

A New Capital Regulation For Large Financial Institutions

Oliver Hart

Harvard University

Luigi Zingales

University of Chicago

Motivations

- The 2008 financial crisis has
 - exposed size of the too-big-to-fail problem
 - worsened the moral hazard it engenders.
- The large – small difference in interbank rates dropped from -29 bps to -78 bps.
- This induces LFI to borrow more increasing
 - the risk of the system
 - the cost of the eventual bailout.
- It also distorts competition increasing the number and size of the banks that would need to be rescued in the future.

What Is Special About LFIs?

- When any large firm goes bankrupt there are two effects on competitors:
 - Substitution: competitors gain market share
 - Complementarity:
 - Information externality
 - Production externality
- In the financial sector, two factors exaggerate the complementarity:
 - A lot of interconnected contracts
 - Psychological element in bank's run

Goal

- The goal of regulation is to preserve the incentive effects of bankruptcy while
 - 1) Avoiding at all costs possibility that LFI is insolvent with respect to its systemic obligations.
 - 2) Conditional on this goal being reached,
 - i) minimizing the probability other obligations suffer a loss
 - ii) making intervention as painless as possible to minimize the “psychological costs”

Result

We design a mechanism where

- 1) in equilibrium there will not be default
- 2) even out of equilibrium the systemic obligations are paid in full
- 3) the differentiated procedure minimize the contagion effects

While much of the incentives effect of debt and of bankruptcy are preserved

Intuition

- Our mechanism mimics the way margin calls function.
- LFIs will post
 - enough collateral (equity) to ensure that the debt is paid in full with probability one.
 - enough non systemic debt to ensure that the systemic debt is paid even out of equilibrium
- When the fluctuation in the value of the underlying assets puts debt at risk, LFI equityholders are faced with a margin call and they must either inject new capital or lose their equity in the bank.

Differences wrt Margin Calls

- 1) Trigger mechanism: based on the CDS price
- 2) Resolution mechanism: If equity is not issued, regulator verifies the value of the firm and
 - If debt is not at risk, he infuse some funds
 - If debt is at risk, he fires the manager and appoint a receiver.
- 3) Second buffer: Junior debt provides an extra layer of protection

Outline

1. Simple capital structure model
2. Optimal capital structure when the states of the world are verifiable
3. Optimal capital structure when the states of the world are not verifiable
4. Endogenizing investments
5. How this rule would have worked
6. Compare with alternatives

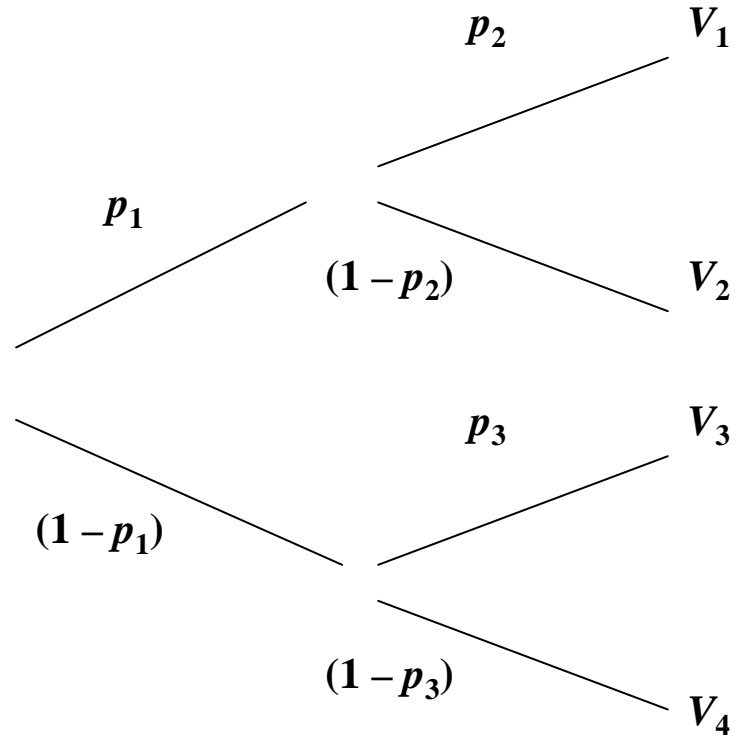
1) The Model

- To model the agency benefits of debt we assume that the LFI manager can “steal” a fraction λ of the cash flow available after having paid down the debt.
- Idea: managers can pay themselves large bonuses as long as the firm does not become insolvent afterwards.
- A two-period model with the following structure

0

1

2



Assumptions

- Capital structure is set in a value maximizing way at time zero
- At time 1, the LFI manager can modify the capital structure by issuing equity only if he has shareholders' approval.
- At time 2, the company pays out the cash flow V and terminates.
- The market is risk neutral, and the interest rate is zero.

