

Regulation and financial innovation

Rui Vilela Mendes

Instituto de Ciências da Complexidade
Centro de Matemática e Aplicações Fundamentais
<http://label2.ist.utl.pt/vilela/>

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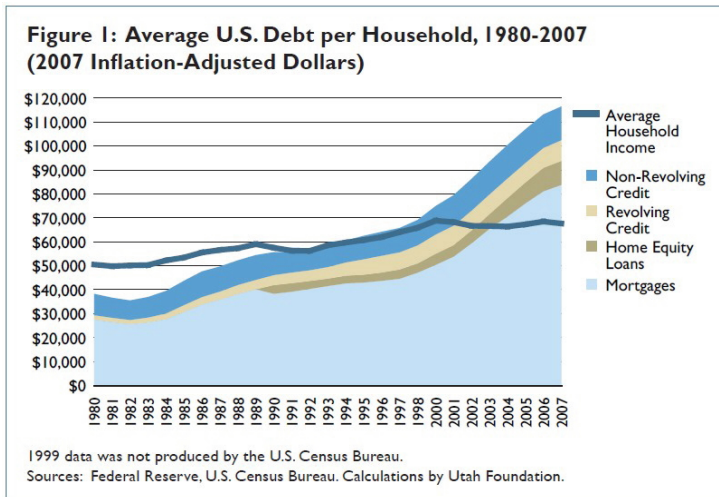
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- Play the game in a consistent manner (risk transfer versus regulation arbitrage)
- Regulation, transfer of risk and game consistency are especially relevant issues in the current financial-economic crisis

Crisis and regulation: A summary

- The subprime crisis
 - The initial conditions
 - The trigger
 - The multiplication effect
- Regulation and innovation
 - Bank regulation
 - Regulation arbitrage
- Regulation
 - The new proposals
 - Will financial innovation arbitrage the proposals ?

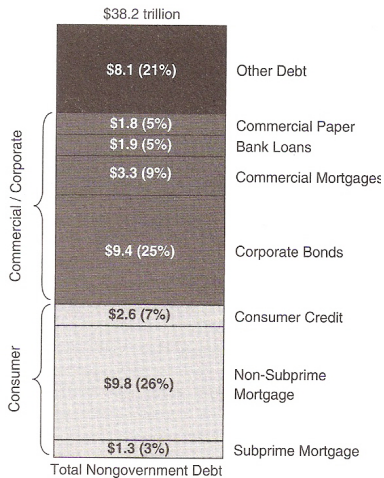
The subprime crisis. The initial conditions

- A credit boom



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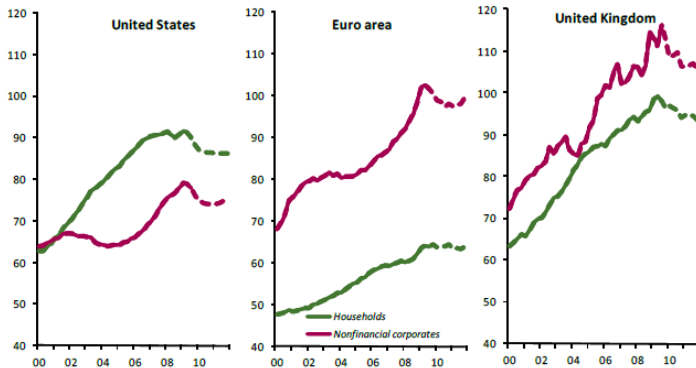
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Figure 1.28. Credit to GDP
(In percent)

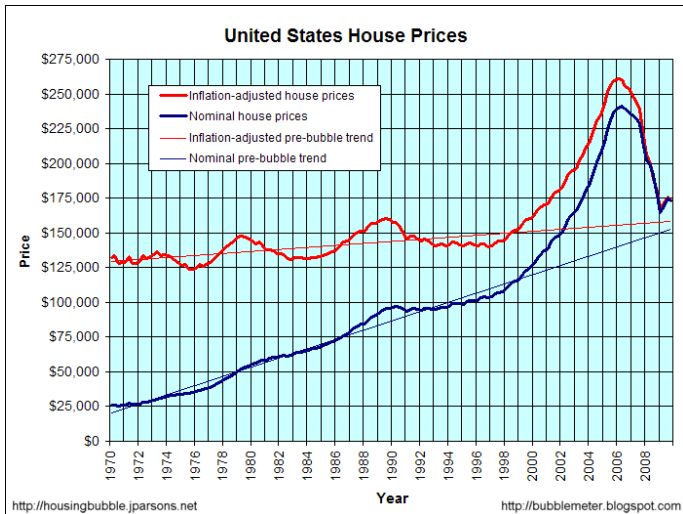


Source: IMF staff estimates.

