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SUBPRIME MORTGAGES AND THE CRISIS: WHAT EXPLAINS THE MELTDOWN OF THE FINANCIAL SYSTEM?

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Merci beaucoup pour cette introduction très amicale. Merci aussi pour l'invitation de faire ce discours au sein de cette conférence. Je m'excuse de continuer en anglais. Je crains qu'il n'y ait trop de termes techniques, à commencer par "subprime", pour lesquels je ne saurais pas vraiment le terme français.

So systemic risk in the financial sector, market failure and government failure. I want to put to you the proposition that the crisis is not just the result of misbehavior. Nor is it the behavior of some particular kind. Lots of things came together, many of them identifiable beforehand, but a major role was played by system failure. So to some extent, and the system failure, I will argue, is in fact related to a misconceived regulatory setup. In terms of regulatory discussion, what you see all over the world is, regulators say, if there hadn't been all these loopholes the crisis would not have happened. Let's just close those loopholes. I think that if they were to look into a mirror, they might find some of the causes of the crisis. One thing that surprises me is that on the side of the regulators there has been no post mortem of the sort that UBS has done on its own side as to what has gone wrong and where we could have done things differently. So, as a general remark, the crisis had not one cause but several. I would like to distinguish between two triggering events and then point to a flawed financial-system architecture. The triggering events were the subprime mortgage crisis; that's something that you probably all know. The other triggering event was a breakdown of what I would call excessive maturity transformation. Borrowing short to lend long. Borrowing at a few months' maturity in order to invest in securities with a horizon of several years; you never know whether your refinancing will disappear.

And in fact this did break down in August 2007. A flawed financial-system architecture, and I would submit that between August 2007 and September 2008 we've seen something of a downward spiral in the financial system that basically drove on its own dynamics because of the way the system was set up. And the spiral involved price declines in the markets and the way these price declines entered into banks' books, and then the way in which banks, in the context in which they were reactive, in particular by what is called deleveraging, i.e. by selling assets - and you know what asset sales do, they contribute to further lowering market prices. I begin by pointing out that in terms of numbers of the subprime problem we have a puzzle, or rather two of them.

If we go back to the IMF's, the International Monetary Fund's, local financial stability report of October 2008, and I use these numbers because later reports don't separate the numbers any more... At that time they argued that the total volume of subprime mortgages in the United States, that is to say, mortgages that do not meet certain quality standards called prime, was on the order of \$1,100 billion. Their estimate of the losses on these securities and derivatives was on the order of \$500 billion. Now if you look at this second number, there are two questions that arise. Why is it so large, and why is it so small? What do I mean by that? Well, the number seems large if you relate it to probable losses on underlying debt service. If you had someone who was able to hold the entire stuff until maturity, it's likely that the value of the proceeds would be significantly greater than the value which you get when you deduct the 500 from the 1,100. A loss rate of 45-50% just seems too high.

So what are these losses? These are not losses from defaulting borrowers. These losses are from markets valuing securities at lower prices. And the first puzzle is that the losses in terms of market valuations seem large relative to the prospects of losses on the debt service of the underlying securities. The second puzzle is that if you compare this to the world financial system, \$500 billion is a small number. Bank assets prior to the crisis were on the order of \$80,000 billion. In comparison to that, \$500 billion is small.

What about other crises? Realized losses in the Japanese crisis of the 1990s are estimated at somewhere between \$500 and \$600 billion. How much of that spilled over to Europe or to the U.S.? Anticipations of losses in the American S&L crisis as of 1990, numbers were floating around of between \$600 and \$800 billion. In the end, when things were cleaned up, the number was only \$60 billion, but at the time, when everybody thought that this was really bad, the numbers that were mentioned were on the same order of magnitude as what the IMF has quoted here. Did you have any notion of the American S&L crisis here, except perhaps for newspaper headlines on the odd day when the newspapers didn't have anything else to write about?

