# Rule versus Discretion in Bank Resolution

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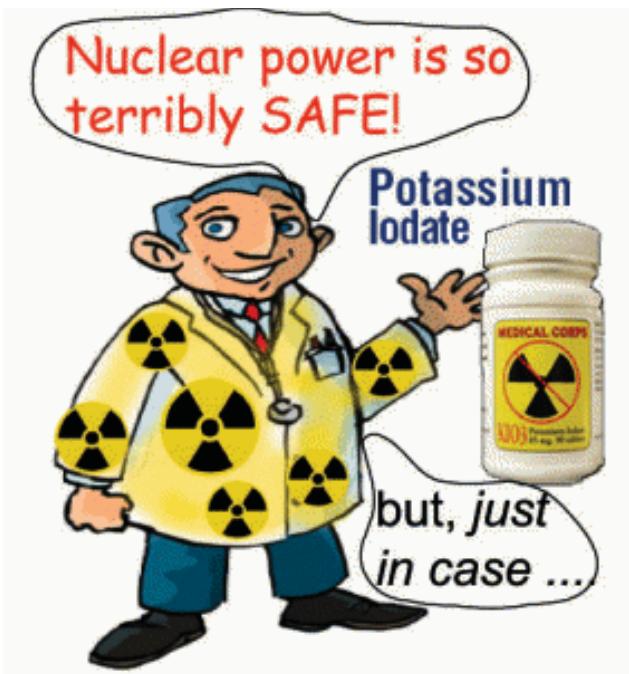
# I wish I had written this paper, because...

- Highly relevant question: the regulator wants to intervene, but must not bring turmoil to the markets
- On the one hand, *general*: no unnecessary specifications and parametrizations
- On the other hand, *simple*: no unnecessary frills, every ingredient sits in the right place $\rightarrow$ *beautiful*
- Most results strengthen intuition, but *many* surprising effects!
- Linear structure, small digestible increments
  3. Start with abstract problem
  4. Discuss commitment
  5. Cocos as implementation of commitment
  6. Effect of liquidity and capital regulation
  7. Add lender of last resort

# Comments

- The setting is bank-specific, but the general question is universal
- Example: catastrophe, but actions cannot be too drastic to avoid a panic
- April 29, 2016: “Every Belgian Is Being Given an Iodine Pill In Case of Nuclear Disaster”



# Setting I

- $t = 1, 2$
- Single bank, subject to *intervention by regulator*
- Short-term liabilities, face value $D$
- Long-term bail-inable bonds, face value $B$, *junior to short-term debt*
- Assets: random cash flow $V \in [\underline{v}, \overline{v}]$
- Regulator observes $v$, public observes signal $S \in [\underline{s}, \overline{s}]$
- Distribution of $V$ given $S$ is $F(v|s)$ with

$$\frac{\partial F(v|s)}{\partial s} < 0$$

# Setting II

- Regulator can *bail in* $a \in [0, B]$ long-term bonds
- Bail in = write down debt (owners do not get paid) or convert into equity (owners paid in shares)
- Public observes $a$, together with $S$, infers the regulator's information
- Define $\beta(v|a,s)$ = distribution of $v$ given public information
- Define $\int v\, d\beta(v|a,s)$ = conditional expectation
- Short-term creditors *can withdraw* their debt, or roll it over
- Non-pecuniary *cost* $\chi$ *(small)* for early withdrawal
- Liquidation value of assets = $\lambda V$
- Market value $p = \lambda \int v\, d\beta(v|a,s)$

# Welfare

- Liquidation cost $(1-\lambda)\,\sigma\,v$
- Bank's equity $E = v + a - (D + B)$
- Assume utility $U(E)$ with $U' > 0, U'' < 0, U'(E^*) = 0$ for some *optimal equity level* $E^*$
- Aggregate social welfare

$$W = U(E) - (1-\lambda)\,\sigma\,v = U(E) - \underbrace{(1-\lambda)\,\pi\,v}_{\kappa}$$

where $\pi$ is the *exogenous* run probability

- If $\sigma$ were independent of $a$, the regulator would choose

$$a^* = E^* + D + B - v$$

or border solution

# Equilibrium with Discretion I

- Regulator's effective objective function

$$W = U(E) - \kappa(v) \times 1_{\lambda E_\beta[V] < D}$$

*Question*: if even $E_\beta[V] < D \rightarrow \pi = 1 \rightarrow$ higher $\kappa$?
*Question*: equilibrium selection (below) would yield $\pi = 0$?
*Question*: avoid these points by assuming *single lender*, then have separate section on *dispersed* short-term lending?

