for banks to take on credit risk and get around asset regulation and capital ratios.

The answers are pretty simple: fixed-value money market funds can invest in short-term Treasuries. Those funds that want to offer higher yields by investing in anything else can grow a substantial equity or liquidity cushion. In my view, that cushion should be 100 percent. Or, fund values can float freely, which is equivalent to equity financing.

Now, even floating NAV (net asset value) is not a complete guarantee against problems. A floating NAV fund establishes its best guess of security values at the end of the day, and the fund allows investors to buy or sell at that price, creating liquidity by a sort of internal market. However, the fund may not be able actually to liquidate large volumes of securities at the set price, so floating NAV is dangerous if all investors want to leave at once. Thus, it is even safer if the fund's shares themselves are tradable in a reasonably liquid market. Then, in a crisis, investors wanting cash quickly can sell their shares to others rather than make a claim on the company.

Funds could also have the right to suspend convertibility, redeem in kind, or switch from fixed to floating NAV. However, any structure in which the fund exercises an option risks generating a run as people try to get out before the fund exercises its option.

Examining all these options, the simplest one seems the best to me: any fund not entirely invested in Treasuries must have floating values and, ideally, also tradable shares. This is all-equity financing without the control rights, which are not needed for a pass-through structure invested entirely in marketable securities. See French et al. (2011) for more analysis of these and other options.

Any of these proposals would substantially reduce the ability of money market funds to contribute to financial crises. Yet, in six years since the crisis, the Securities and Exchange Commission has not enacted any of these reforms. The Federal Reserve openly kept interest rates above zero so that money market funds would not have to charge customers to keep their money. Money market funds only came into existence in the 1980s as a response to the failure of Regulation Q, which stopped banks from paying interest on deposits. The regulatory system cannot bring itself to reform or put out of business a very simple structure that failed. This is perhaps a good warning of the political obstacles facing genuine reform of any set of institutions.

Auction-rate securities and special-purpose vehicles

Auction-rate securities and special-purpose vehicles have a similar structure. They invest in illiquid securities, typically with longer maturity than would be allowed in a money market mutual fund, such as mortgage-backed securities. They fund these purchases by rolling over short-term debt, which allows investors effectively to run at each rollover point. They issue no equity, but typically have a guarantee from a sponsoring institution. That credit exposure, which did not trigger a capital charge, again makes the structure a simple way to avoid capital regulation.

These are banks in an economic sense of the word, except that they hold marketable (if illiquid) securities rather than relationship loans. Like overnight repurchase agreements, they offer institutional investors a high-yielding form of "cash." They also failed in the crisis, suffering runs and failures to roll over debt. In turn, these runs triggered guarantees from sponsoring banks, revealing the credit exposure.

Obviously, this game needs to end. Funds or pools of mortgage-backed securities are a great idea—if they are funded by floating-value liabilities.

The story of how banks evaded risk regulation and capital regulation through all three sets of securities is a good warning against putting too much faith in longer and more detailed asset and capital regulation in the future.

4. Objections

The most natural objection is that we need banks to "transform" maturity and risk—borrow short and safe, lend long and risky—and to "create" liquidity. Without this function, it is claimed, there will not be an adequate supply of "safe" assets for people and businesses to hold and there will not be an adequate supply of risky credit.

Of course, risk and maturity "transformation" are fallacies. Maturity and credit risk can be sliced and diced, pooled and tranched, but they cannot be removed. Still, just how vital is bank creation of a run-prone short-term debt tranche? Is it worth the costs we have just paid in occasional crises, and the cost we are starting to pay in massive regulation, to preserve this attempted transformation?

4.1 Technology and the demand for "safe" assets

The quantity of short-term debt and run-prone securities is large in our economy. For example, Krishnamurthy and Vissing-Jorgensen (2013) measure all short-term debt as averaging 66 percent of GDP, with a peak of 99 percent in 2007.

It is easy to label this equilibrium outcome as a demand and assume that it is inviolable—that the economy simply cannot function without the large quantity of privately provided runnable assets, backed by risky investments. For example, Gorton, Lewellen, and Metrick (2012) state "...regulators and policymakers must adroitly balance the need to improve financial stability with the simultaneous need to maintain enough liquid, safe debt in the economy to meet the demand for such debt." Krishnamurthy and Vissing-Jorgensen (2013) go on:

> "... investors have a large demand for safe and liquid investments, and that short-term debt satisfies this demand ... The financial sector supplies such debt by holding positions in other risky assets (loans, securities, etc.) that is funded by short-term debt. The corporate sector, particularly the high-grade segment, also satisfies this demand by issuing commercial paper. Our evidence supports standard theories of banking that emphasize the special role of banks in transforming risky, illiquid assets into safe and liquid assets ... the shadow banking system played an important role in the production of safe and liquid assets over the last decade."

But an observed equilibrium quantity does not measure what demand would be under alternative arrangements or how easily investors can substitute, given an incentive to do so. Our tough job, in thinking about a regulatory regime, is to understand how much of this observed quantity is really economically necessary and what the finite costs would be of a different

arrangement. If Treasuries offer 2 percent, large corporations will happily declare a "need" for overnight repurchase agreements paying 2.5 percent, especially if they think they're all smart enough to run the day before bankruptcy or if they know the government will support the market in a run. The question is: if the only way to get 2.5 percent were to hold a floating-value fund, shoulder some price risk, and give up the right to run, would this "need" for higher-yielding fixed-value securities evaporate?

Why do people need liquid, fixed-value assets, money, or money-like securities? Well, to make transactions, you might say. And that once was true. To pay for something, you have to offer a security return whose value the seller knows exactly and which can be transferred at minimal cost. You need to hold an inventory of such assets in your portfolio in order to make transactions and other unscheduled payments in between times that you can access, (or choose to) access, floating-value or illiquid assets held for portfolio purposes.

But, as I argued in the introduction, technology renders this "need" obsolete. We can now know exactly the prices of floating-value securities. Index funds, money market funds, mutual funds, exchange-traded funds, and long-term securitized debt have created floating-value securities that are nonetheless information-insensitive and thus extremely liquid.

Consumers already routinely make most transactions via credit cards and debit cards linked to interest-paying accounts, which are in the end largely netted without anyone needing to hold inventories of runnable securities, and despite the artificially large (4 percent) fees charged by credit card companies. Allowing more competition in electronic transactions could increase that quantity.

The inventory is the real point. Even if we transfer fixed-value securities to finalize a transaction, we no longer need to hold a large inventory of such securities. Business and financial actors really do not need to hold more than a day or two's worth of actual fixed-value transferable securities, because floating-value securities can be so easily bought and sold. Does this inventory demand constitute 66 percent of GDP? Not even close. People can easily pay credit card charges at the end of the month from floating-value funds.

I have used "fundamental economic need" as a qualifier because not all the discussion in the literature on the “need” or “demand” for safe assets spells out exactly where such demand comes from. Much of the remaining "demand for safe assets" gets psychological—infinite risk aversion—or almost mystical and axiomatic. I find that a pretty dubious basis for policy. Yes, we observe a large quantity of short-term debt. That observation does not prove it must be so.

4.2 Supply of safe assets

Even if the *demand* for run-prone securities is large, that does not mean that we must insist on a private *supply* of such securities, backed by risky assets and prone to runs.

There is a bright side to our government's fiscal profligacy: $18 trillion of federal government debt is enough to 100 percent back any imaginable fundamental economic need for run-prone assets. Reserve balances at the Fed corresponding to purchases of agency debts add to the total. If we need more still, the government can buy additional assets and issue more debt. Agency debts, student loan debts, and other debts already guaranteed by the government are a good place to start, given the government's choice to issue those guarantees. One worries about our government buying additional assets, but foreign sovereign wealth funds such as the Norwegian oil fund are transparently managed and avoid crony investments. And any such purchases are an order of magnitude more transparent than the possibilities for cronyism and directed lending posed by our current large-scale discretionary bank regulation.

