Financial Crises: Mechanisms, Prevention, and Management[1]

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The recent financial turmoil has led to disruptions in credit flow second only to the one during the Great Depression in the 1930s. Building on my earlier work in Brunnermeier (2009), this article first outlines the underlying amplification mechanisms that turned several hundred billion dollars of losses in the subprime mortgage market into a multi-trillion dollar destruction of wealth. The understanding of these mechanisms is an important prerequisite for setting up a new financial architecture whose objective is to minimize the risk and impact of a recurrence of a similar crisis. In the second part, I discuss specific proposals for crisis *prevention* that are described in more detail in Brunnermeier et al. (2009). The final part of this report discusses elements of crisis *management* useful in handling and minimizingthe impact of such crises.

1) Underlying Mechanisms

Trends leading up to the crisis

Several trends in the last decades have made the financial system vulnerable to a sharp financial downturn with detrimental implications for the real economy. First, the U.S. economy was experiencing a low interest-rate environment, both because of large capital inflows from abroad, especially from Asian countries, and because the U.S. Federal Reserve had adopted a lax interest rate policy. Asian countries bought U.S. securities both to peg the exchange rates on an export-friendly level and to hedge against a depreciation of their own currency against the dollar, a lesson learned from the South-East

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Asia crisis in the late 1990s. The Federal Reserve Bank feared deflation risks after the bursting of the Internet bubble and thus did not counteract the buildup of the housing bubble. Second, the banking system underwent a deep structural transformation. The traditional banking model, in which the issuing banks hold loans until they are repaid, was replaced by the "originate and distribute" banking model, in which loans are pooled, tranched, and then resold via securitization. The creation of new securities facilitated the large capital inflows from abroad. A large fraction of funding was arranged through the so-called "shadow banking system," which turned out to be very fragile, since it relied primarily on short-term financing.

Both trends led to a housing and credit bubble. Lending standards eroded, and inflated house prices served as collateral to finance unsustainable high consumption levels in the U.S., which outpaced domestic production. The savings rate for U.S. households shrank close to zero percent. Most of the U.S. consumption increase was financed by a growing current account deficit.

Leverage, Maturity Mismatch, and Two Liquidity Concepts

The problem with the increased lending was not only the high leverage ratio, but also the maturity mismatch –most of the long-term lending through the shadow banking system was funded by (very) short-term borrowing that relied on the repo and Asset Backed Commercial Paper market. In short, as will be explained below, it was high leverage ratio combined with increased maturity mismatch that led to a fragile situation.

To be more specific, leverage can cause a risk-shifting problem resulting in excessive risk-taking. Hence lenders, who anticipate excessive risk taking, and cut back their funding. The lack of new funding is however no problem if existing funds are secured with long-term debt contracts, since no new funds need to be raised in the interim. New funds are needed only when debt matures earlier than the assets pay off, i.e., if there is a maturity mismatch.. A funding shortage arises when it is prohibitively expensive both to (i) borrow more funds (low funding liquidity) and (ii) sell off assets (low market liquidity). In short, problems arise if both funding liquidity dries up (high margins/haircuts, restrained lending) and market liquidity evaporates (fire-sale discounts).

Funding liquidity describes the ease with which investors and arbitrageurs can obtain funding. Funding liquidity is high—and markets are "awash with liquidity"—when it is easy to raise money because

collateral values are high (and/or rising), and haircuts and margins are low. *Market liquidity* is high when it is easy to raise money by selling one's assets at reasonable prices. Conversely, market liquidity is low when selling the asset depresses the sale price considerably. When market liquidity is low, it is very costly to shrink a firm's balance sheet.

From the point of view of a bank, both forms of liquidity are influenced by the financial soundness of other financial institutions. Furthermore, they can mutually reinforcing through (i) liquidity spirals, (ii) hoarding of funds, (iii) runs on financial institutions and (iv) network effects via counterparty credit risk.

