The figure of 500 billion dollars in losses is too low to explain why the global financial system, with bank assets of 80 to 90 trillion dollars, was dragged into the abyss. Back in 1990, the losses incurred by the US savings and loan associations were said to amount to some 600 to 800 billion dollars. In the Japanese banking crisis of the 1990s, the banks’ actual losses amounted to more than 500 billion dollars. In neither case did the crisis have any repercussions for the global financial system as a whole.

At the same time, the figure is too high to be explained by lowered expectations of debt service on sub-prime mortgages. As of October 2008, the IMF estimated the total volume of non-prime mortgages at some 1,100 billion dollars.

The architecture of the international financial system is fundamentally flawed

Losses of 500 billion would imply a loss rate of 45 percent. If borrowers initially had, on average, 5 percent equity in their homes, a loss rate of 45 percent on the mortgage would imply a loss rate of 50 percent on the value of the underlying real estate. Between mid-2006 and mid-2008, however, real estate prices in the United States dropped only 19 percent on average, with the worst hit metropolitan areas recording a 33 percent decline.

Admittedly, this back-of-the-envelope calculation is over-simplified, but the main point is that the IMF’s loss estimates refer to market prices of mortgage-backed securities, not to the debt service on the underlying mortgages. The two are not the same and, as the IMF points out, there are good reasons to believe that market values are significantly below present values of expected returns on the underlying mortgages, either from the borrowers’ debt service or from foreclosure proceeds. The fact that market values are too low is due to systemic interdependence. The financial crisis is thus not just a matter of subprime mortgages and gambling bankers. The crisis is also due to some fundamental flaws in the architecture of the international financial system. Indeed, many devices that were supposed to serve as fire extinguishers have in fact worked as fire enhancers, adding yet more fuel to the flames. Part of the blame for this must be given to statutory regulation. In principle, it is a good idea to shift some of the risks of real estate finance to third parties. Problems in real estate markets have always been among the most important causes of financial crises, as was the case in the banking crises of the late 1980s and early 1990s. Real estate finance is problematic because, in terms of economic aggregates, the values involved are high relative to the overall wealth of the economy. Moreover, the economic lifespan of a typical real estate investment extends far beyond the time horizon that the typical saver envisages for his investments.

The discrepancy between the economic lifespan of a real estate investment and the time horizon of the typical saver is a major source of risk. If a real estate investment is financed by short-term loans, the borrower faces the risk that, when these loans come due, he may be unable to refinance the property. If the investment is financed by long-term loans, the financier faces the risk that, if he wants to liquidate his holding prematurely, he may not be able to do so, or the price may be quite low.

Experience has shown that neither the banks nor the mortgage borrowers are well suited to bear these risks. Around 1980, for instance, when refinancing rates had risen to over 15 percent, many savings institutions in the United States were technically insolvent because...
Downward spiral: For many Americans unable to repay their loans, the dream of home ownership has become a nightmare. The problems with private real estate financing triggered a global financial crisis. The origins lay in the architecture of international finance.
the 6 percent they earned on the 40-year fixed-rate mortgages they had issued in the 1960s were far below their refinancing costs. This insolvency was the ultimate cause of the US savings and loan crisis of the 1980s. Much of the interest rate risk of mortgage financing was subsequently passed on to debtors by means of adjustable-rate clauses. However, when market interest rates rose to another high in the late 1980s, many borrowers were unable to cope with the ensuing rate adjustments and defaulted on their debts; the banks that foreclosed on the mortgages then found that, with interest rates high, property values were relatively low.

The securitization of mortgages provides a means to pass risk on to third parties. This makes sense if these third parties are better able to bear the risk. For risks arising from the longevity of real estate finance, this is actually the case: these risks are better placed with life insurers or pension funds because the liabilities of these institutions also have very long-term horizons.

Many borrowers could not cope and defaulted on their mortgage debts.

In principle, it is also a good idea to use the typical securitization procedures of packaging and tranching. If one puts a large number of individual mortgages into a package, the returns on the package do not depend very much on the specific characteristics of any one mortgage. The resulting standardization contributes to making the mortgage-(package-)backed securities tradable. If one divides the returns on such a package into different pieces by issuing different kinds of debt with different priorities against this package, then, ordinarily, the default risk on the senior debt will be low. Selling this debt to a third party will thus not have much of an effect on the issuer’s incentives to assess the credit risks of the underlying mortgages. In contrast, the owner of the so-called equity tranche – that is, the residual returns that are left after all debt has been serviced – is very much affected by the incidence of credit risk on the underlying mortgages and thus has a strong incentive to assess this risk beforehand. If the equity tranche is retained by the initiating mortgage bank, this bank will put a lot of effort into assessing the mortgage borrower’s creditworthiness. This corresponds to the construction of the German Pfandbrief, where the initiating bank is fully liable for the debt it issues, and bears all the credit risk in its mortgage lending. Alternatively, if the bank that performs the securitization takes on the liability for the credit risk of the underlying mortgages, this bank at least has an incentive to impose some quality standards for the mortgages it accepts, and thus to impose some discipline on the initiating mortgage banks.