Demand deposits are only about $1.5 trillion (Federal Reserve Money Stock Measures Release H.6). Money market funds are another $2 trillion, although some of those funds are already invested in Treasuries. Savings and time deposits are large at $8 trillion, but most of those could presumably be easily held as floating value, or at least not immediate-service and hence run-prone securities. Even all of Krishnamurthy and Vissing-Jorgensen's (2013) 66 percent of GDP in short-term debt is only about $10 trillion.

Small changes in the structure of government debt and a concerted effort by the government to displace private money with run-free public interest-paying money could speed the process.

The Federal Reserve is holding about $3.5 trillion of assets, corresponding to about $1 trillion in cash and $2.5 trillion in interest-paying reserves. It should keep the large balance sheet and pay market interest on reserves. A corresponding $2.5 trillion in bank liabilities are now run-free. The Federal Reserve’s intention to open the interest-paying reserve market to nonbanks via reverse repurchase agreements is a good step in the right direction.

The Treasury can issue more short-term debt. Ideally, the Treasury should issue fixed-value, floating-rate, electronically transferable debt, divisible to the cent, and let the rest of us have the same reserves that banks get at the Federal Reserve.

Now, long-term Treasury debt is also desirable as it insulates the Treasury from the fiscal consequences of interest rate changes. The Treasury can issue remaining debt in longer form—perpetuities are ideal—or engage in swap contracts to reduce that interest rate risk. The Treasury can separate the maturity and liquidity structure of its liabilities from its interest-risk exposure via swaps just like any bank.

Treasury debt as money

There is a deeper point here. For most of the corporate and financial system, cash is irrelevant. Short-term debt *is* money. Technology and communications mean we now have interest-paying money for all legal transactions.

Since it's denominated in dollars, U.S. federal debt is the most default-free and run-proof security we have. The government can always print dollars to pay off debts. It might inflate, but it need not default. The underlying claim to future taxation is a safer backing for short-term debt than any claim the private sector can securitize. These features give the government a natural monopoly in producing run-proof interest-paying money.

We have used private intermediation to create a multiplier, to create a larger volume of interest-paying claims that promise payment of a limited amount of government short-term debt. The vast volume of government debt, together with the much lower fundamental economic demand for run-prone assets, means we no longer need this multiplier.

In the nineteenth century, we realized the government had a similar natural monopoly in the production of bank notes. Now that electronic transfers and instant communication make interest-paying money possible, the government should extend its natural monopoly to interest-paying electronic money as well.

Accounting and taxes

There are some genuine accounting and legal roadblocks to what I have just written. Floating-value funds generate a capital-gains tax record-keeping nightmare. Fixed-value funds appear as cash on balance sheets. Both facts are part of the implicit subsidies given to run-prone securities by many laws and regulations.

Rather obviously, those accounting and legal restrictions need to be changed. Expensive and difficult, you may say, but nothing like the expense and difficulty of implementing the Dodd-Frank Act!

4.3 Credit supply

A second broad objection is that run-prone bank financing is necessary not so much to create "safe" assets for people and businesses to *hold*, but in order to create an adequate supply of loans for households and businesses to *borrow*.

A monitoring need for run-prone liabilities

Diamond and Rajan (2001) propose a theory of the need for run-prone liabilities that is diametrically opposite to the Gorton-Metrick view of short term debt as information-insensitive and hence money-like. In Diamond and Rajan's view, short-term investors monitor intensively and discipline management with the threat of a run. Therefore, "stabilization policies, such as capital requirements, narrow banking, and suspension of convertibility, may reduce liquidity creation," and thereby reduce the banking system's ability to make loans.

I am less convinced of the quantitative significance of this story. First, it simply does not ring true. Overnight repo is not held by institutions which closely monitor management; repo is a form of corporate cash management. Second, if so, Diamond and Rajan ought to add deposit insurance to the list of stabilization policies that reduce lending. For deposit insurance cures runs, and insured depositors no longer monitor. If government monitoring were a sufficient substitute, it could monitor equity-financed banks just as well. At least, if Diamond and Rajan are right, I get to convert all insured deposits to floating value or 100 percent backed form. Third, their theory starts, "Loans are illiquid when a lender needs relationship-specific skills to collect them." In their view, the special character of relationship lending versus, say, operating a tech startup or a car company needs monitoring by run-prone debt rather than the usual monitoring by corporate equity holders. But what relationship lending remains is done by small commercial banks, not the bureaucratic behemoths at the center of the storm. Originate-to-sell activities, proprietary trading, investments in marketable securities, shadow banking, repurchase agreements, and so forth invest in marketable, if somewhat illiquid, securities, not relationship banking. Fourth, in fact, our banks have a substantial equity cushion in line before a run by short-term creditors, and equity is presumed to monitor management as in other corporations.

A good word for securitization

If banks are "special," it is centrally their ability to make relationship loans based on "soft information." Once again, information, communication, and financial technology have

dramatically reduced the underlying need for soft-information lending, as the quantification of everything is replacing soft information by hard information and big data.

Mortgages, student loans, credit card loans, and many others are now routinely securitized. Technical innovation underlies that fact: quantifiable information such as credit scores, income, location, and so forth can, if allowed, do as good a job (or a good enough job) of assessing credit risk as the supposed soft information of loan officers. The big data revolution, if allowed, will only improve matters. Google and Facebook could probably predict defaults with great accuracy – which might or might not be regarded as a good thing.

Securitized debt, with a secondary market, does not have to be financed by run-prone assets. If, for some reason, equity-funded banks do not supply adequate credit, then long-term commercial paper, corporate bonds, and mortgage-backed securities held directly or at floating value in exchange-traded or mutual funds can do so.

Financial innovation has helped this holding end as well. The fundamental savers in our economy—people, pension funds, endowments, etc.—can easily hold (slightly) floating-value long-only funds invested in mortgage-backed securities or other securitized debt. Liquidity is now provided by the liquid markets for these securities, not by banks' run-prone redemption promises.

Relationship-lending banks, if they do need to be financed by run-prone securities, simply do not have to be a large part of finance, commingled with other activities, and at the center of systemic runs.

Expensive capital and Modigliani-Miller

A second line of criticism is that equity capital is "expensive." If banks have to fund their loans by issuing equity, long-term debt, or other floating-value run-proof claims, they will have to pay higher returns, and will in turn have to pass those higher costs on to borrowers in the form of higher interest rates. Admati and Hellwig (2012) (see also my review, Cochrane (2013a)) have pretty definitively skewered this view and lucidly address much of the basic confusion on the issue of bank equity. No, banks do not "hold" equity as reserves and a use of funds. Banks issue equity and equity is a source of funds. If banks issue more stock and less debt, the stock becomes less risky. That much is just accounting and inarguable. The argument is whether the expected return on that stock, which is the bank's cost of equity capital, will decline in proportion to the risk, as the Modigliani-Miller (MM) theorem asserts.

There is, in fact, one good reason for the MM pricing result to fail: the government guarantees and subsidizes bank debt. So, by switching to equity financing, the bank gives up that subsidy

and the bank's total value falls. But taxpayers are equally better off, so the experience of individual banks[6] does not tell us anything about the *social* MM theorem. To argue that debt-financed banking provides lower social-cost loans than equity-financed banking, we must count the costs of debt guarantees and subsidies, of financial regulation, and of occasional crises to the bill.

It might well be that equity-financed banks charge 50 basis points (bp) more in mortgages because they lose the subsidy associated with government debt guarantees and the tax shield. If the 50 bp subsidy is an important social goal, let the government subsidize the lending directly, and on budget, without creating a run-prone intermediary in the way.