In the absence of any debt, the market value of the LFI (which we label V^U , i.e., value of the unlevered firm) would be

$$V^U = (1 - \lambda)[p_1 p_2 V_1 + p_1(1 - p_2)V_2 + (1 - p_1)p_3 V_3 + (1 - p_1)(1 - p_3)V_4].$$

If we introduce a debt D such that $V_4 < D < V_3$, then the market value of the debt V^D at issue will be total value of the levered LFI (V^L) will be

$$V^L = V^U + \lambda[p_1 p_2 + p_1(1 - p_2) + (1 - p_1)p_3]D + \lambda(1 - p_1)(1 - p_3)V_4.$$

The Unregulated Outcome

- Since there is a benefit, but not a cost, of debt, the value of a LFI is monotonically increasing in the level of debt.
- An unregulated value-maximizing LFI will pick a debt level that would lead to bankruptcy with probability one.
- A regulator could impose a debt level less than or equal to V_4 .
- This would eliminate the systemic risks, but impose a high cost for the LFI.
- Can we do better with a contingent capital structure?

The Regulated Outcome

- Consider a time-zero debt level D such that $V_4 < D < V_3$.
- At time 1, if the realization is good \rightarrow debt not at risk
- If the realization is bad, then debt becomes risky \Rightarrow LFI receives a margin call, i.e., it is forced to raise more equity.
- The LFI must raise $y \equiv D - V_4$.

The Regulated Outcome -2

By diluting the entire value of existing equity, LFI can raise

$$p_3(1 - \lambda)(V_3 + y - D).$$

Hence feasibility requires

$$p_3(1 - \lambda)(V_3 + y - D) \geq y,$$

which implies that for a debt level D to be made riskless through a margin call it must satisfy

$$D \leq V_4 + p_3(1 - \lambda)(V_3 - V_4).$$

The Regulated Outcome -3

- LFI value

$$V^L = (1-\lambda)[p_1p_2(V_1 - D) + p_1(1-p_2)(V_2 - D) + (1-p_1)p_3(V_3 + y - D)] + D - (1-p_1)y$$

Substituting the value of y , we obtain

$$(1) \quad V^L = V^U + p_1\lambda D + (1-p_1)\lambda V_4.$$

- Since (1) is increasing in D , it will be optimal for the LFI to set D at the maximum level compatible with the financing constraint.
- Substituting in (1) and rearranging we obtain:

$$(2) \quad \hat{V}^L = V^U + \lambda V_4 + \lambda p_1 p_3 (1-\lambda)(V_3 - V_4).$$