When mortgage securitization was introduced in the United States, there was no provision to make the mortgage banks liable for credit risks in their mortgage lending. In the beginning, this omission had no further consequences. Fannie Mae and Freddie Mac, the government-sponsored mortgage banks that first introduced large-scale mortgage securitization, provided guarantees for the debt service on the mortgages they securitized. At the same time, they imposed a minimum standard for the quality of the mortgages they would accept for securitization. The term prime mortgages describes mortgages that meet this standard.

After 2000, however, New York investment banks moved aggressively into mortgage securitization. Unlike Fannie Mae and Freddie Mac, these banks did not provide any guarantees for the debt service on the mortgages they securitized. Moreover, they focused on mortgages that did not meet the quality standards of Fannie Mae and Freddie Mac – the so-called subprime mortgages. No attention was paid to the incentive implications of the fact that, now, neither the mortgage banks nor the securitizing institutions bore any liability for the credit risk of the underlying mortgages. The investment bankers seem to have known all about market risks and nothing about credit risks.

Subprime mortgage lending and securitization grew rapidly in importance. By 2006, these mortgages accounted for more than 40 percent of new mortgage lending (2000: 9 percent) and 14 percent of the overall stock of outstanding mortgages (2000: 7 percent). Their quality declined steadily. Up to 2006, however, the quality deterioration was masked by the rise in property prices. These prices grew about 9 percent per year from 1999 to 2003, and about 15 percent per year from 2003 to 2005. The leap from 9 to 15 percent in 2003 coincided with a massive expansion of private investment bank activity in mortgage securitization.

The expansion was fuelled by expansionary monetary policy. In the years from 2002 to 2004, money market interest rates in the US were between 1 and 2 percent, compared with 6 percent in 2000 and 4 percent in 2001. Long-term interest rates on government securities dropped from 6 percent in 2000 to just over 4 percent in 2003 to 2005, and interest rates on fixed-rate prime mortgages from 8 percent in 2000 to just under 6 percent in 2003 to 2005. The difference between this mortgage rate and the money market rate thus actually rose from 2 percentage points in 2000 to 4 percent between 2003 and 2004.

Investors buying the mortgage-backed securities do not seem to have exerted any “market discipline” that might have compensated for the lack of liability on the side of the mortgage-initiating and mortgage-securitiz-
ing institutions. Whereas the quality of mortgage debt-
or was steadily going down, risk premiums for fixed-
rate subprime mortgages dropped from 3 percent in
2001 to 1 percent in 2004. In contrast, there was no
such change in the risk premiums for corporate bonds
in these years. Investors in mortgage-backed securities
seem to have focused on yields without paying much
attention to risks. Among these investors, three groups
are noteworthy:

First, hedge funds and investment banks bought the
equity tranches; the fact that, for incentive reasons,
mortgage initiating and mortgage securitizing banks
should have retained these tranches was ignored. Sec-
ond, other investment banks bought subordinate debt,
the so-called mezzanine tranches, and securitized them
again by forming packages and issuing different debt in-
struments against these packages. Finally, so-called con-
duits and special-investment vehicles (SIVs) created by
European and American banks bought all sorts of mort-
gage-backed securities, refinancing themselves by issu-
ing asset-backed commercial paper, or very short-term
securities; these vehicles had practically no equity.

Investors seem to have paid attention only to yields,
ignoring issues of risk as well as incentives. They relied
on the rating agencies’ assessments – without question-
ing whether a “AAA” rating on one security could real-
ly mean the same thing as a AAA rating on another
when the interest rate was significantly higher for the
first security than for the second.

But the assessments of the rating agencies were se-
riously flawed. These agencies exaggerated the effects
of diversification across securities, neglecting correla-
tions arising from the dependence of different risks on
common underlying factors such as movements in
market rates of interest or movements in real estate
prices. They also seem to have believed that real estate
prices could only go up, and that credit risk on the un-
derlying mortgages was thus negligible. They failed to
appreciate that at least some of the observed increas-
es in real estate prices were due to one-time changes
in the environment that would not be repeated, such
as the decline of interest rates from 2000 to 2003, or
the influx of funds into mortgage finance that was
caused by the innovation of subprime mortgage securi-
ritization.