To argue beyond this resolution, one needs to imagine something deeply important, and often psychologically rather than economically important, about the difference between "equity" and "debt." One has to argue why a bundle of 90 percent debt and 10 percent equity is much more palatable to investors than the same security, with the same risk profile, sold as equity.

Creating "banks" that can fail

If there truly is a deep need for debt rather than equity, as an asset, there is no reason the bank itself must provide it. Banks could issue 100 percent equity. That equity could be purchased by a second institution, structured investment vehicle, or similar pass-through entity, that tranches bank equity into short-term debt, long-term debt, and remaining risky equity.

But this vehicle very clearly is not too big to fail and no government guarantees. Because, who cares if it goes bankrupt?

We fear the bankruptcy of banks because they are complex and might take years to unwind. Most of all, we fear the disruption of their operations. The failure of a special-purpose vehicle that holds bank equity, by contrast, can be handled in a morning. Short-term debt gets paid first, long-term debt gets the bank equity, equity is wiped out. The equity-issuing bank itself never fails, so there is no issue at all of sorting out thousands of claims in thousands of jurisdictions, clearing out huge derivatives books, or closing down the lending operations while they are sold to a new owner.

[6] For example, Baker and Wurgler (2013) argue that lower-beta, and hence presumably less-leveraged, bank stocks give the same average return as higher-beta bank stocks.

Even short-term debt of such a pass-through entity poses little systemic risk. The assets—bank equity—are liquid and tradable. The assets' value is known to within a bid-ask spread every few seconds. The illiquidity and obscurity of run-prone institutions' assets are not present.

As a practical matter, if indeed the Modigliani-Miller theorem fails and the value of bank equity is less than an equivalent package of debt and equity, leveraged not-too-big-to-fail hedge funds will step in and do the unbundling, as long as the demand for debt was not really a demand for government guarantees.

4.4 Fixing bankruptcy

The trope following the financial crisis is: "bankruptcy can't work for large financial institutions." But it is not often explained exactly why. Especially with hundreds of billions of dollars of resources spent in fighting the financial crisis, a small amount of resources spent diagnosing and fixing bankruptcy ought to be a key part of the reform effort[7].

The Lehman bankruptcy was a bit chaotic. But once you ask just what went wrong, specifically, rather than just accept "Lehman was a mess, we can't do that again," the problems do not seem beyond the fixing capacities of a small army of lawyers. And we have a large army of lawyers trying to implement Dodd-Frank. Collateral was commingled and hard to retrieve. OK, segregate capital better. United Kingdom bankruptcy law did not fully recognize that repo collateral belonged to those who owned it. OK, we can fix that. Under US bankruptcy law, the assets are drained to pay the (large) bid-ask spread on the entire derivatives book, so each counterparty is made whole. OK, we can fix that by, for example, assigning long positions directly to short positions, with a novation in between, or selling the whole book. Too many jurisdictions? Living wills are a fine idea, along with exactly which claims will be adjudicated where. And so on and so forth. Bankruptcy law was built up over centuries of experience by just such patient tinkering.

Remember, bankruptcy does not leave a crater behind, as in the popular imagination. Bankruptcy is a reorganization, with preservation of the good parts of a business. Bankruptcy is also a recapitalization. Too many analysts write "banks must be recapitalized" and jump to the conclusion that taxpayers must provide the capital. In bankruptcy, existing equity claims are written off, existing debt is written down and becomes the new equity, and valuable operations

[7] Scott and Taylor (2012) is a prime source for this view. Summe (2010), Fleming and Sarkar (2014), and Duffie (2010a, 2010b) are excellent summaries of some details of what went wrong in 2008.

are sold to new owners. Bankruptcy wipes out the debt overhang and marries operations to a sufficient capital base (new owners, debt holders who now own equity) and ready to function with a new sign on the door. The question is the sand in the gears of that desirable process.

People are capable of thinking ahead of time about how things will be resolved in bankruptcy. Much of the page after page of legalese in financial contracts that critics so bemoan really comes down to exactly that planning.

If indeed bankruptcy can't work for large financial institutions, so creditor's bankruptcy protections are invalid, why did creditors lend to, or deal with, such institutions banks in the first place? The only sensible answer: creditors don't think it will happen. Having seen bailout after bailout, they think the bank is too big to fail, so there is no point in spending a lot of time sorting out bankruptcy procedures. Government fear of bankruptcy creates the fragility that reinforces the fear.

If bankruptcy is necessary—if for some reason equity-funded banks can't exist, even with equity tranched out by an easy-to-fail downstream institution—a little effort in fixing bankruptcy, or fixing institutions so they can survive bankruptcy, seems worthwhile!

Bernanke, innovation, and bankruptcy

Bernanke (1983) described the loss of human and organizational capital in bankruptcy. Legal and financial innovation has fundamentally changed that scenario. In 1933, interstate banking was prohibited, branch banking was prohibited, remote ownership was prohibited, and certainly international ownership was prohibited. In bankruptcy, the people and organizational capital of a bank simply could not, by regulation, be married to new capital. If the (fictitious) first bank of Omaha went bankrupt in 1933, it could not sell—or even give—the deposit-taking and loan-making operations to JP Morgan, receive an equity infusion from a sovereign wealth fund, or even be sold to a private equity fund. Now it can, so the special loan-making human capital Bernanke pointed to need not be lost. Canada's Federal banking system, with nationwide branches, has long been held up as a model that did not suffer the United States' historical crises. Now we essentially have such a system.

The economy needs a *banking system*. Rather than save existing individual banks, their management, their equity holders, or their creditors, saving the banking system should be the priority. New banks, new management, new equity holders, and new debt holders can and should quickly take over failing ones. But the process is not perfect, and it can still be made much easier for investors to quickly take over bank assets.

This lesson remains important for Europe, in which many small national banks, stuffed with sovereign debt, remain, and it is hard for large, well-capitalized international competitors to swoop in and get bankrupt pieces moving again.

5. Current policy

Runs and panics have been with us for centuries. The policy and regulatory response in the United States and around the world has evolved following a different model than the one I sketched. Each intervention made some sense but had unintended consequences. New reforms patched up unintended consequences of past regulations with somewhat sensible new ones. But then those had unintended consequences as well. Each time, the size and scope of regulation expanded. The Dodd-Frank Act is not at all a new or radical set of ideas. Its core—credit guarantees, risk and capital regulation, and a big kit of lender-of-last-resort and resolution fire hoses—simply builds on and dramatically expands the same ideas that have been tried for over a hundred years in the United States and United Kingdom.

This set of ideas has run its course. It's pretty clear that the Dodd-Frank regulation is a stifling monster. *The Economist's* review (2012) captures beautifully Dodd-Frank's mind-boggling complexity, inevitable politicization, and dysfunction. Basel bank regulation, even to regulators such as Andrew Haldane (2012), appears a hopelessly complex Rube Goldberg contraption. Most observers do not really expect either structure to stop financial institutions from once again undermining the regulations or to stop, rather than institutionalize, too-big-to-fail bailouts. And the scale of the bailouts and credit guarantees approached last time, and will likely exceed next time, governments' finite ability to provide guarantees and bailouts.

It is important to sketch and understand this evolution. All too often, fairly radical ideas (a class to which I freely admit this essay belongs) portray conventional wisdom as simply silly or misguided. That portrayal undermines the new ideas, I think. It is better to understand how the current ideas evolved as reasonable solutions to problems as they occurred, and then somewhat reasonable patches to the system as undesired consequences emerged. That understanding, a clear picture of just how many (and much larger) undesired consequences the current framework will have, and a recognition of how technology has changed basic assumptions, should help sensible people of all backgrounds, even those who participated in the last few rounds of patchwork, to see see it's time to go back to the beginning rather than patch more.