Liquidity Spirals

A funding shock can trigger two distinct liquidity spirals: the loss spiral and the margin spiral. The loss spiral is due to asset price effects. If many financial institutions suffer a similar funding shock, all of them have to cut back on their positions. This depresses the price level of the assets, leading to a further erosion of wealth, which forces financial institutions to cut back on their positions even further. Overall, a leveraged institution that suffered a mark-to-market loss of $x has to reduce its position by $x times its leverage ratio. Note that if financial institutions can defer losses and do not have to mark-to-market, the loss spiral is much less powerful.

The *margin/haircut spiral* reinforces the loss spiral as it forces the financial institution to reduce its leverage ratio on top of the effect of the loss spiral, the latter of which arises even if leverage is to be held constant. Margins and haircuts implicitly determine the maximum leverage a financial institution can adopt. Margins/haircuts spike in times of large price drops and thereby lead to a general tightening of lending. Brunnermeier and Pedersen (2009) – see Figure 1 – show that a vicious cycle emerges, where higher margins and haircuts force de-leveraging and more sales, which increase margins further and force more sales, leading to the possibility of multiple equilibria. As asset prices drop, risk measures like Value-at-Risk increase, not only lead to higher margins and higher external funding costs, but also reduce risk appetite within banks. Risk managers step on the brakes and force traders to de-lever their positions.

Reduced Positions

Initial Losses e.g. credit → Funding Problems

Prices Move Away from Fundamentals

Higher Margins

Losses on Existing Positions

Figure 1: Loss and margin/haircut spiral that arise due to leverage and maturity mismatch.

Source: Brunnermeier and Pedersen (2009)

The spirals are most pronounced in a financial system in which banks obtain their funding through markets instead of deposits. But even for traditional deposit-taking banks, their marginal source of funding has been the capital markets, for example through repurchase agreements or commercial paper.

Allowing financial institutions to hide losses by not forcing them to mark-to-market is not necessarily a solution: it introduces more information asymmetries and makes the margin/haircut spiral worse. Hence, while mark-to-market exacerbates the loss spiral, it leads to more transparency and hence reduces the adverse impact of the margin spiral.

Margin/Haircut Spiral and Procyclicality. These liquidity spirals are the underlying cause of procyclicality. As asset prices drop, losses mount and margins/haircuts increase.

So far I have not explained why a drop in asset prices leads to higher margins and haircuts, as well as a more cautious attitude towards lending. There are at least three reasons: (i) backward-looking risk measures, (ii) time-varying volatility, and (iii) adverse selection.

Margins, haircuts and banks' internal risk tolerance are typically based on risk measures such as Value-at-Risk (VaR). Typically these risk measures are estimated using historical data. Hence, a sharp temporary price drop leads to a sharp increase in the estimates of these risk measures. This leads to an increase in margins/haircuts, constrains investors, and may force them to sell off their assets. Paradoxically, the forced fire sale might justify the sharp increase in the risk-measure ex-post. In a boom phase volatility and default estimates are low. As a consequence, margins will be low, which allows higher leverage and supports the expansionary phase. When the first adverse shocks hit, the volatility estimates shoot up, leading to a deleveraging process described by the margin spiral. In short, if the objective of individual institutions is to maintain return on equity, or value at risk, leverage will be procyclical.

Second, the volatility of a price process can vary over time. A sharp price decline may signal that we are about to enter more volatile times. Consequently, margins and haircuts should be larger and lending should be reduced after such a price decline. An extreme example was the situation in August 2007, when the asset-backed commercial paper market dried up completely within a few hours. Prior to the crisis, asset-backed commercial paper was almost risk-free because of overcollateralization – i.e. the initial losses would be borne by the lower tranches. However, in August 2007, the overcollateralization cushion evaporated, making such assets much more risky. Consequently, investors were unwilling to let structured investment vehicles roll over their debt.