In 2005, monetary policy became more restrictive,
and by 2006, short-term interest rates had gone up to
5 percent again. In mid-2006, real estate prices began
to fall and the problems of subprime mortgages came
out into the open. In April 2007, these problems were
fully understood – and clearly explained in the IMF’s
GLOBAL FINANCIAL STABILITY REPORT. Remarkably, howev-
er, this analysis by the IMF concluded with the assess-
ment that there was only a small probability of the
subprime mortgage crisis spilling over and upsetting
the rest of the financial system.

Precisely such a spillover came in August 2007: The
rating agencies downgraded mortgage-backed securi-
ties, some by as much as three grades at once. This
created a fall in the market prices of these securities. The
conduits and SIVs that held such securities had no equ-
ity to buffer their losses and became de facto insol-
vent. Financing for these companies from the money
market collapsed and they had to call on the sponsor-
ning banks to make good on the promises of liquidity
assistance that they had previously given. Some of the
sponsoring banks were unable to meet these demands
and became insolvent themselves. On the whole, the
liquidity assistance from sponsoring banks was not suf-
ficient to fully replace the vanished financing from the
money markets.

Malfunctioning markets

There were thus two shocks that markets had to ab-
sorb: first, the drastic downgrading of mortgage-
backed securities by the rating agencies, and second,
the sudden breakdown of the mechanisms by which
SIVs had financed their holdings of mortgage-backed
securities. The importance of these “shadow banks,"
on the order of 1,000 billion dollars, took everybody
by surprise.

These two shocks triggered a downward spiral of the
financial system that went unchecked until October
2008. This downward spiral is characterized by the in-
teraction of the following elements: First, many mar-
kets were not functioning properly. Asset prices fell
dramatically but, even so, there were few buyers. Many
investors feel vulnerable with respect to their own fi-
nancing and do not want to enter into new commit-
ments; many investors expect prices to fall even fur-
ther, and many also fear that, in terms of the selection
of assets offered for sale, they may be taken advantage
of by the sellers.

Second, under fair value accounting for market
risks, the banks are obliged to immediately adjust the
values at which they carry these securities on their bal-
ance sheets. The resulting write-offs diminish the
banks’ equity.

Third, most banks had virtually no equity capital in
excess of regulatory requirements. In order not to fall
afoul of regulatory requirements, they had to react im-
mediately to the write-offs, either by raising new capi-
tal or by selling assets. Raising new equity is difficult in
a crisis. Selling assets, however – deleveraging – puts ad-
ditional downward pressure on market prices.
Beyond the lack of “free” equity capital, many banks in fact had very little equity capital at all, and the write-offs that they had to take soon raised questions about their solvency. Under the so-called model-based approach to capital regulation, the required capital of a bank is determined on the basis of the bank’s own quantitative risk model. The banks used this regulatory scheme to “economize” on equity – more precisely, to expand the activities supported by the equity they had. At UBS for example, before the crisis, equity accounted for 2.5 percent of the balance sheet total, or 40 billion out of 1,600 billion Swiss francs. The bank’s losses on mortgage-backed securities have been substantially higher. If it hadn’t received new equity capital from the Government of Singapore Investment Corporation and the Swiss Confederation, UBS would long since have been declared insolvent.

As doubts about solvency grew, banks became less and less willing to lend to each other, and interbank markets ceased to function properly. This created additional problems for US investment banks that had been accustomed to financing themselves through short-term money-market instruments that had to be continually rolled over. For Bear Stearns, this method of financing dried up in March 2008. Lehman Brothers suffered a similar fate in September.

Doubts about solvency made banks less and less willing to lend to one another

To alleviate doubts about their solvency, many banks tried to improve their equity positions – by deleveraging. Fears about their ability to refinance thus had a similar effect as capital regulation, inducing banks to sell assets in order to maintain their equity ratios. Fourth, deleveraging added to the downward pressure on market prices of securities. The resulting price declines forced further write-offs and further deleveraging from other banks, with yet further repercussions for prices and write-offs. This downward spiral characterized developments from August 2007 to September 2008. On several occasions, liquidity injections by central banks relieved acute crises. These injections, however, could not actually stop the downward spiral. At last, with the insolvency of Lehman Brothers in September 2008, the financial system imploded altogether and was kept working only by government subsidies and guarantees. These interventions seem to have stopped the downward spiral, at least for the time being.

As yet, it is impossible to say what comes next. The real economy turned down only in the last quarter of 2008. This downturn will impair the debt service of nonfinancial firms to the banks, which will further damage the banks. If this induces another round of deleveraging, there is a risk of a new downward spiral, this time in the interaction between the banks and the real economy.