So the second puzzle is, why is it that this particular crisis spilled over to affect the rest of the world? In April of 2007 the International Monetary Fund actually presented a very detailed study of the subprime mortgage crisis. The numbers were a bit smaller, but in terms of identifying what the problems were, there's really nothing that is missing in this document. And then they ended up saying, it's quite unlikely that this will have any effects on the rest of the world's financial system. At a conference that the BIS, the Bank for International Settlements, organized on financial stability and the macroeconomy in June of 2007, no one talked about subprime. There was no inkling that this was about to happen. There were discussions of hedge funds.

Why did nobody foresee this? That's part of the puzzle. So let me go through the actual analysis. I begin with a brief overview of what subprime itself is actually about. To some extent this is past history, but it provides some basis for understanding that this was not altogether a crazy thing.

The first observation is that real estate is always a problem. And real-estate crises have been a source of financial crises and financial risk on many occasions. The problem is that real estate is just a huge chunk of assets, to some extent highly correlated, and when things in real estate move, that moves a lot of other things as well. Now any journalist that writes that if only these banks hadn't invested in those crazy mortgages, these risks wouldn't have

been there, must either be saying that somebody else should have borne these risks or that we should all be living in tents. Surely, if we were living in tents, the cost of real estate, the amount of wealth tied up in real estate, would be somewhat smaller. I doubt that any of you would be willing to forgo the living standards that you're enjoying to live in tents just to avoid the risk of financial crisis. So if we don't want to live in tents, somebody has to bear this risk, and then shifting this risk away from the initiating bank and shifting it away from the borrower is a good idea; shifting some of these risks away.

I don't have the time to enter into this, but if you look at past experiments on what's a good system for bearing real-estate risk, there was one experiment in the United States from the '30s to the '80s which had this risk being borne by savings institutions, with the result that in about 1980 two thirds of American savings institutions were technically insolvent. The insolvency wasn't uncovered because they didn't have to put it on their books, but it was there nevertheless, and was the major reason for the ensuing Savings & Loan crisis.

Another experiment was engaged in in the 1980s in various countries, in particular in the United Kingdom: shift, for instance, interest-rate risk to borrowers by having adjustable-rate mortgages. So when market interest rates go up, the bank tells the borrower, you have to pay more interest. Well, in the late 1980s in the United Kingdom, the borrower said, we can't, we have borrowed up to our utmost capacity to pay and, therefore, if you raise the interest rate, we've got to default. And the banks said, fine, we'll repossess the property. But property markets were depressed. This is not an accident, but when refinancing costs are high, interest rates are high, real-estate prices are likely to be low. These things are correlated. So that experiment also didn't work. Actually, on that occasion, it wasn't the banks that suffered; it was the insurance sector because the banks and building societies had insured this credit risk, this insurable risk with the insurance companies.

So trying to find someone else who can bear risks is a good idea. But the problem is, to do this in a way in which you don't destroy the incentives of the initiating banks to actually make sure that the credit risk is appropriate, that the borrower can fulfill his obligations. The German system of securitization of long-term debt is able to do so. That means the bank just issues obligations of maturities, in theory, equal to the maturities of the mortgages it holds, and then there are lots of risks that they can just forget about, except if the individual property is not worth very much. If the individual borrower is not behaving well, the bank still carries that risk because all of this is an obligation of the bank; the assets that are issued are an obligation of the bank, and the final investors can get to the bank if they want to.

Now, in the case of mortgage securitization in the United States, this did not happen. In fact, all the risks were shifted to investors. This was initially invented by so-called government-sponsored enterprises, Fannie Mae and Freddie Mac; we'll not talk about what the meaning of these acronyms is. They're called government-sponsored because they enjoy certain privileges and many people thought that they were actually backed by the government, which officially they weren't, and they ended up being anyway. Now these institutions actually guaranteed the debt service on these mortgages and they insisted on quality standards. That's the meaning of the word top-prime. Subprime is the stuff that Fannie and Freddie wouldn't take. So these two institutions actually resolved the incentive problem. Not ideally, because the initiating banks had retained some liability; maybe they would have looked even better; but still, by imposing these standards, they insured some quality. Now in the early

2000s the private investment banks in the U.S. found that this was a profitable business and moved into it, and had two innovations: no guarantees and subprime rather than prime. And they didn't hold on to the last tranche in this operation, the worst tranche, the tranche that bears the first loss if something goes wrong, but sold it.