The third reason why margins increase when prices drop is the emergence of frictions due to asymmetric-information. As losses mount, debt becomes more risky and hence more "information sensitive" (a point first stressed in Gorton and Pennacchi (1990)).[2] Figure 2 illustrates this point. The hockey stick depict the payoff of a debt contract as a function of firm's cash flow. If the cash flow is sufficiently high, the face value of the debt is paid off in full. The bell-shaped curves depict two different probability distributions of the cash flow. For example, if the cash flow is distributed as depicted by the solid blue curve, the debt holder does not care much about the exact cash flow of the firm. However, after the firm faces a negative shock, the cash flow shifts towards the left (as depicted by the dashed

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[2] Beng Holmström drew the connection to the current crisis.

black curve), each debt holder is eager to collect information. Suddenly asymmetric information problems emerge which can lead to market break-downs.

Figure 2: As the cash flow distribution shifts towards the left,

debt payoff becomes more sensitive to information.

On top of it, financiers become more careful about whether to accept a pool of assets as collateral since they fear receiving a particularly bad selection of assets. They might, for example, be worried that structured investment vehicles have already sold the good, "sellable" assets and left as collateral only the bad, less valuable, "lemons."

Fire-sale externality. Why do financial institutions overexpose themselves to the risk of getting caught in a liquidity spiral by holding highly levered positions with excessive maturity-mismatches? The reason is a fire-sale externality, i.e. a situation in which the institution does not bear the full cost of its own actions. It arises since each individual financial institution does not have an incentive to take into account the price impact its own fire-sales will have on asset prices in a possible future liquidity crunch. Hence, fire sales by some institution spill over, and adversely affect the balance sheets of others, which constitutes a negative externality. This was first pointed out in Stiglitz (1982) and Geanakoplos and Polemarchakis (1986). The fire-sale externality is arguably the main rationale for bank regulation.

Hoarding and Maturity Rat Race

The second amplification mechanism is due to precautionary hoarding. It arises if potential lenders are afraid that they might suffer from shocks in the near future, when they will need funds for their own projects and trading strategies. Precautionary hoarding therefore increases when a) the likelihood of such shocks increases, and b) outside funds are expected to be difficult to obtain (see e.g. Holmström and Tirole, 1997, 1998). Financial institutions either refuse to lend at all or lend only at very short

maturity. Since lending at a shorter maturity grants one de-facto seniority over other lenders, a maturity rat race can emerge where all lenders only lend very short-term (see Brunnermeier and Oehmke, 2009).

The troubles in the interbank lending market in 2007-8 are a textbook example of precautionary hoarding by individual banks. As it became apparent that conduits, structured investment vehicles, and other off-balance-sheet vehicles would likely draw on credit lines extended by their sponsoring bank, each bank's uncertainty about its own funding needs skyrocketed. At the same time, it became more uncertain whether banks could tap into the interbank market after a potential interim shock, since it was not known to what extent other banks faced similar problems. These effects led to sharp spikes in the (3 months) interbank market interest rate, LIBOR, relative to the Treasury bill interest rate.

Runs

Runs on financial institutions constitute another mechanism that amplifies an initial shock. In a classic bank every investor has an incentive to preempt others and run to the bank. A first-mover advantage triggers a dynamic preemption motive.

Deposit insurance has made classic bank runs almost obsolete, but runs can occur on other financial institutions and especially to the shadow banking system. Not rolling over commercial paper is, in effect, a run on the issuer of asset-backed commercial paper. Bear Stearns essentially experienced a bank run in March 2008 when hedge funds, which typically park a sizable amount of liquid wealth with their prime brokers, pulled out those funds. In September 2008, AIG faced a "margin run" as explained in Gorton (2008). Several counterparties requested additional collateral from AIG for its credit default swap positions. These requests would have brought the firm down if the Fed had not injected additional funds.