5.1 Deposit guarantees and regulation

The United States responded to the bank runs of the 1930s with federal deposit insurance. Deposit insurance stops runs by removing the need to get your money out before bankruptcy, or before the other guy.

However, deposit insurance and the Fed's lender-of-last-resort function give rise to moral hazard. Bank management is now playing with a free option, artificially cheap debt, and a source of crisis financing. Bank depositors no longer have an incentive to monitor the quality of the bank's assets or to care about capital buffers. So, we enhanced risk regulation and capital requirements.

But regulatory supervision is a poor substitute for market discipline, with both bank and depositor now having even stronger incentives to undermine it. So, time after time, crises erupted anyway. Each time, credit guarantees grew and the scale and intrusiveness of asset and capital regulation grew. The government bailed out unsecured debt-holders in the Continental Illinois failure, when the term "too big to fail" came into common use. The savings and loan crisis and bailout of the 1980s, the various Latin American crises, the collapse of Long-Term Capital Management and the Russian default crisis, the Asian currency crises of the late 1990s—each provoked larger and larger creditor guarantees. All paved the way for Bear Stearns, opening the discount window to broker-dealers, Fannie and Freddie, the Lehman exception that proved the rule, the TARP bailouts and (more importantly in my view) blanket guarantee of all bank debt, and finally the massive expansion of regulation under Dodd-Frank.

5.2 Rules and discretion

"Regulation" can mean laws, with clear rights, recourse, and judicial arbitration. It can mean rules written by regulatory agencies, where people have at least administrative, if not judicial, recourse. Or it can mean that regulators use discretion to approve plans ahead of time, oversee moment-by-moment business decisions, or deny actions after the fact.

Financial regulation largely conforms to the latter mold. There are rules, mountains of rules. But the rules are so complex and overlapping that there is little chance of simply reading them and complying. Each large bank has hundreds of regulators sitting inside, approving every deal. Lucchetti and Steinberg (2013) quote John J. Mack, Morgan Stanley's chairman and chief executive from 2005 to 2009: "Your No. 1 client is the government." They report that current CEO James Gorman "phones Washington before making major decisions," and "About 50 full-time government regulators are now stationed at Morgan Stanley."

The stress tests give a good example. One might think that the Fed would write down rules for the stress test. But no, the Fed changes the rules and scenarios each time—for good reasons. Fed staffers know that if they announce the rules ahead of time, the banks will cleverly cook the books to pass the tests. So the staff finds fun, new, and innovative tests each time.

The newspaper reports on Citigroup failing stress tests in March 2014 are revealing. The *Financial Times* wrote[8]: "One senior executive said that [Citi CEO] Mr. Corbat had shown himself to be `overconfident' that he had repaired the bank's rickety relationship with regulators and had `mistaken a "not bad" relationship for a good relationship'." The *Wall Street Journal*[9] wrote: "Mr. Corbat had met on multiple occasions with senior officials at the Federal Reserve and the New York Fed and believed Citigroup was on track to meet the Fed's demands." More revealingly still, the *Journal* article continues:

> "[The] so-called qualitative part [of stress tests] has become increasingly important. It includes subjective factors such as how the bank manages the stress-test process and incorporates past lessons and concerns. It also takes into account how a bank handles costly litigation [brought by the government!] and manages its technology systems. Regulators have been saying for some time that they are placing more emphasis on the so-called subjective aspects of the test and not just capital levels, leverage ratios and other quantitative measures."

You don't need a "relationship" to pass a driver's license test. "Subjective aspects" mean pretty much anything the regulator wants them to mean. A system more ripe for capture and a revolving door would be hard to design. A system more ripe for political control would be hard to design. No banker would dare to speak out against regulators who can "subjectively" do pretty much anything the regulator wants.

5.3 Innovation cat and mouse

Many of the structures of the shadow banking system were clear end-runs around this regulatory system. Regulation Q limited the interest banks could pay on deposits, to keep banks from exploiting deposit insurance by offering higher interest rates to invest in riskier projects.

[8] Tom Braithwaite, Camilla Hall, Gina Chon, and Martin Arnold, "Citi Stress Test Hit by Audit Lapses," *Financial Times,* March 28 2014, http://www.ft.com/intl/cms/s/0/06ba38f2-b69b-11e3-905b-00144feabdc0.html.

[9] Suzanne Kapner, Stephanie Armour, and Julie Steinberg, "'Stress Test' Failure Sparked Scramble at Citigroup," *Wall Street Journal*, March 27, 2014, http://online.wsj.com/news/articles/SB10001424052702304688104579465851513193722.

Money market funds evolved in the 1980s to circumvent Regulation Q. Banks and savings and loans were forbidden to buy stock, obviously risky. Junk bonds were invented in the late 1980s, and they gave savings and loans risky assets that behaved like stocks but were called bonds. Prime money market funds, financial commercial paper, special purpose vehicles with off-balance-sheet credit guarantees, and overnight repo financing were the tricks that led to our financial crisis. It's an old game. The Medici bank used offsetting foreign exchange forward contracts to synthesize interest-paying debt against the church's prohibition of usury.

Yet it is time for some sympathy. Huge complex rules that lead to armies of discretionary regulators doing what they please do not occur for some dark conspiratorial reason. The minute we write down rules, banks game their way around the rules. If we're going to try to subsidize debt and then regulate against its use by horrendously complex too-big-to-fail banks, then an army of discretionary regulators, with all its unsavory consequences, is a logical necessity. This system cannot be cleaned up, reformed, or made more rule-based. But it would be a triumph of hope over a century worth of experience that regulators will finally, this time, put a stop to the clever tricks to get around the next regulations. The only alternative is to undo the "if."

5.4 Innovation and competition

Not all of financial innovation is clever tricks to undermine regulation. In fact, most financial innovations serve good purposes, even the innovations that are also used to undermine regulation. The first money market funds invested in Treasuries, providing run-free access to Treasury yields to small investors who had been locked out of those yields by Regulation Q. Junk bonds were a key innovation in the productivity-improving buyout wave of the 1980s. Repo financing is an effective way for risk-averse investors to lend out the collateral value of their securities.

Financial regulation by its nature limits competition and innovation. It was clear already in the 1930s that competition and innovation would undermine the regulatory package of deposit insurance, asset and capital regulation, and the lender-of-last-resort function, so the Glass-Steagall put in a sharp distinction between commercial and investment banking. Commercial banks were granted a near-monopoly on issuance of demand deposit-like securities. Regulation Q, with an explicit goal of enhancing the profitability of the banking industry, capped interest rates to stop competition for depositors. Barriers to entry kept too many banks from trying to divvy up the spoils. And bankers played a lot of golf. Investment banks and other financial institutions couldn't issue demand deposits—but they were pretty lightly regulated and free to fail.

But Glass-Steagall fell apart, financial innovation did the rest, and the Dodd-Frank Act breaks the remains of the wall surrounding regulated finance. Essentially the entire financial system is now subject to detailed federal control. Already the Financial Stability Oversight Council

(FSOC) has designated[10] as systemically important two insurance companies (AIG and Prudential Financial) and GE Capital as "non-bank financial companies" along with a long list of financial market "utilities." The Treasury's Office of Financial Research (2013), in an official report to the FSOC, now worries that "reaching for yield" and "herding" by asset managers will provoke fire sales, thus making run-proof equity mutual funds systemically important. The council is, as I write,[11] therefore considering whether to extend systemically important designation to such funds.

Pretty much every market, contract, and financial institution receives much more regulation under Dodd-Frank. As part of our new effort to avoid crises, the Consumer Financial Protection Bureau will regulate the font on your credit card disclosures. (Well, nearly!)