Thus, nobody, neither the originating mortgage banks nor the investment banks, had any incentive to take care of the quality of the clients. And you know what happens if nobody has an incentive to take care of anything – quality declines. One measure of this: there was a 15-fold increase in fraud on the side of mortgage borrowers over the decade from 1996 to 2006. And many of the delinquencies, irregularities in terms of the contract, were actually discovered even before the first problem occurred. So there was just a lot of not looking closely enough to avoid fraud.

That being said, if one looks at delinquencies in terms of late payments – there is some empirical research showing that delinquency rates, 12 months after the contract, increased continuously during this time. Not actual delinquency rates. There were years when delinquency rates went down; in 2005, delinquency rates were quite low. Why? Well, because the market was spooked. And if your real estate is appreciating, you don't want to default on your mortgage. Now the empirical research asked the question: suppose we keep mortgage prices fixed, what can we then say about the quality of mortgage performance? And there the answer is, quality went down continuously as this market exploded in the early 2000s. What happened to real-estate prices? Well, they had been fairly stable throughout most of the 1990s; from 1999 to 2003 they increased by some 10% per year, then, over the next two years the growth rate jumped to 15% per year. Then it went down, and in the summer of 2006 it turned negative. So the price increases for the first years of the decade just hid the decline in mortgage quality.

In principle, an economist would expect that, if the institutional setup is such that if there are no incentives to take care, there is going to be some external discipline exerted. Market discipline is one of the magic words of modern finance. Well, there was very little of it. First of all, the rating agencies, the agencies attesting to the quality of assets, just didn't pay much attention to the creditworthiness of the borrowers because they thought that, with real-estate prices appreciating, there wasn't much to worry about. And they didn't realize, maybe they didn't want to realize, that the factors that made real-estate prices go up might also change and make them go down again. Some of these factors, in fact, could not persist all the time, So one reason for the increase in real-estate prices was that the refinancing costs had been lowered quite dramatically between 2000 and 2003. That, of course, could not be repeated. They also failed to understand, and this is a notion that I will come back to over and over again: the role of correlations. Different risks moving together. I have before given the example of British insurance companies insuring credit risks. That's plausible if you assume that one person's creditworthiness is independent of another person's creditworthiness. But it's a very bad view of the world if both persons' creditworthiness is driven by the same underlying factors. Like the increase in interest rates in the United States and in the United Kingdom in the late 1980s. Like changes in real-estate markets, as we will see in a few minutes.

What else happened in these markets? Nobody was willing to really look at what these assets were. Everybody was interested in yield. They asked why were the first loss tranches, the so-called equity tranches – the tranches that really carried the liability of this stuff – why were

these tranches purchased? If you go back a few years, everybody used the word yield-hunger. Hedge funds were hungry for securities that provided yields. So were investment banks.

And then you have this puzzle of European investment banks moving into the securitization business themselves. And being latecomers, they didn't securitize mortgages. They didn't take packages of mortgages and resell them in tranches. They took packages of mortgage-backed securities of medium quality, issued several tranches and said, the most senior debt on this stuff is really high quality. You see, they could package B-rated or unrated, quite poor quality stuff, put it together and hope you get something which is of no risk. That might make sense if these risks were uncorrelated. This is where the word comes again. But if they all move together, there is no gain in diversification from packaging this stuff.

And the European investment banks didn't worry very much about the risk of this stuff they were taking up because they wanted to resell it anyway. The stuff that they sold was called MBS CDOs – they are collateralized debt obligations that have mortgage-backed securities as collateral. You have MBS CDO squared, that's a collateralized debt obligation that has MBS CDOs as collateral, and so on. And very few institutions looked at the risk. Take the example of UBS. Here we have two features that I really find quite amazing. The UBS investment bank was involved in the securitization business, and they held on to some of the stuff that they issued for the simple reason that they liked the rate of return, they liked the rate of interest, which was a few basis points higher than what they could have gotten on other stuff with similar ratings. The fact that this was highly correlated with the things that they held anyway because they needed to store the stuff while they were in this procedure was completely forgotten.