- Equilibrium: the bail-in rule maximizes welfare, and beliefs are consistent
- Lemma 1: In an equilibrium with discretion,
  - No runs: $\lambda E_\beta[V|\alpha, s] \geq D$
  - Minimal pooling: $\alpha(v, s) = \alpha(\underline{v}, s)$ for all $v \leq v_P(s)$
  - Incentive compatibility: $\alpha(v, s)$ is either flat or equal to ideal action $a^*(v)$
- Beliefs might be crazy: short-term creditors may panic for some low $a$, need not even be monotonic?

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# Equilibrium with Discretion II

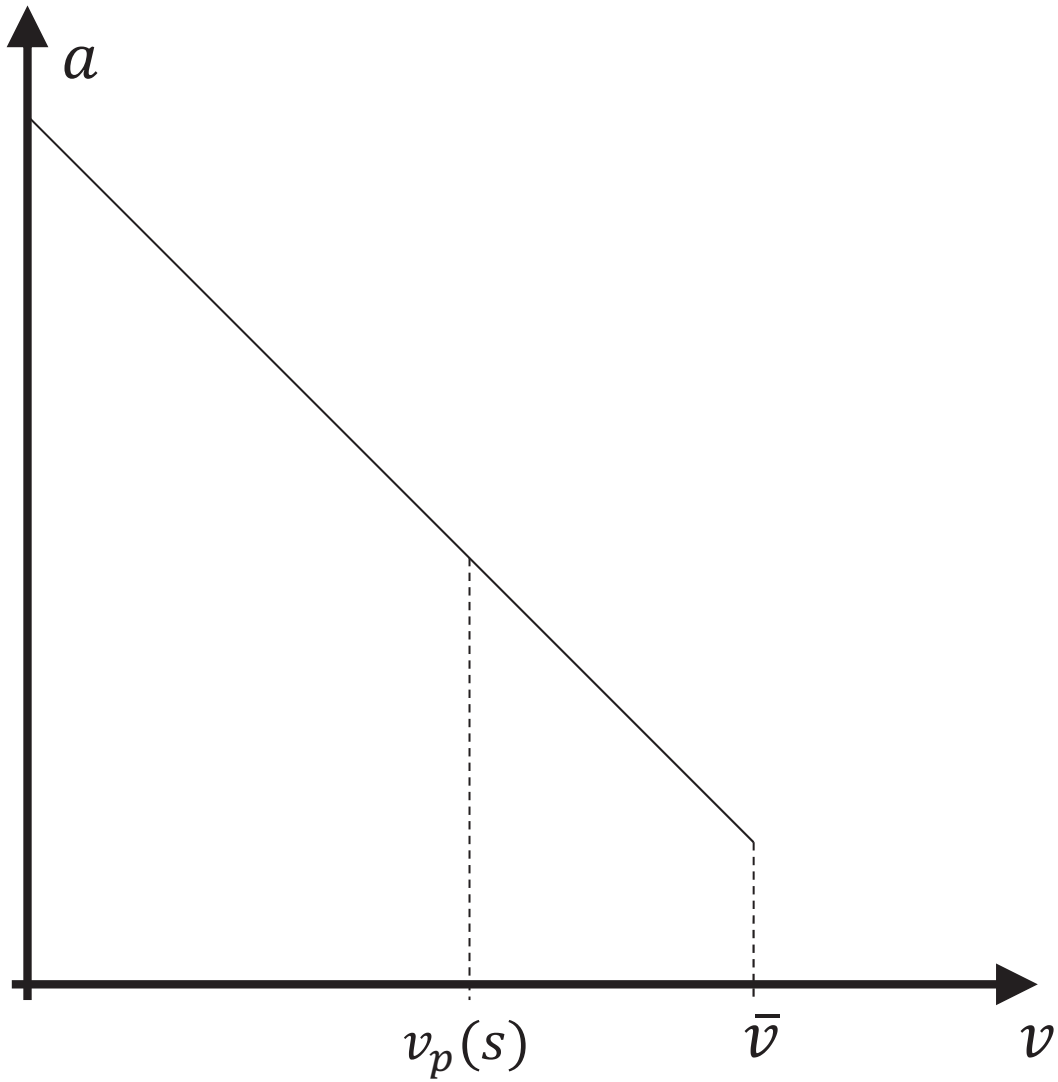
- Equilibrium Selection I: consider only equilibria that survive the *intuitive criterion*
- Equilibrium Selection II: out of remaining equilibria, take the best
- *Proposition 1*: Intuitive criterion $\rightarrow$ the bail-in rule satisfies

$$\alpha(v,s) = \min\{a^*(v), a'\} \quad \text{for some} \quad a' \leq a^*(v_P(s))$$