Note: The dashed lines represent forecasts.

The subprime crisis. The initial conditions

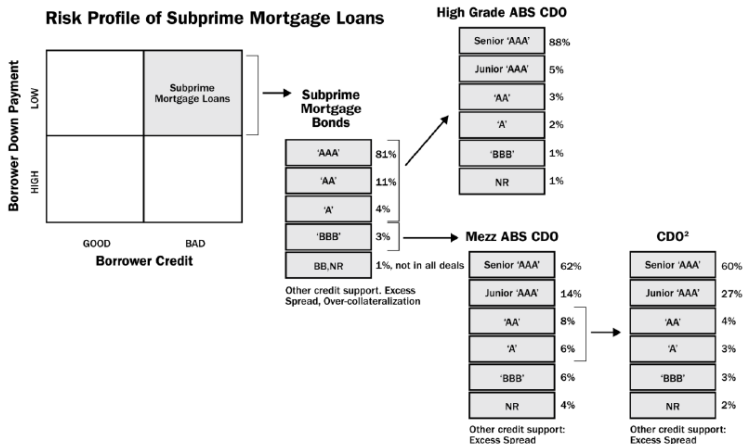
- A housing bubble



- Teaser rates. Need to refinance. Synchronization.

The subprime crisis. The initial conditions

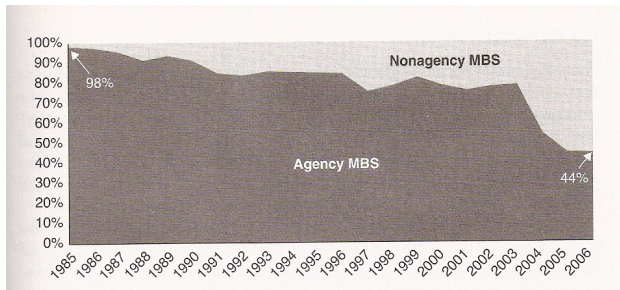
- The mortgage securitization



- Originate and distribute

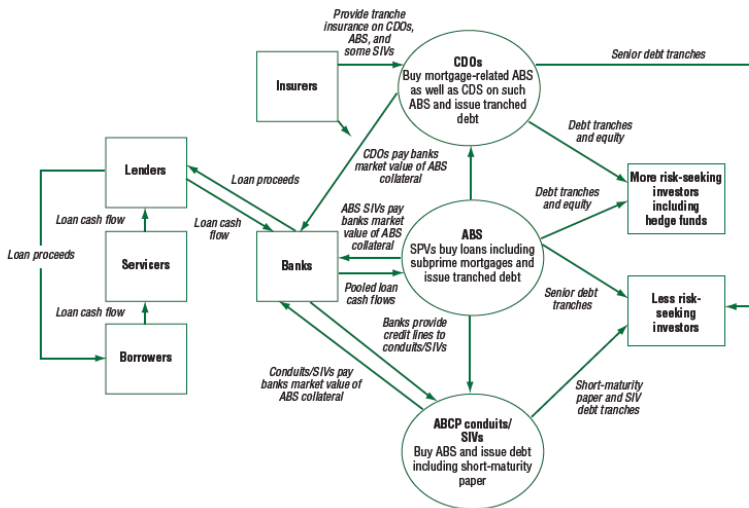
The subprime crisis. The initial conditions