The questions raised at the beginning of this article regarding the estimated 500 billion dollar losses on securitized subprime mortgages can now be answered: declines in securities prices were higher than the declines in present values of expected returns because securities markets were not functioning well. The effects on the financial system were greater than in other crises because the interaction of price declines, fair value accounting, lack of equity, and deleveraging acted as fire enhancers.

In thinking about causes and responsibility, one must distinguish between misbehavior and flaws in the system. Misbehavior is a behavior that ultimately works against the person or institution in question. Flaws in the system are flaws in the rules and institutions that govern individual behavior such that, if individuals abide by the rules – while pursuing their own self-interests, the results are detrimental for the institutions involved, or even for the financial system as a whole. For flaws in the system, the question of who is responsible is of a different character than for individual misbehavior.

Individual misbehavior: Investment bankers were so focused on sales growth and market shares in mortgage securitization that they neglected the risks of this business. Investors of all sorts were so focused on yields that they neglected the risks that come with higher yields. Large banks combined an active stance in mortgage securitization with holdings of mortgage-backed securities on their own account without analyzing the risks that this combination implied. The rating agencies likewise had no adequate model of the relevant risks.

Another form of misbehavior involved the excessive practice of “borrowing short to lend long,” by the SIVs of the German state banks (Landesbanken), as well as US investment banks, without concern for refinancing risks. Monetary policy induced short-term interest rates to be very low and yield curves to be very steep in the years 2002 to 2004, and thus made the practice of “borrowing short to lend long” even more tempting than usual.

Flaws in the system: The fact that banks involved in initiating or securitizing mortgages bore no liability for the credit risk of these mortgages was a major reason for the drastic deterioration in the quality of mortgage borrowers. The effect was reinforced by a lack of quality control from yield-hungry buyers. European invest-
ment banks keen on securitizing mezzanine tranches created an uncritical demand for these securities – though, economically, such further rounds of securitization served no useful purpose.

German public banks had no sustainable business model and were “gambling for survival” – without any regulatory intervention. Like US investment banks, the conduits and SIVs of these institutions were outside the domain of statutory supervision, so no one had any idea of the magnitude of their overall commitments and of the extent of maturity transformation they had engaged in. At private banks, both internal and external risk management and control systems failed: Internally, there was a failure of risk control over investment banking. Externally, there was a failure of market discipline by shareholders, analysts and the media, all of whom paid more attention to returns than to risks. Yet a 25 percent rate of return on equity, taken as a benchmark in banking, must involve a risk premium, most likely reflecting the risks stemming from the bank’s being undercapitalized.

Bank risk management was based on the assumption that, through their quantitative risk models and stress tests, they had all important risks under control. Some risks, however, cannot be adequately captured by such models. Thus, it is practically impossible to obtain reliable estimates of correlations between the credit risks on different mortgages and different mortgage-backed securities, or of the correlations between the counterparty risks in a hedge and the underlying risk against which the hedge is taken – or of the risks of systemic repercussions emanating from the maturity transformation of conduits and SIVs.

The accusation that too little account was taken of the inadequacies of quantitative risk models can also be leveled against the supervisory authorities. Since 1996, their rules have permitted banks to determine their capital requirements for certain risks exclusively on the basis of risk models. This is why some banks were able to expand their operations so that their balance sheets totaled 30, 40, or even 60 times their equity. “Ten percent core capital” doesn’t mean 10 percent of the balance sheet total, it means 10 percent of risk-weighted assets, with risks based on the bank’s risk model.

The model-based approach to capital regulation was introduced in the 1990s after a long process of “regulatory capture.” The banks insisted that equity requirements had to be adapted to risks and that their own risk models provided the proper basis for doing so. Faced with the expertise of the banks, the regulators gave in. In the process, however, very little was said about the effects such regulation would actually have on risks in banking, or about the difference between the public interest in financial stability and the private interests of the bank.

If equity requirements had been higher overall, and if there had been a less mechanical approach to applying the regulation in the crisis, there would have been less need for deleveraging, and doubts about solvency would have been less urgent. But bank regulators and supervisors can be criticized for not thinking in systemic terms. They focus on the solvency of individual institutions and the need to protect investors in these institutions, without realizing that the survival of these institutions depends on the systemic environment. The lack of reporting duties for hedge funds, conduits and SIVs can be defended if one thinks only about investor protection, but not if one thinks about the systemic implications for other financial institutions. The requirement to deleverage by selling assets if write-offs erode a bank’s equity can endanger the bank itself if the systemic repercussions on prices and on other institutions induce further declines in the value of the bank’s remaining assets.

At this point, there is widespread agreement that financial regulation must be extended and strengthened. To date, however, there is little appreciation of the fact that the current system of banking regulation has itself contributed a lot to the downward spiral in the crisis. It is thus necessary to rethink the conceptual basis of this system.

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