Intuition

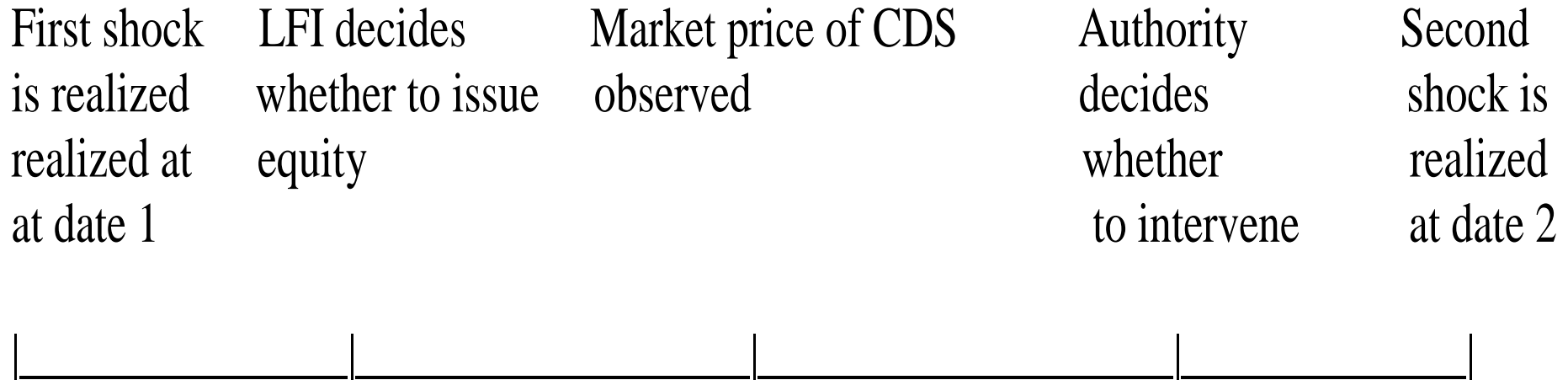
- Debt prevents managerial stealing.
- Since there is at least V_4 in debt, the second term (V_4) represents the stealing prevented in all states of the world.
- With probability p_1 , the higher debt level remains in place and will prevent some further stealing.
 - How much? $\lambda p_3(1-\lambda)(V_3 - V_4)$
 - With what probability? p_1
- With probability $(1 - p_1)$ at time 1, we find ourselves in the lower branch of the tree.
 - debt level must be brought down to V_4 to avoid default, there is no additional stealing prevented.

States of the World Not Verifiable

- We study a “margin requirement” type of mechanism
 - When the margin is called?
 - What happens if the margin call is not answered
- Trigger mechanism: CDS
- Rule: if new equity is not raised (or is not raised in a sufficient amount), the regulator will intervene.
 - Determines whether the debt is at risk; if not he inject some funds in the form of pari passu debt
 - If the debt is at risk he replaces the CEO with a receiver and reorganize the company imposing a haircut on creditors.

Timing

Figure 1: Timing



Key Result

Proposition 1: Assume $D \leq V_4 + p_3(1 - \lambda)(V_3 - V_4)$.

Then the equilibrium price of a CDS, p_{CDS} will be greater than zero if and only if the lower branch of the tree is followed and the LFI raises equity with value less than $D - V_4$ at date 1.

Proof:

A) Suppose lower branch and LFI raises less than $D - V_4$ in equity \Rightarrow it cannot be a rational expectations equilibrium for the regulator not to intervene: there is a positive probability that the debt will not be paid at date 2, and the CDS price will reflect this.

- Suppose instead that market expects regulator to intervene.
- The regulator will find that the LFI is under-capitalized and so he will reorganize imposing creditors a haircut => the CDS price will be positive.
- Thus the unique rational expectations equilibrium is for the CDS price to be positive and for the regulator to intervene.

Resolution Mechanism

- Haircut is imposed to make CDS market viable.
- The injection of funds is designed to
 - Make it politically costly to say that the LFI debt is not at risk
 - Protect systemic relevant contracts (which are senior) from the regulator's mistake
- Political cost maximized by making the government claim junior to financial debt
- But we want to prevent that the government has an easy way to bailout firms for fears that it will abuse of this privilege -> debt senior
- Pari passu debt strikes the right balance.
- If the firm is insolvent pari passu debt does bail out the existing creditors, but it is sufficiently junior to make the government suffer some pain.

Double Layer

- If mechanism works perfectly, no problem even if 100% of debt is systemic.
- If concerned about an “out of equilibrium” events, then
 - a) limit fraction of total debt that is systemic;
 - b) make the systemic debt senior.
- Junior long- term debt has also the function of supporting the CDSs.

Endogenizing LFI activities

- Investment has a cost of i and return R with probability π and r otherwise.
- Realization of this investment opportunity is perfectly correlated with the value of the underlying assets.
- Introduce an additional agency problem:
 - manager captures a fraction of the upside of any investment (in the form of stealing), he suffers no downside cost.

Proposition 3:

Under the CDS trigger mechanism, no negative NPV investments will be undertaken.

- Manager better off if
 - Investment is positive NPV (he can steal a fraction of it;
 - or new equity is issued (he can steal a fraction of it).
- In second case shareholders do not approve

Our rule eliminates all the agency costs of debt.