- Agency versus non-agency securitized mortgage issuance



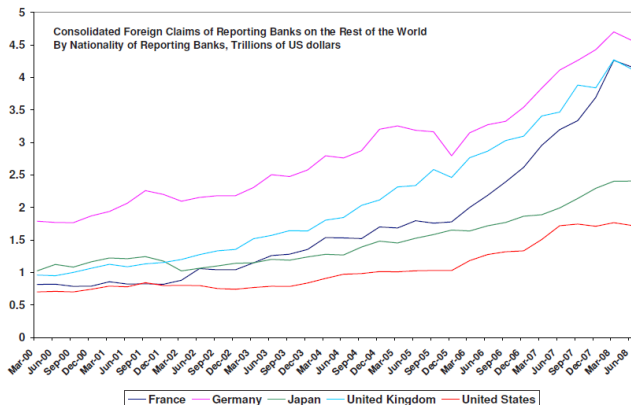
The subprime crisis. The initial conditions

The mortgage securitization ("originate and distribute" but also regulation arbitrage)



The subprime crisis. The initial conditions

- Connectedness of the financial institutions



- High leverage of the financial system

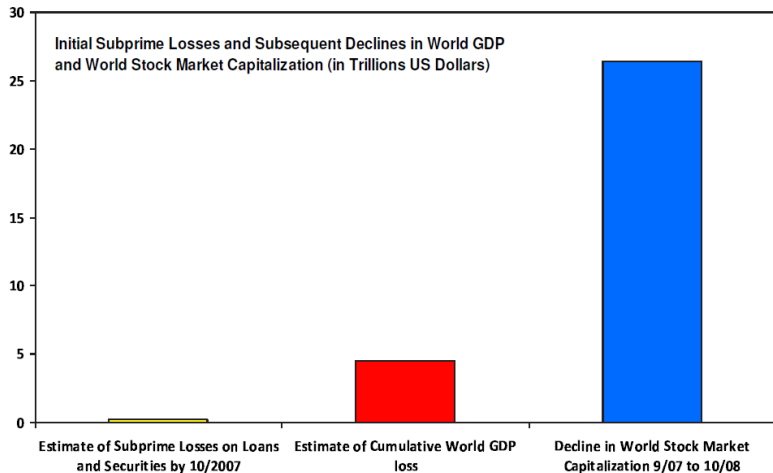
Banks: Off-balance assets exceeding those on the balance sheet

Insurers: Capital much smaller than volume of insurance claims

The subprime crisis. The trigger

- Summarizing, the initial conditions implied:
 - Underestimation of the risk in the newly issued assets
 - Opacity of derivative securities in the capital of financial institutions
 - Connectedness of the financial institutions across the world
 - High leverage of the financial system
- The trigger: the decline in housing prices, impossibility to refinance, mortgage default leading to further decrease on the price of houses, devaluating the derivative securities, etc.
- However, in a true "originate and distribute" mode the shock should have been absorbed by the market, without seriously jeopardizing the financial institutions.
- By the creation of SPV/SIV's a sizable portion of the AAA tranches remained in the (shadow) banking system. When the ABS's started to lose value, the special conduits could no longer finance them in the short-term money market. Many ABS's had to return to the balance sheet which led to the selling of assets because of capital requirement and the downwards spiral was launched.

The subprime crisis. The multiplication effect



The multiplication effect. A systemic crisis



"I THOUGHT WE WERE JUST BUYING A HOUSE!"

The subprime crisis. The multiplication effect

- Before the crisis: *A perfect world*
 - Traditionally banks held their mortgages in a single portfolio
 - The 1980's big change: **Transfer of credit risk**
 - Pooling of mortgages, divide the pools into tranches, sell to third parties
 - **The risk of mortgage default is written out of the books of the original bank**, which has capital available to make further mortgage loans (and collect the fees), mortgages which are also pooled, etc., etc.
 - In the mortgage business banks collected fees, intermediate agents collected fees, rating agencies collected fees. Conclusion: **Explosive profitability of the banking sector (~40% of corporate profits)**

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- When the price of houses started to fall, refinancing became impossible, the rate of defaults increased
 - The expected loss and uncertainty of the related assets increased
 - Depositors and investors are likely to withdraw their funds from institutions at risk.