Such runs can lead to socially inefficient outcomes, since the agent withdrawing his funds does not take into account that this causes negative externalities on others who withdraw with a delay.

Network Effects: Counterparty Credit Risk – Interconnectedness Externality

Most financial institutions are lenders and borrowers at the same time. Modern financial architecture consists of an interwoven network of financial obligations. For example, new credit derivatives like

credit default swaps made financial institutions very interconnected. One main problem with these instruments is that each financial institution knows its own financial, but has only a vague idea what financial obligations its counterparties have. The obligations of its counterparties' counterparties are even more difficult to estimate. Consequently, nobody has a good idea what effects the default of a particular institution would have as it ripples through the financial system. This lack of information significantly increases uncertainty and counterparty credit risk.

The problem is exacerbated because most of these credit derivatives are traded over-the-counter. If all credit derivatives were traded via a clearing house, exposures could be netted out and the clearing house would know the exposure of each financial player.

When signing a bilateral credit derivative contract, each individual institution does not take into account that it introduces additional risk to its counterparties. Indeed, the more interconnected a financial institution is, the more difficult it is for a regulator to predict the repercussions of the bank's default on the financial system. This makes it more likely that this institution will be bailed out by the government, which involves a wealth transfer from tax payers to bank's debt and equity holders. Hence, each institution has the perverse incentive to become as interconnected as possible in the most opaque way.

Endogeneity of Liquidity - Micro-prudent versus Macro-prudent Behavior

Finally, it is very important to note that liquidity is endogenous and that one bank's micro-prudent behavior to cut back its funding to others hurts other banks and hence might not be macro-prudent. This can most easily be seen in the following example, depicted in Figure 2: if bank 1 sheds assets and cuts back on its lending to bank 2, it shrinks its leverage ratio but worsens the balance sheet of bank 2. Consequently, bank 2 is forced to shed assets and cut back its lending to bank 3 and similarly bank 3 has to cut its lending to bank 1.

Figure 2: Three interconnected banks

The argument resembles Keynes' paradox of thrift. Formally, many of the above-described mechanisms can lead to multiple equilibria: one with low funding liquidity levels and one with high funding liquidity (e.g. in Brunnermeier and Pedersen, 2009). Once the economy falls into the low funding liquidity equilibrium, it is not easy to return to the "good" equilibrium since it is difficult to coordinate all investors' beliefs and ensure that trust and confidence return to the credit markets.[3]

2) Crisis Prevention

The mechanisms outlined above help to design a financial architecture that is less prone to periodic financial crisis. Any regulatory intervention built on sound economic principals is justified, if it (i) constrains distortionary effects due to monopoly power, (ii) protects the essential needs of ordinary people when information is costly to acquire (e.g. prevent fraud), or (iii) internalizes significant externalities. In this section I outline some specific measures that internalize externalities and hence should be reflected in a new financial architecture. This is in sharp contrast to the current regulatory framework which does not focus on externalities and, ironically, even provides an incentive for financial institutions to become "too big to fail" and "too interconnected to fail," since the larger an institution, and the more interconnected it is, the higher the probability that a financial institution will be bailed out in times of crisis. For a more detailed discussion about policy measures I refer again to Brunnermeier et al (2009).

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[3] While most economist favor models with a unique equilibrium in order to make clear predictions, I think that models with multiple equilibria provide important insights for studying financial crises.

Macro-Prudential Regulation – Focus on Systemic Risk Contribution

During times of financial crisis, losses tend to spread across financial institutions, threatening the financial system as a whole. Future regulation should provide incentives for financial institutions to reduce risk concentrations that lead to contagion. It is therefore imperative to focus on the risk spillovers (externalities) an institution creates or is correlated with, rather than the risk of an individual bank in isolation. A financial institution's contribution to systemic risk can be large either if it (i) causes financial difficulties at other institutions or if it is (ii) correlated with financial difficulties among other financial institutions. New measures of systemic financial risk need to be developed that ideally encompass both channels.