This dramatic expansion is a natural result of the basic philosophy. Having seen money-market funds, savings and loans, junk bonds, special-purpose vehicles, auction-rate securities, and overnight repo turn "systemically important," having seen investment banks and hedge funds (in regulator's eyes) turn "systemically important," there is no way to tell what new idea or institution might cause trouble. So, give an army of discretionary regulators authority to regulate it all as they see fit.

To stop potential regulatory arbitrage, the Dodd-Frank Act pretty much puts every action of every large institution under discretionary control of regulators, and every institution potentially under such scrutiny. Nowhere does the Dodd-Frank Act even *define* systemic importance. It is pretty much whatever the regulator thinks it is. The legal power to *determine* systemic importance is, by contrast, well-defined. But conversely, there is no safe harbor, no definition of any activity that is *not*, and cannot be deemed ex-post, systemically important, "could pose a threat to US financial stability," and subject to detailed regulation. There is no standard one could use to appeal that decision.

Every element of Dodd-Frank regulation is thus anathema to innovation, competition, and (above all) entry. Simply the need for an immense compliance department and relationships with regulators puts a prohibitive barrier to entry in place.

More deeply, the basic idea in Dodd-Frank is to designate specific *institutions* as systemically important rather than isolate *contracts* that pose systemic risks as I have suggested. Systemically important means, almost by definition, "cannot be allowed to fail," and that in turn means "cannot be allowed to lose money or be driven out by upstart competitors" who threaten their profits.

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[10] Financial Stability Oversight Council, US Department of the Treasury, http://www.treasury.gov/initiatives/fsoc/designations/Pages/default.aspx.

[11] Mark Schoeff Jr., "SEC commissioners push back against systemic designation for mutual funds," *Investment News*, April 3, 2014, http://www.investmentnews.com/article/20140403/FREE/140409958.

All this stifling of competition and innovation is in the regulation even if the regulation works exactly as benevolently intended. Regulatory capture is one of the most classic unintended consequences of discretionary regulation: the regulatory structure becomes an instrument for incumbents to protect themselves from competition, especially competition by innovative new companies. This is not just theory. Centuries of bitter experience taught us to be a nation of laws and rules, not to place our faith in a benevolent aristocracy. Discretionary regulators, no matter how well-intentioned, are much more subject to the political pressure that institutions with hundreds of billions of dollars at stake can bring to bear.

Thus, under Dodd-Frank we will likely have a financial system dominated by the same six large banks thirty years from now that we do today, protected from innovation and competition, subsidized by the government to remain profitable, though occasionally penalized by showy prosecutions when they step out of political line, and engaged in a constant battle of wits with discretionary regulators. Financial market participants will focus on currying favor with regulators and politicians. Stress tests and official pronouncements will continue to be awaited with solemnity once reserved for a change of pope.

5.5 Putting out fires

Firefighting is the second major component of our current financial regulation scheme. The Bank of England started acting as a lender of last resort in the late 1870s. Following the 1907 panic, the United States created the Federal Reserve in 1914, largely to be a lender of last resort. Runs happened anyway in 1933.

Firefighting in the 2008 crisis extended to lending to banks and broker-dealers, debt guarantees, FDIC resolution, bailouts, shotgun marriages, asset purchases, and many other measures. The European Central Bank (ECB) guarantee to do what it takes to stop sovereign debt crises could ratchet up the quantities even further.

"Bailout" is a misnomer. We should call it a "creditor bailout," because that is what matters. It does not matter much if management keeps their jobs, if equity is wiped out, and so forth. It's hard to say that Greece or Ireland was bailed out. They're suffering pretty badly. Greece's creditors were bailed out.

Ex-post creditor bailouts are irresistibly tempting, because they are about the only way to stop a run. Deposit insurance was originally limited in scope, because the government wanted large depositors to exercise the sort of discipline and caution that they had before. For the same reason, the government shrinks from ex-ante guarantees of overnight repurchase agreements, prime money market funds, and so forth. But any runnable debt can run, and if you want to stop runs, then you end up guaranteeing debts. The attempt, I think, is to pretend ex-ante that the

government won't bail out ex-post, to get the moral hazard right, and then bail out ex-post to stop the run. But markets see through the game.

Conversely, the anti-bailout language in Dodd-Frank might actually be strong enough to put us in the worst-possible world: markets expect too-big-to-fail but the government can't or won't do it. Prevailing sentiment is that law and regulation don't seem to constrain executive action that much, so they'll find a way to bail out. We'll see.

Politicians and regulators are also tempted to bail out failing companies and countries in order to paper over difficulties and stop their perception of domino-like contagion. But this strategy is fairly pointless. In a systemic run, news that bank A is insolvent will spread to a run in bank B whether or not the government bails out bank A creditors. It's the news that matters.

To the extent that such bailouts work, they mainly demonstrate the regulators' commitment to bailing out. Bailing out Bear Stearns sent an unintended "don't' worry" message to Lehman Brothers creditors. (Summe (2010, p. 87) gathers considerable evidence on this point.) Greece didn't owe Italy any money, and news about Greek finances has little information about Italy's. By bailing out Greek creditors, the European Union, ECB, and International Monetary Fund let creditors know an Italian bailout was more likely, easing Italy’s crisis.

Propping up prices

In the 2008 financial crisis, a new—or, at least, vastly expanded—firefighting tool emerged: directly manipulating asset prices. The original TARP idea, as presented by Treasury Secretary Henry Paulson, was to use $700 billion to buy mortgage-backed securities on the open market in order to prop up their prices and thus make banks look more solvent. That announcement coincided with a ban on short-selling bank stocks, a clear attempt to boost bank-stock prices. Europe also banned short sales during the sovereign crises. In fall 2008, the Federal Reserve lowered interest rates to zero, equivalently doing everything in its power to raise the price of Treasury debt and any other debt related to Treasury. The Fed, together with Treasury, also successfully intervened in financial commercial paper markets, buying up large quantities and driving up their prices.

This price-manipulation impulse has continued in the Fed's quantitative easing (QE) program and in the macroprudential policies which other central banks are following and the Fed is considering. QE2 and QE3 were explicitly aimed at raising the prices of long-term Treasury and mortgage-backed securities. Macroprudential policy elsewhere targets house prices, exchange rates, credit spreads, and stock prices. Many observers blame the Fed for holding interest rates too low before the crisis in an apparently all-too-successful effort to inflate housing values, and

the same after the crisis in a transparent attempt to do the same again. Stein (2014) is a thoughtful review of the Fed's ideas to target risk premiums, including corporate bond spreads.

The idea is, in general, for central banks to keep prices from rising "too fast" in a boom and then to prop prices up in a bust. The central banks will use regulatory tools including leverage and capital ratios and mortgage-loan-to-value ratios, along with interest rate policy, to diagnose and correct perceived bubbles, imbalances, savings gluts and so forth. Governments will also, with grand international coordination, undertake policies to manipulate exchange rates, force other countries to push consumption versus exports, and so on.

In short, policy should now fight runs by manipulating prices and economies so that banks don't ever lose money in the first place. This is truly a grand expansion of regulation. What did the old lady eat after the horse?

Resolution authority

The Dodd-Frank Act adds a new "resolution authority" to handle failing so-designated systemically important institutions. This is at least an attempt to think through firefighting bailouts ahead of time. The authority comes in place of bankruptcy court, laws, and procedures. The authority is supposed to follow the order of precedence specified in bankruptcy law. But those are more what you'd call guidelines than actual rules, as the authority has broad powers to pay creditors in whatever order it deems appropriate, particularly to address perceived systemic problems and to invest government money. That's the whole point. If we were going to follow or fix bankruptcy law, or any set of rules, we would write the rules and follow the law. The point of a "resolution authority" is to hand discretionary power to the officials who will run it.

