Comments by Rafael Repullo on

Financial Institution Dynamics and Capital Regulations

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Purpose of paper

• Provide a rationale for two features of banking regulation
  → Minimum capital requirements
  → Capital conservation buffer of Basel III

• What is new?
  → Agency problem between bank manager and shareholders

• How is it motivated?
  → High bank payouts in the early stages of the crisis
Structure of paper

• Introduction
• Some suggestive evidence
• A primer on Basel III
• Dynamic model of a bank without deposits
• Dynamic model of a bank with deposits
• Conclusion
Model 1: Bank without deposits

• Bank run by risk-averse manager
  → Manager chooses dividend payments and equity issues
  → Manager compensation linked to dividend payments

• Key assumption
  → Manager cannot commit to paying future dividends
  → Time inconsistency problem

• Main result
  → Underinvestment (relative to first-best)
Model 2: Bank with insured deposits

• Incorporating insured deposits and exogenous default risk
  → Distortions generated by deposit insurance

• Main result
  → Excessive leverage (relative to first-best)
Preliminary comments

• Model 1 is not a model of a bank
  → Dynamic model of firm fully funded with equity

• Model 2 adds one specific feature of banks: insured deposits
  → No borrower screening, loan monitoring, risk-shifting, etc.
Main comments

• Conflict between managers and shareholders is interesting
  → Shed light on roles of outside and inside equity

• Formal analysis is very complicated
  → It is difficult to see what is driving the results

• Some assumptions are not properly justified
  → Results may not be robust

• Policy analysis is incomplete
  → “Two types of regulations would likely be necessary”
What am I going to do?

• Comment on some special assumptions of the model
  → Are they needed for the results?

• Consider a simpler setup
  → In fact, a one-period model
Part 1

Some comments on the assumptions
Standard assumptions

- Manager is risk-averse and shareholders are risk-neutral
- Manager is more impatient than shareholders
- Concave production function
- Proportional cost of equity issuance
Special assumptions (model 1)

• Manager’s compensation is fraction $\psi$ of dividends paid
  → Reduced form: No analysis of optimal agency contract
  → Why not a function of share prices?

• Fraction $1 - \gamma$ of compensation accrues to future shareholders
  → Why do we need this?
  → Why not simply assume $\gamma = 1$?

• First-best defined by eliminating differences in impatience
  → Does this make any sense?
Special assumptions (model 2)

• Bankruptcy threshold level of capital $n$ is not zero
  → Why not?

• Outside option of manager of defaulting bank is $V(n)$
  → Why does it depend on $n$?

• Increasing (internal) cost of raising deposits $h(d)$
  → Why do we need this?
Part 2

A simple model
A simple model

- Two dates $t = 0, 1$
- Risk-neutral manager that gets fraction $\psi$ of dividends paid
- Manager discount factor = Shareholders discount factor = $\beta < 1$
- Cost of raising equity = 0
- Deposit rate = 0
- Safe investment
Notation

- Initial net worth = $n$
- Initial dividend paid = $z$
- Manager compensation $c = \psi z$
- New equity raised = $m$
- Bank capital $y = (n - z - c) + m$
- Bank deposits $d$
- Bank investment $y + d$
- Bank return $f(y + d) = (y + d)^{1/2}$
Allocation of final payoff

• Final payoff $f(y + d)$
  → First used to pay deposits $d$
  → Then used to pay shareholders and manager $f(y + d) - d$
  → Shareholders get
    \[
    \frac{1}{1 + \psi} [f(y + d) - d]
    \]
  → Manager gets fraction $\psi$ of dividends paid
    \[
    \frac{\psi}{1 + \psi} [f(y + d) - d]
    \]
Model 1: Bank without deposits

- Manager’s problem

$$\max_{(z,m)} \left[ \psi z + \beta \frac{\psi}{1+\psi} f(y) \right]$$

subject to PC of new shareholders

$$m = \beta \frac{m}{y} \frac{1}{1+\psi} f(y)$$

→ LHS of constraint: new equity raised at $t = 0$

→ RHS of constraint: discounted value at $t = 1$

→ Note: new shareholders get share $m/y$ of bank’s capital
Solution of model 1

• If optimal decision involves $m > 0$ we have

$$m = \beta \frac{m}{y(1+\psi)} f(y) \implies y = \left( \frac{\beta}{1+\psi} \right)^2$$

• Substituting this result into manager’s objective function gives

$$\max_z \left[ \varphi z + \beta \frac{\varphi}{1+\psi} f(y) \right] = \varphi \left[ z + \left( \frac{\beta}{1+\psi} \right)^2 \right]$$

• Which implies maximum feasible dividends $z$

$$z + c = (1+\psi)z = n \implies z = \frac{n}{1+\psi}$$
Comments on the solution (i)

• Initial net worth is fully distributed to shareholders and manager
• New shareholders provide all the capital: $m = y$

