Heterogenous Regulation of Financial Institutions

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First Annual ECB Macroprudential Policy and Research Conference

Introduction

A principal lesson from the crisis of 2007-2008: seemingly different institutions are ultimately exposed to the same risks as banks (runs!)

Regulatory response: Expand bank-style regulation beyond banks

Some examples for the latter:

- Dodd-Frank gives FED the power to regulate all institutions of systemic importance
- Regulating shadow banking system is top priority for FSB
- Solvency II requires insurance companies to hold capital like banks ("Basel for insurers")
- Investment banks became BHCs and are now in the regulated depository sphere

There is a clear rationale for such regulation

- Similar risks should be regulated in same way
- Avoiding regulatory arbitrage
- Spill-backs from non-bank to bank sector

However:

- Homogenous regulation can exacerbate systemic risk
- It may also discourage specialization
- If no lightly regulated areas in the financial system, innovation may be stifled
- Activities in different parts may simply be different and hence require different regulation

This paper: Optimal regulation across sectors

1. Financial system with two sectors
   - Traditional sector: carries out standard projects
     - no start-up costs, fair return ("commercial banks")
   - Second sector: carries out advanced projects
     - potentially high return, need fixed costs and are subject to an incentive problem ("hedge funds, investment banking")
2. Systemic risk
   - Trade-off between return and liquidity
   - Liquidation externality: individual bankers take too much risk; this provides the rationale for regulation
3. Interaction among sectors
   - Market for distributing liquidity in the system
   - Liquidation externality works across sectors (discontinuation of projects by one sector affects other sector)

Distortions and results

Regulation has several objectives:

1. Correct the liquidation externality
2. Efficient allocation of capital across sectors
    1. extensive margin: relative size of two sectors
    2. intensive margin: specialization in portfolios
3. Provide incentives in the advanced sector

Some Results

- Homogenous regulation is not efficient
- Optimal regulation across sectors is interdependent
- Optimal regulation can be achieved through menu which combines activity restrictions with institution-level subsidies

Literature

Until recently, literature on systemic risk has mostly focused on single sector. Some exceptions are:

- Spill-backs from insurance to banking sector (Allen and Carletti (2006) and Allen and Gale (2005))
- Ordonez (2013): Banks can use shadow banks to avoid regulation, this can be efficient when banks are disciplined by reputational concerns. However, this backfires when reputation weakens.
- Harris, Opp and Opp (2014): Capital requirements for banks spurs entrance of non-banks. The latter focus on good borrowers, which has negative effects on banks
- Plantin (2016): If shadow banking cannot be perfectly regulated, it may be optimal not to regulate traditional banking system too much because risk is then pushed in shadow banking system

Literature

- Benefits of diversity: Specialized asset positions mitigate systemic risk (Acharya and Yorulmazer, 2007, Wagner, 2011, Allen et al 2013)

- Interaction among regulators, mostly across countries (e.g., Dell'Arricia and Marquez (2006), Acharya (2003), Holthausen and Ronde (2002)).

The model

- Three dates (0,1,2) and risk-neutral bankers (measure one)
- Liability side of a bank is given: one unit of funds with e equity and $1-e$ (insured) debt
- Technologies
  - Standard storage technology
  - Traditional technology: project that returns $\mathbf{f}(\mathbf{y})$ ($f' > 0$, $f'' < 0$) at date 2 for an investment of y at date 0
  - Advanced technology: returns $\mathbf{f}(\mathbf{y}) + \mathbf{by}$ ($b > 0$) at date 2 but requires fixed investment of $\mathbf{k}$ at date 0
    - Advanced technology more productive if operated at full scale ($\mathbf{b} > \mathbf{k}$)
    - Advanced technology is subject to incentive problem: at date 1.5 banker can extract private benefit B (interpreted as not undertaking effort) when there was no prior liquidation at $t = 1$. In this case project returns zero at date 2.
  - A banker can only operate one of the two long-term technologies
  - Choice of long-term technology not observable but scales are

The model

- Date-1 liquidation (discontinuation) technology for projects: allows to turn $1+\gamma$ units of output at date 2 into 1 unit at date 1.
  - Liquidation cost γ increases in *total amount* of liquidation I in the economy: $\gamma'(I) > 0$
  - This may arise because of systemic externalities, such as interaction of asset prices and borrowing constraints

- Liquidity risk: At date 1 with probability π a mass λ (> 0) of depositors withdraws

- Markets: At date 1 there is a market where bankers can trade claims to date-2 output

1. Economy without incentive problems: The first best

Consider first economy without incentive problems.

An allocation can be characterized by proportion of bankers operating traditional projects ($\mathbf{n}$), their investment scales $\mathbf{y}_B$ and the investment scales of bankers operating advanced projects, $\mathbf{y}_F$. Liquidity holdings are $x_B = 1 - y_B$ and $x_F = 1 - y_F$ in the two sectors.

Discontinuation of projects. In crisis state, there is a liquidity shortage equal to total withdrawals by depositors λ, minus the combined liquidity holdings of the two sectors:

$$l = \lambda - n(1 - y_B) - (1 - n)(1 - y_F) \tag{1}$$

Thus $(1 + \gamma)l$ units of date-2 output have to be liquidated and the total cost is hence $\gamma(l)l$

The first best

- The first-order condition for the traditional project, y_B^*, is given by

$$f'(y_B) - 1 - \pi\gamma = \pi\gamma'(I)I. \tag{2}$$

  LHS: project-level gain from scaling up. RHS economy-wide effect, arising because the unit liquidation cost γ increases when more needs to be liquidated at $t = 1$

- The first-order condition for the advanced project y_F^* is given by

$$f'(y_F) + \mathbf{b} - 1 - \pi\gamma = \pi\gamma'(I)I. \tag{3}$$

From (2) and (3) we obtain that scales in the traditional sector are lower ($y_B^* < y_F^*$) as (marginal) productivity is lower in this sector. Lower scales for traditional projects in turn imply higher liquidity holdings for bankers undertaking these projects: $x_B^* > y_F^*$.