This is in sharp contrast to existing regulation that focuses primarily on the risk of an individual financial institution in isolation. The Basel II regulation is based on Value at Risk (VaR), the most commonly used risk measure, which only captures an individual's bank risk in isolation. Regulation based on VaR reduces likelihood of the failure of an individual bank, irrespective of whether this bank causes, or is correlated with, distress in other financial institutions. VaR may be useful for micro-prudential regulation whose main objective is investor protection (against fraud). However, such measures are not effective measures against systemic risk.

One risk measure that focuses on the contribution of a financial institution to systemic risk is CoVaR (as suggested in Adrian and Brunnermeier (2009)). The CoVaR of an institution is defined as the Value-at-Risk (VaR) of the financial sector conditional on this institution being in distress. The percentage difference between the usual VaR and the CoVaR captures the degree to which a particular institution contributes (or is correlated with) to the overall systemic risk. Such a systemic "co-risk measure" should

a) determine financial institutions that should be subject to macro-prudential regulation, and
b) affect the degree to which regulatory constraints bite.

In Brunnermeier et al. (2009) we propose to assign all financial institutions to one of four categories:

Institution	Examples	macro-prudential	micro-prudential
"individually systemic"	Large and interconnected banks and insurance companies that cause risk spillovers	yes	yes
"systemic as part of a herd"	Leveraged hedge funds, whose correlated may concern systemic risk	yes	no
non-systemic large	Pension funds and insurance companies that are not highly levered	no	yes
"tinies"	unlevered	no	no

Table 1: Classification of financial institutions based on their systemic risk contribution

Regulatory Charges: Capital Charges, Pigovian Taxes, Compulsory Insurance

Financial institutions that are subject to macro-prudential regulation have to be constrained in their activities. Ideally, one would like to provide an incentive structure that internalizes all externalities outlined in Section 1. The larger a financial institution's contribution to financial risk is the larger should be the capital charge, Pigovian tax, or compulsory insurance premium. Each incentive scheme has its advantages and disadvantages:

Caps: Current regulation focuses to a large extent on capital charges and hence limits (caps) the extent to which banks can leverage up and extend their business activities. Absolute caps limit the total amount of leverage, but they might stifle competition among the banking sector.

Pigovian taxes: Pigovian taxes increase with a bank's CoVaR and other systemic co-risk measures. The advantage of such a tax system is that it generates a revenue stream for the government. This revenue stream compensates the tax payer for bailing out the financial sector whenever a crisis occurs. Note that the government is the natural insurance provider against systemic risk, since investors' flight to quality makes it cheap for the government to issue debt in times of crisis. Also, unlike a capital charge system, a Pigovian tax system does not hinder competition among banks, but might be less effective in achieving a total maximum leverage ratio than capital requirements.

Compulsory private insurance scheme: A well-designed private insurance scheme whose insurance premium is based on a financial institution's contribution systemic risk (as e.g. measured by its CoVaR and other inputs) would work similar to a Pigovian tax. However, the regulators have to ensure that the insurance scheme is properly administrated and a sufficiently large amount of capital is set aside and invested in safe government bonds.

Liquidity Regulation

The reliance on short-term funding of long-term assets with potentially very low market liquidity has been the main source of financial fragility. While current regulation focuses primarily on the assets' quality, systemic risk has as much to do with how assets are funded. If two institutions have the same asset, but one funds them with long-term debt and the other by borrowing overnight from the money market, the implications for systemic risk are substantially different. Consequently, any future regulation, be it a capital charge, Pigovian tax, or private insurance scheme, should provide an incentive for long-term funding in order to minimize the asset-liability maturity mismatch. The rationale for this regulatory element is the fire-sale externality outlined in Section 1: each individual institution chooses a socially excessive maturity mismatch because it does not take into account the fact that it will be forced to sell its assets at fire-sale prices if it is unable to roll over its short-term debt during a crisis, and thus imposes a negative externality on others.