• Note interesting feature of solution
  → Bank pays dividends and raises equity at same time
  → Small cost of raising equity would not change the result
Comments on the solution (ii)

• For $\psi < 1$ we get an overinvestment result

  $\rightarrow$ First-best obtained by solving

  $$\max_y [\beta f(y) - y]$$

  $\rightarrow$ First-order condition

  $$\beta f'(y) = \frac{\beta}{2y^{1/2}} = 1 \rightarrow y^* = \left(\frac{\beta}{2}\right)^2 < \left(\frac{\beta}{1+\psi}\right)^2 = y$$
Model 2: Bank with deposits

• Manager’s problem

\[
\max_{(z,m,d)} \left[ \psi z + \beta \frac{\psi}{1+\psi} [f(y+d) - d] \right]
\]

subject to PC of new shareholders

\[
m = \beta \frac{m}{y} \frac{1}{1+\psi} [f(y+d) - d]
\]

→ LHS of constraint: new equity raised at \( t = 0 \)

→ RHS of constraint: discounted value at \( t = 1 \)

→ Note: new shareholders get share \( m/y \) of the bank’s capital
Solution of model 2

• If optimal decision involves $d > 0$ we have first-order condition

$$f'(y + d) = \frac{1}{2} (y + d)^{-1/2} = 1 \text{ which implies } y + d = \frac{1}{4}$$

• But then if the optimal decision involves $m > 0$ we get

$$m = \beta \frac{m}{y} \frac{1}{1 + \psi} \left( \frac{1}{2} - d \right) \text{ which implies } y = \frac{\beta}{1 + \psi} \left( \frac{1}{2} - d \right)$$
A preliminary result (i)

• We have two linear equations with two unknowns ($y$ and $d$)

\[
y + d = \frac{1}{4}
\]

\[
y = \frac{\beta}{1+\psi} \left[ \frac{1}{2} - d \right]
\]
A preliminary result (ii)

- There is no solution with $d > 0$ and $m > 0$ if
  \[
  \frac{\beta}{2(1 + \psi)} > \frac{1}{4} \quad \rightarrow \quad 1 + \psi < 2\beta
  \]

- In this case either $d = 0$ or $m = 0$
  
  \[\rightarrow\] Model 1 shows what happens when $d = 0$

  \[\rightarrow\] We now analyze what happens when $m = 0$
Solution of model 2 with no equity issuance

• If optimal decision involves \( d > 0 \) we have first-order condition

\[
f'(y + d) = \frac{1}{2} (y + d)^{-1/2} = 1 \quad \text{which implies } \quad y + d = \frac{1}{4}
\]

• But then manager’s problem becomes

\[
\max_{(z,d)} \left[ \psi z + \beta \frac{\psi}{1 + \psi} [f(y + d) - d] \right]
\]

• Substituting \((1 + \psi)z + y = n\) and \(y + d = \frac{1}{4}\) gives

\[
\max_d \frac{\psi}{1 + \psi} \left[ n + d - \frac{1}{4} + \beta \left( \frac{1}{2} - d \right) \right] \quad \text{which implies } \quad d = \frac{1}{4} \rightarrow y = 0
\]
Comments on the solution

• Initial net worth is fully distributed to shareholders and manager
• Depositors provide all the new funding for the bank

• Note interesting feature of solution
  → Bank operates with zero capital
  → Result driven by assumption $\beta < 1$

• Risky investment + deposit insurance would yield same result
Final solution of model 2

• We have shown that solution involves either $d = 0$ or $m = 0$

  $\rightarrow$ Manager’s payoff when $d = 0$

  $$U_m = \frac{\psi}{1+\psi} \left[ n + \frac{\beta^2}{1+\psi} \right]$$

  $\rightarrow$ Manager’s payoff when $m = 0$

  $$U_d = \frac{\psi}{1+\psi} \left[ n + \frac{\beta}{4} \right]$$

• If $1 + \psi < 2\beta$ we have $U_m > U_d$

  $\rightarrow$ Bank will not want to take deposits
Summing up

• Simple model keeps key assumption of original model
  → Manager’s compensation is fraction $\psi$ of dividends paid

• Simple model yields some of the original results
  → Bank pays dividends and raises equity at same time

• Simple model yields some surprising results
  → Bank would not want to take deposits
  → It would not be a bank!
Intuition for the results

• Manager compensation depends on dividends paid
  → Manager gets no compensation out of debt payments
  → Hence preference for equity rather than debt finance

• Manager prefers high dividend payments
  → Hence paying dividends and raising equity at same time
Concluding remarks

• Introducing agency problems in banking is interesting
  → But need microfoundations for management compensation

• Model is too complicated
  → And some restrictive assumptions may not be needed

• Policy analysis requires to specify a social welfare function
  → Difficult with heterogeneous agents