Given that necessary discretion, it seems likely that the resolution authority will induce runs rather than calm them, so the net result will be a government guarantee of every claimant in a crisis.

Imagine markets are nervous, as in September 2008, with a few high-profile failures in the background. You are a claimant to a large, designated systemically-important financial institution, or one that might get designated systemically important. You have some certainty about where you stand with bankruptcy law. Perhaps you have repo collateral or a collateralized derivatives contract that is supposed to be subject to automatic stay. You haven't run yet. But now you suspect that your creditor might be "resolved" by politically appointed government officials—officials who have wide powers, a clear mandate to bail out systemically important creditors, no definition of what that means, and strong political pressures being brought to bear. You know that big banks with the Treasury secretary's private cellphone number will soon be screaming their own systemic importance and the disasters that will befall the republic should

they not get paid back. You remember how Goldman Sachs got its collateral from AIG and how the General Motors bankruptcy trampled creditor rights. What do you do? Run.

So the prospect of resolution, rather than calming the waters, seems doomed to start its own run. Now take one more step back. What will officials do? They don't want to liquidate commercial banks unnecessarily, especially in the middle of a crisis. Guaranteeing all debts to avoid resolution seems like their only possible course—just as the Fed and Treasury guaranteed all of the TARP banks' debts in October 2008.

Keep in mind the crucial difference between a looming crisis and normal times. MF Global's failure was a lot different from Lehman's failure. We could well see a successful resolution in "calm" markets, where the troubles of a single bank have little information content about its competitors. And that success could lull us into a false sense of confidence. It all works differently when political appointees are trying to “instill confidence,” “stop contagion,” and so forth.

Resolution authority fails on a simple elemental contradiction. Its premise is that large financial institutions are too complex to be resolved by bankruptcy law, with its centuries of law, precedent, and experience, and with acres of fine print in contracts specifying just who gets what and when. But if that is too complex, how is a team of appointed officials going to figure out who gets how many billions of dollars out of hundreds of thousands of complex contracts, over a weekend?

5.6 Making markets more fragile

Deposit insurance, explicit and implicit guarantees, ex-post creditor bailouts, a lender of last resort, asset price manipulation, and other firefighting measures all have the unintended effect of making markets more fragile and thus becoming more dependent on regulatory intervention.

Before the lender-of-last-resort function, banks had developed a clearinghouse system to deal with runs. With the lender of last resort, the clearinghouse ceased to function, so when the Fed arguably fell short as lender of last resort in the 1930s, the banking crisis was worse than it would have been. The shadow banking system was arguably more fragile than an unregulated banking system.

Similarly, the array of firefighting tools invites people to hold fewer fire extinguishers. With a resolution authority in place, a creditor's incentives now are to be as systemically important as possible in the authority’s eyes, to ensure getting paid first, and to invest heavily in political connections with the appointees in charge.

All of asset pricing relies, in the end, on deep-pocket long-term investors who are willing to swing in with ready cash and buy. Your fire sale is their buying opportunity. But when the Fed "stabilizes" prices in a crash, the rewards to bottom-feeders evaporate. They learn to "ride the bubble" on the upside next time rather than keep some cash around ready to pounce. Similarly, if the Fed starts limiting upside price movements, then the returns to buying in the bottom of the recession are limited.

Where was the smart money in 2008-2009? If limits to arbitrage, leveraged intermediaries, and so forth in fact cause fire sales to break out, where are the long-only, multi-strategy funds, endowments, sovereign wealth funds, pension funds, family offices, and uber-wealthy 0.01 percent? Nothing institutional stopped them from participating in what turned out to be the buying opportunity of a lifetime in junk bonds, stock indices, commercial paper, and mortgage-backed securities. It isn't hard, there are Vanguard funds and ETFs for each! To some extent, these investors may simply have panicked like everyone else, rationally or irrationally. If true, that event denies the importance of the institutional-finance paradigm. Alternatively, being a multi-strategy investor, understanding many markets, waiting to take advantage of transient opportunities, and, in doing so, providing liquidity and countering volatility in those markets takes a big up-front investment while forgoing narrower and more specialized opportunities. The less the rewards to such fast-moving capital, the more frequent the central bank put, the fewer such investors there will be.

When bailouts and market interventions rule the day, then financial market participants spend their efforts divining and influencing the will of government officials rather than understanding the value of companies and assets. In turn, their extra influence means officials are as likely to cause trouble as to repair it. By showing up in front of Congress with three pages of notes, asking for $700 billion, with no clear idea of what he wanted to do with it except a transparently hopeless plan to float the MBS market, Secretary Paulson is as likely to have started a run as to have stopped one. Taylor (2009) argues persuasively for this view based on detailed analysis of the timing. Add that performance to a short-sale ban on banks, and information-insensitive investors got the word they should look really hard, right now. The ebb and flow of the European debt crisis tracked changing sentiments about the bailout-will of government officials, not from any news or even rumors about Greece and the other countries' fundamental solvency.

In the end, if you have a big firehouse, then people start to store gas in the basement and don't keep their fire extinguishers ready. This moral hazard is well-known, but it is perhaps not so well appreciated just how much more fragile markets are as a result of a century of crisis management.

6. Comparison

I hope this little review shows how the current state of regulation evolved naturally. But it has now grown to a size where the collateral damage—unintended, or understood but accepted—is enormous, and current regulation is not likely actually to stop another crisis. Those costs and limitations are important, because drastically limiting run-prone liabilities will bear some costs and require some regulation. But with the current state of affairs in front of us, you can see that an approach based on limiting run-prone liabilities is orders of magnitude simpler, clearer, and more open to rule-based rather than discretionary regulation.

There are some fundamental differences. I started with a defined view of the problem:—we had a systemic run—and an economic analysis of the incentives that led to that problem. I analyze the nature of regulation, not its quantity. That's how we're supposed to approach economic regulation: understand the crucial market failure, then craft a minimal intervention to solve it. Regulation is effective or ineffective, smart or dumb, not more or less. That approach leads me to a focused set of changes that should stop runs while leaving untouched a whole panoply of real or imagined ills and complaints about the financial system that, in that analysis, have nothing to do with stopping runs.

The Dodd-Frank regulatory package, by contrast, really never decided what the problem was. The financial system failed, so add "regulation" to anything smacking of finance, as if regulation were like fertilizer one can simply throw on a field. The law is, in fact, mostly authorization for agencies to go figure out what to do. The Dodd-Frank Act does not define "systemic" or "contagion" or "interconnection" or even what "pose a danger" means. Without such a framework, under the guise of stopping crises, every complaint about the financial system got thrown in one bill.

Again, we can have some sympathy. The ideas I summarize in this essay evolved by a long conversation among academics and policymakers in the years since Dodd-Frank was enacted. At the time, the systemic-run view was not as common, nor was the view that lots of bank equity would be cheap. Chasing down “causes of the crisis” and efforts to keep large financial firms from failing seemed more plausible. Legislators' view that "finance failed" so it needed “more regulation,” given the cacophony of experts before those legislators, might be pardonable. Such sympathy does not mean however, that, now later and wiser, we must continue to pursue that hastily enacted framework.

Despite its huge increase in contemplated regulation, the Dodd-Frank apparatus does very little in the directions I have suggested actually to stop run-prone financing. Yes, Basel rules and Federal Reserve policy include modest rises in capital ratios, but these are modest, a very small part of the overall policy response, and subject to the same games as the last round of capital ratios, especially given the huge increase in the complexity of capital ratio regulation. One can

see the Federal Reserve already giving up on formal ratios and relying on its own discretionary stress tests instead.