The first best

The first-order condition for n (size of the standard sector) is:

$$f(y_B) - y_B - (f(y_F) + by_F - y_F - k) + \pi\gamma(l)(y_F - y_B) = -\pi\gamma'(l)l(y_F - y_B) \quad (4)$$

LHS: project-level gain of using the traditional technology as opposed to the advanced technology.
RHS: economy-wide effect arising because the per-unit liquidation cost changes when a banker switches to the traditional technology. This effect depends on the difference in scales in the two sectors ($y_F - y_B$) – as scales determine liquidity levels and hence liquidations. Since liquidity holdings are higher in the traditional sector (and hence $y_F^* - y_B^* > 0$), liquidations decline when a banker switches to the traditional technology, and unit liquidation costs γ fall.

Interdependencies in regulation

Optimal investment levels across sectors are **substitutes**: Consider an (exogenous) increase in the investment scale in the advanced sector, y_F. This will lead to an increase in the liquidation cost γ in the economy, and lower the optimal scale in the traditional sector.

The reason is that liquidation costs are driven by economy-wide shortages, and not shortages specific to an individual sector.

Equilibrium

Private versus Social FOC: LHS (project-level) identical but RHS does not enter private FOC

Proposition

In equilibrium we have that
(i) the aggregate amount of liquidity is inefficiently low ($\widetilde{x} < x^*$),
(ii) the advanced sector is inefficiently large ($\widetilde{n} < n^*$).

(i) Individual banker ignores the external effect of liquidity on other bankers (arising from lower liquidation cost γ), and chooses too little liquidity
(ii) As traditional projects are operated at lower scales, there is a positive external effect of moving to the standard sector: a banker doing so increases the net supply of liquidity and lowers liquidation costs. This effect is not internalized and hence too few bankers choose the standard sector.

Regulation

Consider first regulation that puts an upper limit on investment scales $\overline{y}$ (homogenous regulation)

Proposition

A single scale limit cannot achieve the first best.

Reason: uniform regulation cannot correct externalities as optimal scales differ across sectors.

Consider next heterogenous regulation set by two regulators

Proposition

Scale restrictions set by two regulators result in an inefficient allocation.

Reason: A regulator internalizes impact of liquidations in own sector but not on other sector. In equilibrium this can result in both too lenient and too strict regulation.

Menu

Consider a regulator offering two menus: A **"light"** menu and a **"restrictive"** , with respective scaling restrictions $\overline{y}_F$ and $\overline{y}_B$ $(\overline{y}_F \geq \overline{y}_B)$.
The restrictive menu is associated with a lump-sum **subsidy** s_B.
Problem: project choice has to be incentive compatible.

Proposition

A menu consisting of two different activity restrictions and a subsidy for the restrictive choice can implement the first best.

Incentive compatibility: as advanced technology has higher productivity, a banker's utility under light menu is higher for this technology. Bankers will operate advanced technology under light and standard one under restrictive menu.
The subsidy (which needs to be strictly positive) is needed to incentivize bankers to choose the traditional sector – as this sector is more regulated, bankers would otherwise populate only the advanced sector.

Menu

The menu described resembles the status quo in regulation:

1. A heavily regulated sector (commercial banks) coexists with lightly regulated sectors (hedge funds, private equity, shadow banking)
2. This seemingly allows for regulatory arbitrage in that activities with same externality are regulated differently.
3. At the same time, the traditional sector benefits from (explicit or implicit) subsidies (e.g., deposit insurance, bank bailouts and access to discount window), making it worthwhile for bankers to undertake activities in this sector as well.

2. Economy with incentive problems

- Regulator now also has to make sure the incentive constraint in advanced sector is fulfilled
  - This requires a minimum scale in the advanced sector. Intuitively, a banker needs to be allowed to operate the project at a sufficient scale to make effort worthwhile.
- There consequence is that there is now an additional benefit from higher scales in the advanced sector, as this helps the incentive constraint. Thus the allocation has to become more heterogenous

Conclusions

- We have considered a model of systemic risk with two, interacting, financial sectors.
- Uniform regulation in this model is inefficient by deterring specialization and by undermining rents required for effort.
- The optimal outcome can be achieved by offering a menu. Bankers self-select, resulting in two sectors operating projects at different scales and holding different levels of liquidity.

Implications for policy

1. Differences in **regulation of activities** on one hand, **and** differences in **subsidies** at the institutional level on the other hand, have to be seen in conjunction. Individually, they each create inefficiencies. However, combined they can create an efficient outcome.
2. Regulation has to take place at the **"meta" system** level. Historically, different parts of the system are under the responsibility of independent regulators. As systemic risk is not confined to individual sectors, this creates inefficiency.
3. Optimal **regulation** across sectors **is interdependent**. Light regulation in on sector is OK if accompanied by strict regulation in other sectors that acts as a "back-stop".
4. Regulation should be based on **comparative advantages**. Some sectors have an advantage in carrying out risky activities, while others may have an advantage in holding and supplying liquidity. Regulators should focus on identifying these advantages, and design regulation to reflects them.