The other feature which I find quite amazing is that senior management never got to see the full-fledged account of the business model of UBS investment bank and the risk that was involved in this model. That's a failure of governance which I find quite remarkable. I suspect that as long as UBS investment bank was producing nice rates of return, they really didn't want to look too closely, which, of course, raises questions of what kind of discourse does one have to organize these things. Now, top management in banks, managements of hedge funds and so on, were also driven by the need to account to their investors.

Shareholder value is a term that has become prominent in financial discourse over the past 20 years. I remember, in the 1980s, it was a dirty word, at least in corporate boards, and it has become prominent in the dialogue between corporate executives and analysts and between corporate executives and journalists, so-called market discipline; and of course, all of that focuses on yields, yields to shareholders. We may wonder why, but that is another subject. But I certainly believe that there is a definite yield bias in market discipline in an organization where managers have compensation based on stock-market performance – I also think there is a yield bias in internal governance.

Here we may wonder about the effects of bonuses. And that's only one piece of the story. That's the piece of the story – subprime – which, as I said before, is too small to explain the world financial crisis. It's the most complicated piece to understand, but it's only one of the pieces. The second piece – many institutions, typically U.S. investment banks, then termed state-owned banks, engaged in maturity transformation; borrowing short to lend long. They financed investment in mortgage-backed securities by issuing short-term commercial paper. I have this indication on German banks; if they'd done this on their own books, their su-

pervisor would have immediately forbidden it. So what did they do? Hardly any equity, but mortgage-backed securities, invested in mortgage-backed securities, and issued very short-term debt to finance them. How did this work? Well, the sponsoring institution gave a promise of liquidity assistance. If the short-term refinancing were to fall away, the sponsoring institution would do it. So in the case of the state bank of the Free State of Saxony, Saxon LandesBank, they actually had such liquidity assistance, promises amounting to 42 billion euros when their equity was on the order of 3 billion euros. These promises were not on the books, because if you don't believe they are going to be called, they don't have to be on the books. And the supervisor didn't say, this is too risky, putting all your eggs in one basket, the creditors' eggs and the taxpayer's eggs as well, putting all of them into one market.

Well, the supervisor said, regulations against large exposures only apply to promises having a maturity of more than one year. Here all the maturities are below one year; therefore we don't have to intervene. Because none of this was on any of the books, nobody really knew about its extent. Why did they do this? Well, these institutions don't really have a business model of their own, certainly not the German state-owned banks.

Yield panic: where do you earn the return that you need in order to fund your costs? Like the 200 specialists that Bayerische Landesbank used to have in New York, plus the spending wishes. Bayerische Landesbank is an institution that should be funding, I don't know, projects in Bavaria. They actually had 200 specialists in New York. Of course, you also need to fund the special wishes of the politicians in charge, but that's minor relative to some other concerns.

In the context of the investment banks, the American investment banks, you have a similar element because the repeal of the Glass-Steagall Act forbidding commercial banks from doing investment banking had changed the rules of competition, and in certain dimensions they had a much easier life because they were part of the Federal Reserve system and had access to the Federal Reserve discount window, had a depositor base for their own finance, and that was much easier to handle than what the investment banks had.

So one suspects that some of that may be involved in institutions taking these kinds of risk. Of course, this kind of risk-taking was also encouraged by U.S. monetary policy. From 2002 to 2004 you had the federal funds rate, that's the short-term money market rate, somewhere between 1% and 1.5%. You had a 10-year rate on U.S. Treasuries, perfectly safe securities, somewhere between 4 and 5% - that's already a quite nice spread of 3 percentage points. On prime mortgages, conventional prime mortgages, the rate would have been 6%. On fixed-rate subprime mortgages, the rate would have been 7 to 8%. Borrow at 1%, invest at 7 or 8%, doesn't that sound like a great deal? Temptation was quite substantial. The restrictive monetary policy set between 2005 and 2007 triggered the turnaround.