The subprime crisis. The multiplication effect

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- Banks and other institutions had to write off billions in asset values, seek large capital infusions and banks drastically reduced lending

The subprime crisis. The multiplication effect

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- In this way a sector that was less than 3% of the USA economy, generated a global crisis.
- The "small" shock was not absorbed by the market because in the originate-and-distribute game, roughly 50% of the assets remained in the large financial institutions. Because:
 - in "good times" AAA tranches generated better profit than conventional bonds
 - they were used (through SIV's and ABCP conduits) to arbitrage regulation.

The subprime crisis. Pathological or physiological ?

- During the credit bubble the ABS's were one of the most profitable market investments. Hence the temptation of banks to hold on them. To counter "capital requirements regulation" they placed them on SPV's.
- For the same profitability reasons, unregulated (or less regulated) investment banks and hedge funds invested strongly on mortgage-derived ABS's. Therefore regulation arbitrage was not the whole story.
- Was the crisis a pathological result of greedy speculators or a natural consequence of the "physiology" of the financial system ?
- Some preliminary considerations:
In the assessment of risk of a financial instrument there are 3 elements:
 - 1 - The probability of default
 - 2 - How much can be recovered if there is a default
 - 3 - In what scenarios will default will occur. Good times or bad times? Pro-cyclical or counter cyclical?

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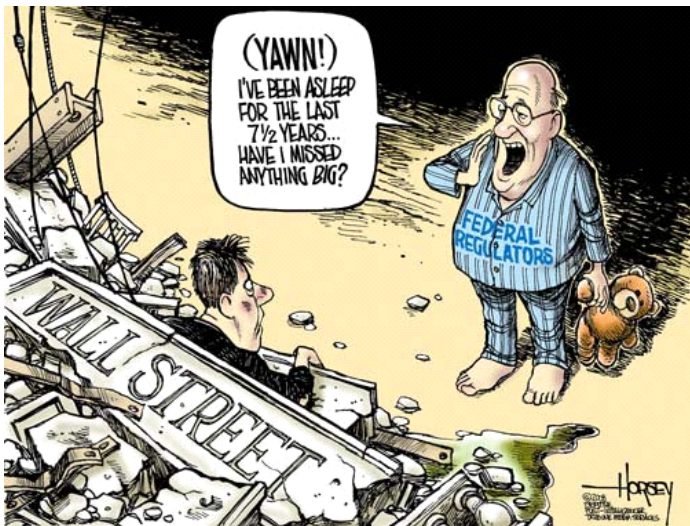
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- Many of these honest and competent decisions created a systemic risk. Therefore it looks as if *the crisis is more physiological than pathological*.

A failure of regulation ?



A failure of regulation ?

- Paulson and Greenspan. Are they the culprits ?



- It is clear that banks were very much at the center of the crisis origin. However banks are the most regulated of the financial institutions.
- Banks, contrary to other financial institutions, are subjected to supervision and regulation
 - 1988: BIS Accord (Basel I)
 - 1996: Amendment to BIS Accord
 - 1999: Basel II proposed
- The three pillars of Basel II
 - Minimum capital requirements for market, credit and operational risk
 - Supervisory review
 - Market discipline: more disclosure
- Assets/Capital must be less than 20. Assets includes off-balance sheet items that are direct credit substitutes such as letters of credit and guarantees

Bank regulation

- Cooke Ratio: Capital must be 8% of risk weighted amount. At least 50% of capital must be Tier 1.
- Tier 1 Capital: common equity, non-cumulative perpetual preferred shares, minority interests in consolidated subsidiaries
Tier 2 Capital: cumulative preferred stock, certain types of 99-year debentures, subordinated debt with an original life of more than 5 years
- A risk weight is applied to each on-balance-sheet asset according to its risk (e.g. 0% to cash and govt. bonds; 20% to claims on OECD banks; 50% to residential mortgages; 100% to corporate loans, corporate bonds, etc.)