- 1) It eliminates incentives to undertake negative NPV investments for risk-shifting reasons.
- 2) It eliminates debt overhang problem by forcing equityholders to issue equity when debt becomes risky.
- 3) It eliminates any discretion in the decision to issue equity, removing any signal associated with it.

Why the CDS?

- CDS is where price discovery first occurs
 - It leads the stock market (Acharya and Johnson, 2007), the bond market (Blanco et al, 2005) and even the credit rating agencies (Hull et al, 2004).
- Equity no good because
 - Affected by the upside
 - Multiple equilibria
- Other debt-like instruments (bonds, yield spreads) good as long as
 - Liquid
 - Not easy to manipulate
 - Easily observable

Would This Rule Have Worked?

(Bps of premium to insure against default)

Financial Institution	8/15/2007	12/31/2007	3/14/2008	9/29/2008
BoA	11	29	93	124
CITI	15	62	225	462
JPMORGAN	19	32	141	103
WACHOVIA	14	73	229	527
WAMU	44	422	1,181	3,305
WELLSFARGO	23	45	113	113
BEAR STEARNS	113	224	1,264	118
GOLDMAN	28	78	262	715
LEHMAN	38	100	572	1,128
MERRILL	29	159	410	666
MORGAN	31	129	403	1,748
AIG	31	59	289	821

False vs. True Positives

"Failed" institution	Date of	Average CDS	Average CDS
	Default	6 months	9 months
		before	before
BEAR STEARNS	3/14/2008	121	10
LEHMAN	9/15/2008	288	106
WAMU	9/25/2008	957	430
WACHOVIA	9/30/2008	176	45
MERRILL	9/15/2008	282	177
AIG	9/16/2008	234	70
CITI	9/30/2008	162	44
"Surviving" Institutions	False Positive Date with a Trigger at		
	100	40	
BoA	9/22/2008	1/22/2008	
WELLSFARGO	9/18/2008	11/23/2007	
JPMORGAN	9/29/2008	2/15/2008	
GOLDMAN	2/14/2008	8/20/2007	
MORGAN	11/13/2007	8/22/2007	

Commitment Mechanism

- Too-big-too-fail is mainly a political economy problem: faced with the trade off
 - Bankruptcy costs vs. distortion in the ex ante incentives,
- even a benevolent government will be biased in favor of the bailout.
- By forcing regulator to take a decision earlier (when restructuring costs lower), our mechanism reduces the bias.

Does It Help to Avoid Systemic Crisis?

- 3 reasons why an LFI failure has systemic effects:
 - 1) Losses on the credit extended to the insolvent LFI can make other LFIs insolvent.
 - Our mechanism eliminates this problem
 - 2) The failure of an LFI can force assets liquidation leading to downward spiral in assets prices
 - Our mechanism does not force any asset liquidation, thus avoiding a downward spiral in assets prices.
 - 3) LFI failure reduces financial and human resources dedicated to trading certain assets classes.
 - Our mechanism increases the amount of capital invested in the sector, alleviating the shortage which is at the root of many crises.

Comparison with the Literature

- Main difference w.r.t. Kashyap et al. (2008) is
 - 1) mechanism to make certain states of the world verifiable:
 - CDS prices vs. an aggregate industry profits.
 - 2) resolution mechanism built in
- Flannery (2005) and Squam Lake proposal (2009) contingent debt.
- Trigger mechanism?
 - Equity : self fulfilling equilibria
 - CDS: It does not work
 - Political: risk associated with it.

Conclusions

- The too-big-to-fail problem arises from a combination of
 - an economic problem : cost of bankruptcy on systemic obligations is very large
 - a political economy problem: time inconsistency induces the government/regulator to sacrifice the long-term effect to avoid the short-term costs
- Our mechanism addresses both these problems.
- It is similar to existing capital requirements:
 - two layers of protections for systemic obligations: equity capital and junior long-term debt.

Conclusions -2

- It differs in
 - trigger mechanism (based on CDS)
 - resolution mechanism.
- This mechanism ensures that LFIs are solvent with probability one, while preserving the disciplinary effects of debt.
- Credit default swaps have been demonized as one of the main causes of the current crisis. It would be only fitting if they were part of the solution.