In many ways this is a repetition of Mr. Greenspan's stop and go policies of the late 1980s and again in the 1990s. He had done this kind of experiment twice before. So how did the crisis proceed? Well, the triggering event, as I mentioned before, was this twin event: in August 2007 the rating agencies woke up to the fact that mortgage-backed securities were of poor quality and downgraded these securities, some of them by 3 steps at once, something that had not happened before, at least in the corporate sector. That immediately affected the prices of these securities and immediately meant that these various special entities that had no own funds, no equity of their own, had a problem because their assets were less than

their liabilities and their financiers immediately called in and said, we're not going to give you money any more, which meant that they had to call on their sponsors. So the Saxon Landesbank immediately went under because it had problems with those 42 billion euros. The shock of all this for the system was the amount that was involved. There is an estimate that this kind of maturity transformation amounted altogether to \$1 trillion. Remember, before, I said that nonprime was \$1.1 trillion. That's a big chunk. Now even if some of these assets were not in subprime but in other kinds of asset-backed securities, it still is a big chunk. And any system of financial markets where the institutions holding long-term assets find that such an amount needs to be refinanced because their refinancing sources don't trust them any more – any system like that is going to have a big shock to digest.

This is why I'm saying that there were really two shocks; they were interrelated because these institutions were in mortgage-backed securities, but excessive maturity transformation is a sin in banking which is much older than these new-fangled derivatives. Which is why I've never understood why the regulators didn't supervise this, didn't step in to say, regardless of what the rules say, we have a right to prohibit unprofessional banking practices, and this kind of behavior is an unprofessional banking practice.

Now I get to the system part of the story – so you have a price decline. Price declines are particularly pronounced after a shock, particularly pronounced if the markets don't work well. And these markets didn't work well. Now these price declines immediately had to go to the banks' books, and the banks had to write up losses, which generated the problem that they had to do something about their loss in equity: recapitalize, deleverage, i.e. sell assets. Let me explain each of these points on its own.

First, market malfunction. There were information problems: what's the value of the asset that's being traded, and when there are information problems, every buyer beware. Changes in risk perception, changes in perceptions of own vulnerability – I have to worry about the people who give me the money. And all of this depressed these markets. To some extent, the pressure may also have had to do with an anticipation that wealth – if tomorrow somebody else has to sell, the stuff will be even cheaper. So why buy today when tomorrow prices may be lower? And there is some indication that in some of these markets we may have seen something like a downward bubble.

You may ask, why didn't anybody buy? Well, some institutions actually did buy, but the question is, who would have felt strong enough, also vis-à-vis his own financiers to actually buy these securities? I've heard quite a number of people say, if I were able to wait for 40 years, or maybe just 20 years, I'd really buy this stuff and make a killing. There are very few people able to do that. Fair-value accounting under the regulatory arrangements for capital regulation, for so-called market risks, that's assets that are traded in markets where the bank worries about risk to market prices – one prerequisite is that you use mark-to-market pricing according to markets all in all. And this even if the markets don't function. Then you replace mark-to-market by mark-to model, whatever that may be – you have a model of what the writedown would be, what the price would be if the market were functioning.

So there were large writedowns, and these went on and on. The repeated nature of writedowns had nothing to do with banks not knowing what problems they had on their books; it had to do with the problems becoming ever-more serious as market prices declined even more. And banks didn't have enough equity to cope with the problem.

There are two levels at which this is an issue. The first is, there were hardly any buffers of equity in excess of what was required by regulators. Now one of the paradoxes of regulation is that if you have a required buffer, that ceases to be a buffer, because that's what you need to satisfy the regulator, and you can't use it to buffer shocks. So to respond, you either have to replenish it, find someone who will give you equity, like the government fund of Singapore did with UBS, or you have to sell. How much do you have to sell? Well, that depends on what the losses are and what the relation of your equity is to your balance sheet. Well, in some cases – it might be the case that for every dollar, or euro, or Swiss franc of losses, you have to sell 40 times as much, or 50 times as much, or 100 times as much, and that's a really large multiplier.