For each off-balance-sheet item we first calculate a credit equivalent amount and then apply a risk weight

Risk weighted amount (RWA) consists of

- Sum of risk weight times asset amount for on-balance sheet items
- Sum of risk weight times credit equivalent amount for off-balance sheet items

Bank regulation

- The credit equivalent amount is calculated as the current replacement cost (if positive) plus an add on factor
The add on amount varies from instrument to instrument (e.g. 0.5% for a 1-5 year swap; 5.0% for a 1-5 year foreign currency swap)
- Risk weighted amount

$$RWA = \sum_{i=1}^N w_i L_i + \sum_{j=1}^M w_j^* C_j$$

1st term: On-balance sheet items: principal times risk weight

2nd term: Off-balance sheet items: credit equivalent amount times risk weight

- Market-risk capital:

$$k \times \text{VaR} + \text{SRC}$$

k is a multiplicative factor chosen by regulators (at least 3), VaR is the 99% 10-day value at risk, and SRC is the specific risk charge (primarily for debt securities held in trading book)

- Risk weights based on either external credit rating (standardized approach) or a bank's own internal credit ratings (IRB approach)
- Also, credit risk and operational risk capital requirements, netting, risk mitigants, etc.
- In conclusion: Banks, contrary to other financial institutions, were already subjected to heavy supervision and regulation. That however did not discouraged them (or even encouraged them) to find clever ways to write-off risks from their balance books.
However, nor regulation, nor cleverness, saved them from trouble.

The moral hazard of systemic risks



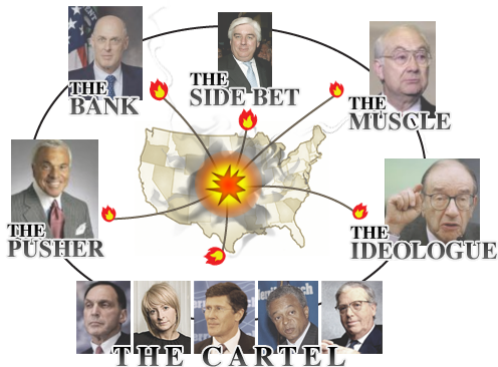
The crisis

- *"It is so difficult to blame one person or two people for the economic meltdown. It really was the whole system"* (Prof. Reena Aggarwal - Georgetown University). Nevertheless, for those that want to point fingers, here is a gallery of "public enemies"

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THE ARCHITECTS OF DESTRUCTION



Regulation and arbitrage

- The functions of the financial system: to allocate capital efficiently and manage risk
- Most existing regulation measures aim at managing the risk of individual institutions. But managing risk, from the perspective of maximizing the value of the enterprise, is exactly what financial institutions are supposed to do. Why regulation?

- **Reasons for regulation:**

- Large externalities. Systemic effects
- Investor protection
- Maintaining competition
- Ensuring access to credit

- **Arbitrage:**

Tax arbitrage

Accounting arbitrage (off-balance, mark-to-market, mark-to-book, stock options)

Regulation arbitrage (capital requirements and financial alchemy to be able to sell questionable products to fiduciary institutions)

- **Micro-prudential versus macro-prudential regulation**
 - Isolated failures of credit intermediaries are not a risk to the economy
 - On the other hand, tighter regulation designed to make banks individually safer, may encourage excessive risk transfer
 - Uniform individual regulation synchronizes movements and is systemically dangerous. Current financial regulations tend to encourage pro-cyclical risk taking.
 - Traditional view of systemic risk focuses on sequences of bank failures, a domino-like spreading of counterparty failures. Because today's financial system relies much on financing in (short-term) money markets, systemic risk is associated to funding liquidity combined with bad asset price movements due to low market liquidity.
 - In conclusion: Focus regulation on aggregate risk to the economy rather than on capital risk tied to individual bank risk. (Size and correlations)

Proposals for systemic regulation:

- - *Systemic requirements based on the firm's contribution to aggregate risk. CoVar (?). (VaR conditional on other institutions being in distress). These might be additional capital requirements, taxes (to create a systemic fund) or the required purchase of insurance. In the case of insurance, this should come from the private sector to allow for price discovery, eventually complemented by insurance provided by the regulator at a price determined by the one of the private sector. In case of need, the payout should go to a government bail-out fund, to avoid moral hazard.*
- *Regulators should take liquidity into account when assessing capital ratios*
- *Maturity mismatches in vehicles that use short-term financing to fund long-term assets should be taken into account*
- *Restrict the activities of large systemically important institutions: Prohibit the management of private pools of capital. Retention in the balance sheet of a meaningful part of the credit risk.*