In fact, some recent regulation goes in the opposite direction. For example, the SEC decided that money market funds should hold shorter maturity debt, to make the funds safer. But this step, of course, gives an added incentive for intermediaries to manufacture shorter-maturity debt, pushing the run one step up the ladder. So much for the systemic rather than institution-specific regulatory approach the FSOC was supposed to inculcate.

Focusing on run-prone contracts frees us from the need, and the adverse consequences, of the rest. If the liabilities can't run, banks can do what they want with assets. Equity-financed banks need not shed assets to pay off debt, so there can't be fire sales.

Current regulation focuses on *assets*, tightly regulating their risk and nature, and now their market prices. I focus on *liabilities*. Equity-financed banks would require next to no asset risk regulation. Bank asset risk regulation is strange on first principles. Bank assets, largely loans or fixed income securities, are much safer than the assets or profit streams of other corporations. They are certainly much safer than the assets of an equity mutual fund. Why put so much effort into regulation of such extraordinarily safe assets? Because the *liabilities* are prone to runs. Equity-financed banks would be more boring than regulated utility stocks. Boring is good.

Dodd-Frank focuses on systemically dangerous *institutions*. I focus on systemically dangerous *contracts*, and an institution is only dangerous if it issues such contracts. Regulation should be based on behavior, not identity.

Dodd-Frank resolution and the following trend to so-called macroprudential regulation focuses on fighting fires, giving regulators bigger and bigger tool kits to fight crises. I focus on clearing out the underbrush, making the system less prone to catching fire in the first place.

The current regulatory approach relies more than ever on regulatory prescience to spot trouble ahead. A financial system that can't have runs in the first place needs no great men or women guiding the ship. If you still have any trust in regulatory prescience—or the ability of prescient individual regulators to take unpopular actions while trying to “bolster “confidence” and prop up weak institutions—consider the astonishing fact that, with the financial crisis just behind them, European bank regulators still treated sovereign debt as a risk-free asset to banks.

7. Concluding comments

7.1 Regulation and deregulation

I have focused on describing what a run-free financial system can look like in the context of modern communications and financial technology. I have tried to answer the standard objections and I have shown how much better it would be than our current path. I have focused less on what kinds of regulation are needed to prod the market to that point. There are several reasons, beyond the limits of space and reader patience.

First, there are lots of ways to achieve the same goal. We have to agree on the vision of where we want to go before we decide on the best way to get there. This vision is radical enough and sketchy enough that it makes sense to work on that agreement first. Even once we agree on the principles, a lot of details of the vision need to be worked out before we start playing central planner and writing regulations.

Second, much of the pathology of markets, during the crisis and now, derives from the ill effects of existing regulations. A detailed plan is as much a disassembly as it is the construction of regulations needed to avoid the difficulties of a hypothetical completely free market.

Third, there is an interesting inverse correlation between complexity and cost. For example, a simple, clear regulation is: nobody but the Treasury may issue short-term, fixed-value, first-come-first-served, I'm-bankrupt-if-I-can't-pay debt. Now, one might object that goes too far and is too costly. Surely it does and it is. So, one tries to get more complex to try to economize on perceived costs. Maybe some kinds of firms can issue a little short-term debt? Who? How do we define what kinds of debt? What are the costs, really? That delicate trade-off is beyond my scope. Since the costs in any case are orders of magnitude less than what we are seeing in the current regulatory regime, and with a distrust of complex regulation, I favor a simpler but somewhat more costly approach. But a bad job of a difficult problem does not advance the overall vision.

Fourth, actual regulatory plans must consider political constraints that are better left out while still working out the vision.

Most of all, and especially given how much discretion and agency rule-writing dominate the process, accepting the vision itself is half the battle. If every agency writing rules, implementing rules, approving plans, subjectively evaluating stress tests, and so on, even under Dodd-Frank, had firmly in mind that run-prone short-term debt is poison in the well, is the central systemic danger, and needs to be purged wherever possible, you and I would not need to do a lot of fancy optimal-policy work.

In sum, let us first agree on the vision and philosophy. If by some miracle that happened, a regulatory plan would be easy. Conversely, a detailed regulatory plan is of no use until we agree on the vision and philosophy.

I have phrased the ideas in this essay as an alternative to Dodd-Frank-style regulation and its international cousins because I see those falling apart at the seams. However, that is not a logical necessity. The core complaint about Dodd-Frank regulation, from all sides, is that it does little actually to prevent another crisis, just as its milder ancestors did little to prevent this one. If you think all the other things in Dodd-Frank are great, and address my long list of other alleged faults of the financial system, then the structure I advocate here can be added rather than substitute for the current system.

7.2 Sovereign debt disclaimer

I built the monetary side of my proposal on sovereign debt, by a sovereign such as the United States that issues debt in its own currency. The resulting stability guarantee presumes a fiscally healthy sovereign in the background. Narrow banking backed by Treasuries is only perfectly safe so long as Treasuries themselves are perfectly safe. What happens if the sovereign defaults or severe inflation looms so there is effectively a run on government debt? Sovereign default, inflation or currency devaluation are different kind of crises altogether from a run or panic in the private financial system.

One should at least consider the possibility of such crises, especially in a moment of emerging low secular growth, ballooning public debt, and vast hidden liabilities.

Government and private default are a bit intertwined: the last crisis cost the US government about $1 trillion per year for several years. Another crisis will cost trillions more in bailouts, propping up markets, credit guarantees, transfers, and fiscal stimulus efforts. These guarantees may well exceed the government's ability to credibly pledge future tax revenues and spark a sovereign crisis as well. So, creating a run-free financial system reduces the chance that a private crisis will spill over and become a sovereign crisis.

Constructing a financial and monetary system which is immune both to private and to public default is an interesting question. Rather than pursue a fundamentally different monetary standard—substitute bitcoins, gold, or SDR (special drawing rights) for short-term nominal Treasury debt—I think fairly simple innovations in government debt would suffice. If the government were to issue long-term, ideally perpetual, debt that comes with an option to temporarily lower or eliminate coupons, without triggering a legal or formal default, then government financial problems could be transferred to bondholders without crisis or inflation. Reputation and a desire to issue future debt at good prices would lead governments voluntarily to

pay coupons when they can. Really, this is no more than a modern version of the institution by which the British government suspended convertibility to gold during wars and then voluntarily reestablished convertibility at par after the war in order to preserve its ability to borrow the next time.

For now, though, I simply note that banking crises against the background of a solvent sovereign are a separate issue from sovereign crises. This essay has really only considered the former. The latter is potentially just as important, especially looking forward.

References

Admati, Anat, and Martin Hellwig. 2012. *The Bankers' New Clothes: What's Wrong with Banking and What to Do about It*. Princeton NJ: Princeton University Press.

Baker, Malcolm, and Jeffrey Wurgler. 2013. "Would Stricter Capital Requirements Raise the Cost of Capital? Bank Capital Regulation and the Low Risk Anomaly." NBER Working Paper No. 19018, May 2013

Bernanke, Ben. 1983. "Non-monetary Effects of the Financial Crisis in the Propagation of the Great Depression." *American Economic Review* 73 (3): 257-276.

Bernanke, Ben, and Mark Gertler. 1989. "Agency Costs, Net Worth, and Business Fluctuations." *American Economic Review* 79 (1): 14-31.

Bernanke, Ben, and Mark Gertler. 1995. "Inside the Black Box: The Credit Channel of Monetary Policy Transmission." *Journal of Economic Perspectives* 9 (4): 27-48.

Bernanke, Ben, Mark Gertler, and Simon Gilchrist. 1996. "The Financial Accelerator and the Flight to Quality." *The Review of Economics and Statistics* 78 (1): 1-15.

Bernanke, Ben, Mark Gertler, and Simon Gilchrist. 1999. "The Financial Accelerator in a Quantitative Business Cycle Framework." In *Handbook of Macroeconomics*, edited by John Taylor and Michael Woodford. Amsterdam: Elsevier.