Why that much? Well, required capital had been much reduced, and in fact, in some institutions equity was on the order of 1%, 2%, 3% of the bank balance sheet. When you read a newspaper article saying, we have 10% core capital, we're wonderful, that doesn't mean that their capital is 10% of their balance sheet; it means that the capital is 10% of the so-called risk-weighted assets, and if there are enough assets that have a risk weight of zero, or a risk weight of 0.1, it can mean anything.

And in practice, if you take the case of UBS, 40 billion Swiss francs out of 1,600 billion, that gives you 2.5%. Which gives you a multiplier of 1 over 2.5%, equal to 40; that's the 40 you had before. Now the problem with this very small equity is that you immediately get into a mistrust about solvency. Mind you, UBS's losses in mortgage-backed securities and related activities were far in excess of the 40 billion of equity that they had before the crisis. So they would have been insolvent if it hadn't been for Singapore and the Swiss Confederacy. When there is distrust about solvency; well, are you going to lend money to an institution that you don't trust?

There you have the interbank markets breaking down, and this of course added to the sense of vulnerability of these institutions. Now central banks have on a number of occasions tried to resolve the problem by providing additional liquidity, but of course central banks cannot really deal with issues of solvency; they can only provide liquidity. The U.S. Treasury thought that it could restore a sense of orderly procedure and save money by letting Lehman Brothers go under, leaving the European creditors of Lehman to bear the costs. I think that they have since found that this was a miscalculation, and that led to the explosion last September, which then led to governments worldwide stepping in and having the taxpayer provide a guarantee.

Let me step back a bit and ask what's gone wrong? Who is to blame? And I think here we need to distinguish between misbehavior and faulty system design. I think it's very important to make this distinction because many of the problems arose not because people consciously or subconsciously misbehaved, but because people didn't understand, and couldn't understand, the risks that were actually involved because there was a significant degree of fragmentation and system dynamics.

More interesting perhaps was improper risk modeling. Risk models, both at institutions and at rating agencies, to the extent that they had such models, were improperly constructed, involving a lack of understanding of the fact that things are nonstationary, meaning that things are not the same from period to period to period, and that there are correlations between different risks. Example of correlations: UBS had hedged some of the credit risk of

mortgage-backed securities with third parties, in particular the so-called monoline insurers. And subsequently, eliminated these risks from their risk models because, after all, they had been hedged. The fact that maybe the third parties', the monoline insurers' ability to actually pay would vanish at the very moment when it was needed – that correlation of risks was not being considered.

Also, there was a complete lack of understanding of the fact that there are risks that you cannot capture in the model. For instance, nobody knew, as I explained, about the extent of maturity transformation through these special entities, the shadow banking system. I don't blame people for not having known about this, but I think one can blame people for not having put this risk into their models. And I think one can blame people for not having taken account of the possibility that there are always things in the world that you have neglected to think about, and that in some sense you must provision for. Of course, there was improper risk control – I gave the UBS example for that.

Misbehavior, well, the regulators tolerated loopholes, not banning unprofessional behavior. The politicians created an atmosphere where the regulators worried about being accused of putting sand in the wheels of national champions. The Swiss National Bank actually raised questions about the equity of the big Swiss banks long before the crisis and proposed a leverage ratio rule long before the crisis. And was turned down on that, not just by UBS and Credit Suisse but also by the Swiss Banking Commission, and also by the Swiss Finance Ministry. And everybody knew that if this dispute were to go to the press, the press would be on the side of the national champions rather than the Swiss National Bank. At this level, everybody has to look into a mirror.

Faulty monetary policy I have already mentioned. Flaws in system design, the lack of accountability and liability in the whole process of mortgage origination and securitization, including the further dilution of responsibility in the further rounds of securitization. Lack of transparency of what market positions were – there has been a decade-long discussion on whether or not hedge funds should be regulated. And this has usually been brushed aside with the argument that investors in hedge funds are really sophisticated people and don't need to be protected. That's fine if you believe that investor protection is the only objective of regulation.

What about systemic risk? It would have been very good for institutions like UBS, or Deutsche Bank, if they had had some information on what the aggregate exposure of other institutions was, what the aggregate maturity transformation at other institutions was. This would have enabled them to anticipate at least some of the second shock of August 2007.