- **Risk measures and capital ratios**

- Regulation focused on one single metric (capital to risk-weighted assets ratio) is easy to arbitrage
- VaR discourages diversification and is also a bad measure of actual large losses
- Capital held to meet minimal requirements cannot be used as a buffer against losses. A buffer can only come from equity in excess of requirements

- **Proposal**

- *Develop regulation that examines more complex indicators (loans to deposits, insured deposits to assets, liquid treasuries to assets, etc.)*
- *Relax capital requirements during crisis. That is, use countercyclical capital requirements.*
- *Financial market safety commission ?*

- **The rating agencies**

- Since the 30's that the rating agencies have become important in the financial markets because of the regulators requirement that the financial institutions comply with their ratings in risk calculations. Even more so after the creation in 1975 of the NRSRO category by the SEC.
- They played a central role in the present crisis by underestimating the risk of the securities they were classifying as safe, even neglecting the mitigated warnings of some of their experts.
- In the "issuer pays" mode, competition between the agencies leads to inflated rates
- In the "investor pays" mode there is a free rider problem

Proposals:

- - *Create a regulator-sponsored centralized clearing platform. An institution that wants its product to be rated, goes to the platform which, by a flat fee, chooses the most appropriate rating agency for the product. Solves the free rider problem because it is an "issuer pays" mode and the conflict of interest problem because the choice is made by the regulating body. It might also enhance competition between the agencies by encouraging them to achieve excellency standards to improve their chances of being chosen.*
- *Alternatively, give the issuer freedom to choose where to find advise, from the present agencies or elsewhere. But require that he justifies his choice.*

Regulation. The new proposals

- **Centralized clearing for credit derivatives**

- CDS's and CDO's are traded OTC. More flexibility but also more counterparty risk.

- **Proposals:**

- *Whenever a OTC derivatives market becomes large enough to have a significant impact on the overall financial system, require it to have centralized clearing (to aggregate information on outstanding deals and risk exposures)*

- *The Clearing House could be simply a Registry or, strongly, could take the role of counterparty and guarantor of contracts. Contracts arising from bilateral negotiation, once registered in the clearing house, would be broken into two with the clearing house in the middle. The clearing house would set standardized margin requirements.*

- *Alternatively set a formal exchange. However it is costly and not appropriate for individualized instruments (CDO's)*

- *Financial products safety commission ?*

- **Short selling**

- Combined action of buyers and sellers accelerates price discovery. Restrictions on short selling constrains sellers that might have bearish views on the market. It also affects buyers who wanting to be long in a company want to limit their risk exposure. Hinders the buying of put options from sellers who might use short selling to hedge their exposure, etc. In conclusion, banning short selling reduce transactions in the market, delays price discovery, curtails liquidity and causes prices to fall.

- **Proposal:**

- *Do not ban short selling and do not enforce the "up tick" rule.*
- *Enforce only the "no naked shorts", except for market makers.*
- *Report daily the short selling volume*

- **Hedge funds**

- Hedge funds are essentially unregulated
- However, they also lack the advantages of banks, through deposit insurance and, sometimes, the "too-big-to-fail" syndrome.
- Lack of transparency can magnify financial crisis due, for example, to counterparty concerns.

- **Proposals:**

- *Require hedge funds to provide regularly the regulator with information on their asset position and leverage levels. Helps the regulator to assess systemic risk*
- *If a hedge fund falls under the LCFI category, then it should be treated and regulated as a systemic institution.*

Regulation. The new proposals

- **LCFI's and moral hazard**

- In a crisis large complex financial institutions are considered too-big-to-fail, because of their impact on the global economy and are expected to be supported by state intervention. This creates a moral hazard effect, that influences its policies. This is becoming even more important now because of the current degree of consolidation in the financial sector.