Dell'Ariccia, Giovanni, Enrica Detragiache, and Raghuram Rajan. 2008. "The Real Effect of Banking Crises." *Journal of Financial Intermediation* 17 (1): 89-112.

Chamley, Christophe, Laurence J. Kotlikoff, and Herakles Polemarchakis. 2012. "Limited Purpose Banking—Moving from `Trust Me' to `Show Me' Banking." *American Economic Review* 102 (3): 113-119, http://dx.doi.org/10.1257/aer.102.3.113.

Chari, V. V., Lawrence J. Christiano, and Patrick J. Kehoe. 2008. "Facts and Myths about the Financial Crisis of 2008." Federal Reserve Bank of Minneapolis Working Paper 666, http://www.minneapolisfed.org/research/pub_display.cfm?id=4062.

Cochrane, John H. 2010. "Lessons From the Financial Crisis." *Regulation* 32 (4): 34-37.

Cochrane, John H. 2011. "Discount Rates." *Journal of Finance* 66 (4): 1047-1108.

Cochrane, John H. 2013a. "Running on Empty: Review of 'The Banker's New Clothes' by Anat Admati and Martin Hellwig." *Wall Street Journal*, March 1.

Cochrane, John H. 2013b. "Stopping Bank Crises Before They Start." *Wall Street Journal*, June 24.

Diamond, Douglas W., and Phillip H. Dybvig. 1983. "Bank Runs, Deposit Insurance, and Liquidity." *Journal of Political Economy* 91 (3): 401-419, http://www.jstor.org/stable/1837095.

Diamond, Douglas W. 2008. "The Current Financial Crisis, Other Recent Crises, and the Role of Short-term Debt." Slides at http://research.chicagobooth.edu/igm/docs/ChicagoCrisistalk.pdf.

Diamond, Douglas W., and Raghuram G. Rajan. 2001. "Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking." *Journal of Political Economy* 109 (2): 287-327.

Duffie, Darrell. 2010a. "The Failure Mechanics of Dealer Banks." *Journal of Economic Perspectives* 24: 51-72.

Duffie, Darrell. 2010b. *How Big Banks Fail and What to Do about It*. Princeton NJ: Princeton University Press.

Duffie, Darrell. 2014. "Is Keeping It Simple for Banks Stupid?" *Bloomberg View*, January 7, http://www.bloombergview.com/articles/2014-01-07/is-keeping-it-simple-for-banks-stupid-.

The Economist. 2012. "The Dodd-Frank act: Too big not to fail," February 18, http://www.economist.com/node/21547784.

Fleming, Michael J., and Asani Sarkar. 2014. "The Failure Resolution of Lehman Brothers." *Economic Policy Review* 20 (2), http://www.newyorkfed.org/research/epr/2014/1403flem.html.

French, Kenneth, et al. 2010a. "An Expedited Resolution Mechanism for Distressed Financial Firms: Regulatory Hybrid Securities." In *The Squam Lake Report*: *Fixing the Financial System.* Princeton NJ: Princeton University Press.

French, Kenneth, et al. 2010b. "Prime Brokers, Derivatives Dealers, and Runs." In *The Squam Lake Report*: *Fixing the Financial System.* Princeton NJ: Princeton University Press.

French, Kenneth, et al. 2011. "Reforming Money Market Funds." Manuscript, http://www.squamlakegroup.org/Squam%20Lake%20MMF%20January%2014%20Final.pdf.

Friedman, Milton. 1969. *The Optimum Quantity of Money and Other Essays.* Chicago: Aldine.

Gambacorta, Leonardo, and David Marques-Ibanez. 2011. "The bank lending channel: Lessons from the crisis." BIS Working Paper no. 345, http://www.bis.org/publ/work345.pdf.

Gertler, Mark, and Nobu Kiyotaki. 2011. "Financial Intermediation and Credit Policy in Business Cycle Analysis." In *Handbook of Monetary Economics*. Edited by Ben Friedman and Michael Woodford. Amsterdam: Elsevier.

Gorton, Gary, Stefan Lewellen, and Andrew Metrick. 2012. "The Safe-Asset Share." Manuscript.

Gorton, Gary. 2010. "E-coli, Repo Madness, and the Financial Crisis." *Business Economics* 45: 164-173.

Gorton, Gary, and Andrew Metrick. 2012. "Securitized Banking and the Run on Repo." *Journal of Financial Economics* 104: 425-451, http://dx.doi.org/10.1016/j.jfineco.2011.03.016.

Haldane, Andrew G. 2012. "The Dog and the Frisbee." Speech given at the Federal Reserve Bank of Kansas City's 36th economic policy symposium, "The Changing Policy Landscape," Jackson Hole, Wyoming, http://www.bankofengland.co.uk/publications/Documents/speeches/2012/speech596.pdf.

Hart, Oliver, and Luigi Zingales. 2011. "A New Capital Regulation for Large Financial Institutions." *American Law and Economics Review* 13: 453-490.

Ivashina, Victoria, and David S. Scharfstein. 2010. "Bank Lending During the Financial Crisis of 2008." *Journal of Financial Economics* 97: 319-338.

Jeanne, Olivier, and Anton Korinek. 2011. "Managing Credit Booms and Busts: A Pigouvian Taxation Approach." Working Paper, University of Maryland.

Kocherlakota, Narayana. 2010. "Taxing Risk and the Optimal Regulation of Financial Institutions." Economic Policy Paper 10-3, Federal Reserve Bank of Minneapolis.

Kotlikoff, Laurence J. 2010. *Jimmy Stewart Is Dead: Ending the World's Ongoing Financial Plague with Limited Purpose Banking*. New York: John Wiley & Sons.

Krishnamurthy, Arvind, and Annette Vissing-Jorgensen. 2013. "Short-term Debt and Financial Crises: What we can learn from U.S. Treasury Supply." Manuscript.

Lucchetti, Aaron, and Julie Steinberg. 2013. "Life on Wall Street Grows Less Risky." *Wall Street Journal*, September 9, http://online.wsj.com/news/articles/SB10001424127887324324404579044503704364242.

Ludvigson, Sydney, Charles Steindel, and Martin Lettau. 2002, "Monetary Policy Transmission through the Consumption-Wealth Channel." Federal Reserve Bank of New York *Economic Policy Review* (May): 117-133.

Perotti, Enrico, and Javier Suarez. 2011. "A Pigovian Approach to Liquidity Regulation." *International Journal of Central Banking* 7, 3-41.

Scott, Kenneth E., and John B. Taylor, eds. 2012. *Bankruptcy Not Bailout: A Special Chapter 14.* Stanford CA: Hoover Institution Press.

Office of Financial Research, US Department of the Treasury. 2013. "Asset Management and Financial Stability,"
http://www.treasury.gov/initiatives/ofr/research/Documents/OFR_AMFS_FINAL.pdf.

Summe, Kimberly Anne. 2010. "Lessons Learned from the Lehman Bankruptcy." In *Ending Government Bailouts as We Know Them*. Edited by Kenneth E. Scott, John B. Taylor, and George P. Shultz. Stanford CA: Hoover Institution Press.

Stein, Jeremy. 2012. “Monetary Policy as Financial Stability Regulation.” *Quarterly Journal of Economics* 127: 57-95, doi:10.1093/qje/qjr054. Stein, Jeremy. 2014. "Incorporating Financial Stability Considerations into a Monetary Policy Framework." Speech, March 21, http://www.federalreserve.gov/newsevents/speech/stein20140321a.htm.

Taylor, John B. 2009. *Getting Off Track: How Government Actions and Interventions Caused, Prolonged, and Worsened the Financial Crisis*. Stanford CA: Hoover Institution Press.