On top of a regulatory incentive, our Geneva report (Brunnermeier et al., 2009) proposes a new accounting rule, mark-to-funding. It gives financial institutions an additional incentive to reduce their asset-liability maturity mismatch. The idea of mark-to-funding is that an investor who has secured the funding of say, a two-year asset with six months debt, he should be allowed to value the assets with the expected price of the asset in six months time. An investor with funding secured for another six months

should not need to worry about price volatility within the next six months. In contrast, an investor who holds the same asset, but relies on overnight borrowing, should be forced to mark-to-market his position on a daily basis. We propose that banks be forced to publish two balance sheets: one mark-to-funding balance sheet on which the regulatory charges are based on and one mark-to-market balance sheet. The latter ensures that all positions are valued in a transparent way. We would eliminate hold-to-maturity accounts and the vagaries associated with it, as assets are shifted from the trading book to the loan book.

Countercyclicality

All regulation restrictions should be countercyclical, i.e. they should be most stringent in times of credit booms. They have to counteract the margin/haircut spiral which causes higher leverage in times of booms and deleveraging in times of crisis.

Furthermore, most financial crises are preceded by asset price and credit bubbles. Financial regulation should be particularly vigilant for bubbles whose bursting might adversely affect the financial intermediation sector. While the bursting of the technology bubble in the early 2000s caused a lot of localized disruptions, it bears no comparison to the turmoil that the bursting of the credit and housing bubble has caused. The big difference between them was that the technology bubble did not severely damage the lending sector. It is important to determine whether a funding and credit expansion at a time is sustainable or may be subject to sudden reversal, with detrimental consequences for the economy. Variables regulators should be vigilant about are credit growth, credit spreads, haircuts, margins, and loan-to-value ratios. It is important that regulation leans against credit bubbles early.

In Brunnermeier et al. (2009) we also propose a laddered response structure to ensure a prompt and early intervention before things get out of hand. One of the first steps is to freeze dividend payments for institutions that are in trouble. Furthermore, an incentive structure has to be put in place that ensures that regulators are forceful in implementing these policies and withstand lobbying efforts from banking industry and politicians.

3) Crisis Management

History suggests that financial crises can be abated but never fully prevented. Once in a crisis, crisis management comes to the forefront. The primary objective should be to minimize the adverse impact on the real economy, i.e. secure efficient lending. In a financial crisis, banks often do not have sufficient equity to engage in lending activities. In addition, it is often impossible for banks to raise additional private capital without government support since

a) troubled financial institutions typically suffer from **debt overhang problems**, Myers (1977). That is, investors refuse to inject additional equity, since it primarily benefits existing debt holders rather than the new investors. This is especially acute if the face value of debt exceeds the bank's asset value.

b) low equity levels make new debt funding very **informationally sensitive** (as illustrated in Figure 2 above). Emerging asymmetric information problems hinder an injection of new funds.

As a consequence, crisis management typically necessitates some form of recapitalization or restructuring of the banking sector by the government. The recapitalization of a leveraged sector such as banks can be done at the expense of (i) debt holders and/or (ii) tax payers. This distinction is important as it involves large wealth transfers. The goal is to eliminate financing frictions by reducing asymmetric information problems. Any recapitalization at the expense of debt holders is limited by the fact that one cannot wipe out short-term funding from the money market or demand deposits since this would induce a run on the banks. Favoring short-term debt, however, might lead to long-run adverse effects, where banks fund themselves on a more short-term basis, increasing their maturity mismatch.

In addition, successful policy should bring confidence and trust back to the market place. Translated to economists' language, in a setting with multiple equilibria, policy intervention should coordinate investors' beliefs such that the "good" equilibrium with an active lending market is reinstalled.