- **Proposal:**

- *In addition to good measures of systemic risk and regulation, create a new piece of legislation introducing a new form of bankruptcy for banks, where derivative contracts are kept in place and the long term debt is swapped into equity. That is, provide an orderly closing procedure for systemically important financial institutions.*
- *Extend this legislation also to non-depository institutions*

- **Recapitalization during crisis**

Proposal:

- *Create recapitalization requirements in addition to capital requirements. Either force institutions to issue securities that provide automatic recapitalization if their value decreases or to buy capital insurance policies.*

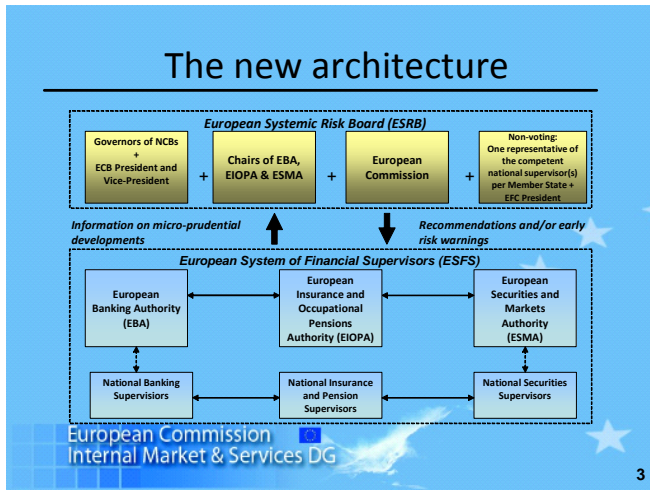
- **International coordination**

- - Lack of coordination between national regulators creates regulatory arbitrage across national jurisdictions. However because of the interconnectedness of the financial institutions all jurisdictions are exposed to their risk taking.
 - To attract investors, countries may engage in a race to the bottom in regulatory standards.

- **Proposal:**

- *Central banks should convene and agree on a broad set of principles, namely:*
 - *Existence of a national regulator for systemic risk of LCFI's. This regulator would be in charge of the systemic regulation rules (see above) and systemic risk evaluation of the LCFI's.*
 - *Seek political consensus on the rules in international bodies.*

- An European system of financial supervision



3

- **An European system of financial supervision**

Benefits of the proposed system

- Fully connected macro-micro supervisory framework;
- Strong cooperation and enhanced trust;
- Reinforce colleges of supervisors;
- Move towards harmonised rules and powers;
- Reinforcement of supervisory resources;
- New procedures for supervisors to take common decisions;
- Comprehensive means to challenge cross-border decisions;
- Quick mechanism allowing for collaborative decisions in emergency situations.

European Commission 
Internal Market & Services DG

15

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- A few remarks:
 - 1 - Radical regulation of the type "everything that is not explicitly allowed is forbidden" has no chance to pass in the current state-of-the-world.
 - 2 - There is always a large time lag between innovation and regulation, because regulation is a law-based process which needs coordination, consensus and finally the implementation of supervision instruments. In the meantime everything goes and when regulation finally comes, innovate again.
 - 3 - If regulation penalizes by taxes or extra capital requirements large institutions, deconsolidate. If that makes you lose economies of scale, specialize and provide services to the independent branches. Beware of equity disclosure.

Will financial innovation arbitrage the new proposals ?

4 - Probably regulation of OTC operations will only apply to large volume markets. Invent new products when the volume becomes sufficiently large to be regulated, avoid clearing house fees.

5 - Invention of new products is not hard. Many of the innovations are just old operations in a new dress. Example: (A loan or a bond or a mortgage) plus (insurance) \simeq put option or CDS

- Group of Thirty; *Financial reform. A framework for financial stability*, 2009.
- V. Acharya and M. Richardson (Eds.); *Restoring financial stability: How to repair a failed system*, J. Wiley, New York 2009.
- M: Brunnermeier, A. Crockett, C. Goodhart, A. D. Persaud and H. Shin; *The fundamental principles of financial regulation*, International Center for Monetary and Banking Studies, Geneva 2009.
- *Global financial stability report*, International Monetary Fund, 2010
- T. Adrian and M. K. Brunnermeier; *CoVaR*, preprint, Federal Reserve Bank of New York, 2009
- *Driving European Recovery: European system of financial supervisors*, European Commission Internal Market & Services DG, 2009
- O. Blanchard; The crisis: *Basic mechanisms and appropriate policies*
- O. Blanchard and M. Riggi; *Why are the 2000's so different from the 1970's? A structural interpretation of of changes in the macroeconomic effects of oil prices.*