At the level of system design we also have to worry about internal governance in banks, market discipline of private banks and, in the German case at least, the complete failure of governance in public banks. We also have to worry about regulation. Capital regulation itself, designed to create a sufficiency of equity capital, in fact induced an insufficiency of capital. As I mentioned, there was no free capital – that's obviously something that you cannot regulate. But as I mentioned, there was also very little regulatory capital. That had to do with the model-based approach which since 1996 has enabled the large banking institutions to use their own quantitative risk models in order to assess their capital requirements. And that has been a major reason why we have these 1%, 2%, 3% equity ratios relative to unweighted assets.

At this point the banker will say – we need to worry about a risk-calibrated system of regulation. If you believe the models – in the case of UBS, as I mentioned before, the major risks of their involvement in mortgage-backed securities were not in their models simply because they had forgotten about correlations, dependence on common factors and about systemic risk exposure. Procyclical effects of this regulation – if the bank has a loss, under this regulation, in order to satisfy the regulation it has to sell assets at a multiplier of 40 or 50 if the capital is very small.

That depresses markets as feedbacks onto the markets and feedbacks onto other financial institutions in the system, which must react likewise so that to some extent this activity may end up hurting the bank because this process may eventually come back to it, where in principle it should have been designed to protect it.

You might ask the question, where does this come from? Well, it comes from a complete lack of conceptual understanding of the effects of regulation. Regulation is based on the notion that if one takes care of the solvency of an individual bank, one is taking care of the system. That's just wrong. At this point a regulator would say, but surely, if there is enough equity capital, like 100%, there's not going to be a problem in the system. You could respond that there is no depositor to be protected any more if there is 100%. It's not a bank any more. Now that's the problem. We'd really like to have it, but we can't and that's why we need the Cooke ratio of 8%. Of course, when the equity ratio is 8%, the story can be different. Then you have to ask yourself, what are the implications of corrective actions? Well, as I mentioned, deleveraging can harm, and it will do so if you ask these institutions to sell assets below the expected present values of what the returns on them are, and it will also do so through the feedback effects on other institutions. So we don't just need more regulation, we need rethinking about regulation.

One of the things that always strikes me is that no attention has been paid to intervention mechanisms, and no attention has been paid to objectives. If you ask a regulator what the objective of banking capital regulation is, you don't get a clear answer. You get three answers. One is, it's a buffer. We've heard about that. One is, it's an incentive device. That's actually a latecomer imported from the theorists. The third one is, it gives you room to intervene before the bankruptcy judge takes over. Now these are three objectives. They have different implications for the standards of regulation and for the procedure of intervention. I've never heard, or read, of the problem of conflicts between these three objectives and the implications for standards and modes of intervention being discussed.

So, I'll conclude with three very simple ideas for reform. The first one, which would eliminate the notion that risk control in a bank and risk control by the regulator are in pursuit of the same objective. Referring to the model-based approach, if we look at current reform discussions, all the discussions go in the direction that we need to refine it. I've not seen any discussion of how we can counteract the effect that this approach has been the reason for why bank capital has been so low, and how we can deal with the fact that there are risks which are not captured by the models?

So, the second element is, we need to have some of the elements of regulation that don't require the models to be right. There must be some notion that banks have to provision for something that they do not foresee and that the regulator does not foresee.

The third point is that we should have some mode of intervention, some intervention mecha-

nisms, that will reduce or eliminate the procyclical effects, the crisis-enhancing effects, or, on the upside, the bubble-enhancing effects of the regulation that we currently have. We're probably closest in terms of reform discussions on the last element, although even there I'm afraid that the proposals I've seen go in the direction of yet more precise measurement, too much confidence in the ability to engineer by formulas, but at least an improvement over what we have had so far.

I have not seen much improvement, much progress – one of the things that amazes me is the extent to which an industry which should be entirely intellectually discredited by the experience of the crisis and its own contribution to the makings of the crisis – the extent to which this industry is still intellectually dominating political and regulatory discussions about reform.

And on that note, I want to close.