Debt-equity Swap Provision

Swapping long-term debt for equity has the advantage that it recapitalizes the bank at the expense of the debt holder and hence does not involve a large wealth transfer from tax payers. Ideally in the future, law should contain a provision that allows forced conversations in pre-specified circumstances, e.g. when it is in public interest. More specifically, a debt-equity swap should only be invoked if the financial sector is in a systemic crisis. Otherwise, there is the danger that this provision be abused and inefficient banks, which should be liquidated, are rescued. Debt-equity swap provisions for particular debt classes

have the disadvantage that in the long-run investors steer away from these types of debt funding and opt for more short-term debt funding, exacerbating the maturity mismatch problem.

Nationalization via Prompt Corrective Action

An alternative way to let the debt holders participate in the recapitalization is to induce a controlled bankruptcy through prompt corrective action that ultimately leads to a forced merger of the troubled banks with a government entity. This is essentially a nationalization of the bank, which ensures that (junior) debt holders pay their part. Any nationalization should be followed by re-privatization of the good bank, while "toxic" assets are held in a bad bank for a while.

Partial Nationalization via Public Equity Injection

This approach requires large sums of funds, and debt holders of banks with a debt-overhang problem are the primary beneficiaries. As the government injects equity, the value of the debt increases. Overall, this approach involves large wealth transfers from tax payers to banks' debt and equity holders. Also, since the government takes on a majority stake in banks, banks are subject to political pressure in their lending decisions. It is questionable whether public equity injections necessarily reignites lending, since remaining private equity holders will try to delever banks in order to pay out the government as quickly as possible.

Tender offer by Government to Buy Debt at Current Market Price

To avoid the tax payers subsidizing current debt holders, the government could try to buy up the debt at the current market price. Importantly, to induce current debt holders to sell their bonds, the government has to commit to let the bank go bankrupt, if it fails to buy the debt at the current price. If legally possible, this combined with a subsequent equity infusion would be an efficient way to resolve the undercapitalization problem.

Purchase of Toxic Asset Bundles

The purchase of toxic assets leads to recapitalization of banks only if the government pays an artificially high price. Like an equity injection, it involves a wealth transfer from tax payers to bank's debt and equity holders. However, it provides less "bang for the buck" than a $ x equity injection, since the banks receive $ x dollars in exchange for toxic assets, which presumably still have some value.

If the purchase involves public and private capital, then price discovery might help to value these assets at reasonable prices. Importantly, these assets should only be sold in big bundles (the whole portfolio of a bank) since otherwise banks have an incentive to cherry pick and to sell off bad assets and keep good

assets. Banks' cherry picking would lead to a lemons' problem and hence would rule out a private co-investment scheme. No private investors would participate. Compared to equity injections such a scheme terminates automatically when the underlying assets mature.

Guaranteeing a Floor for Asset Bundles

To stimulate trading of assets, the government can guarantee a minimum price for assets (for a limited amount of time). The hope is that by putting a floor on asset values, many of these assets would change hands and price discovery for toxic assets would start. To avoid cherry picking and lemons problems, only portfolio of assets should be guaranteed.

Non-recourse loans are one way to offer a floor on asset values. If the price of the asset falls below its collateral value, the borrower of funds can simply give up its collateral without being forced to repay his loan. Using non-recourse finances for newly issued securities that are backed by new mortgages and loans can help to stimulate lending to end users and seems to be an attractive option.

Propping up House Prices via Mortgage Subsidies

In addition to introducing refinancing schemes to minimize the number of home foreclosures, the government can try to lower mortgage rates and thereby push up house prices. This can be done by allowing the central bank to directly buy long-dated securitized mortgage products or accept them as collateral for non-recourse loans. However, there is the danger that artificially high house prices lead to other distorting effects, especially in areas in which higher demand is met with additional construction activity.

There are numerous other schemes that are debated. It is ingenuity of our imagination combined with careful economic analysis that will help us overcome the current financial crisis.

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