- *Excessive weakness* if the regulator has very bad news
- *Proposition 1'*: The highest payoff is achieved if $a' = a^*(v_P(s))$. Expected welfare (depending on public information $s$) is thus

$$\bar{U}(s) = E[U(v + \min\{a^*(v), a^*(v_P(s))\} - D - B)|s]$$

# The Mechanics of the Communication Game



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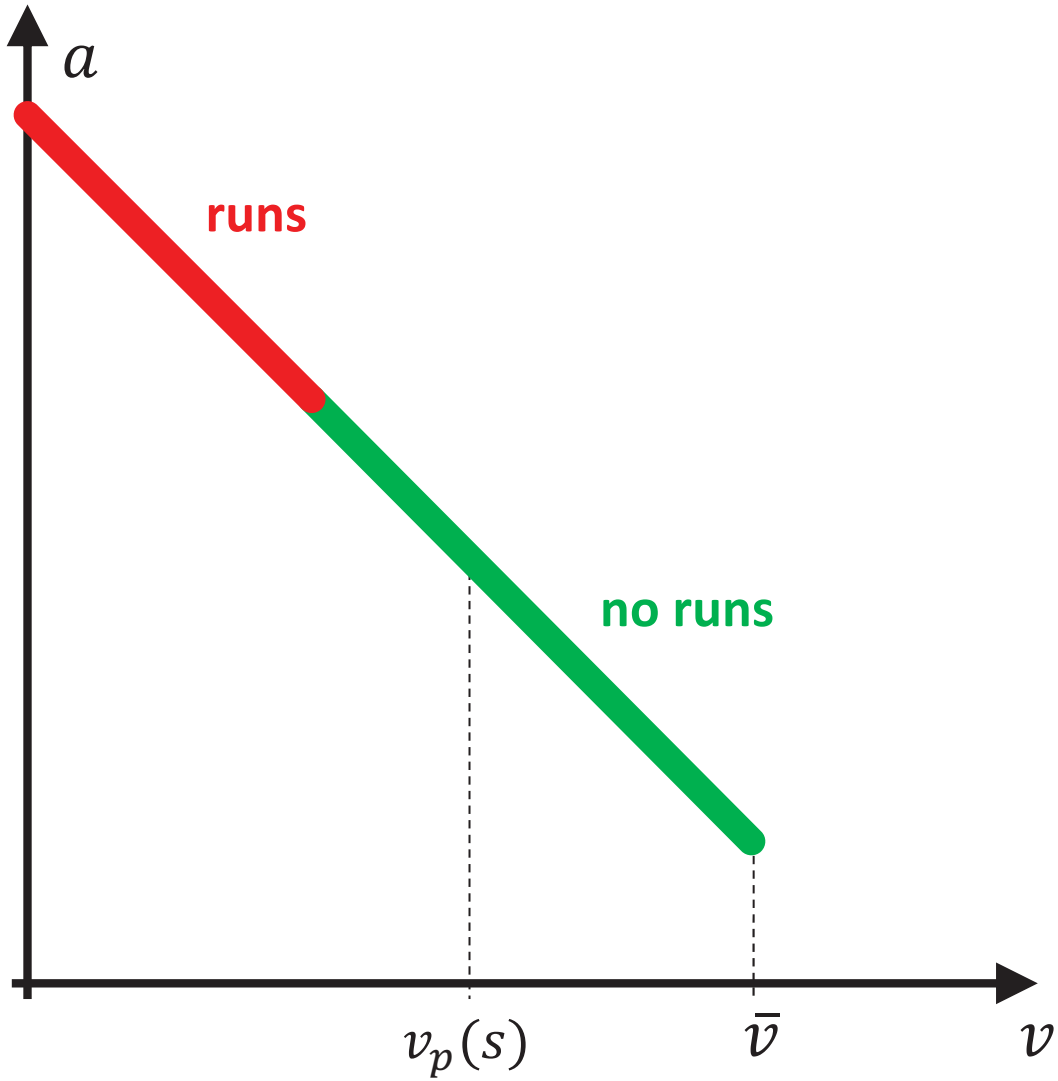

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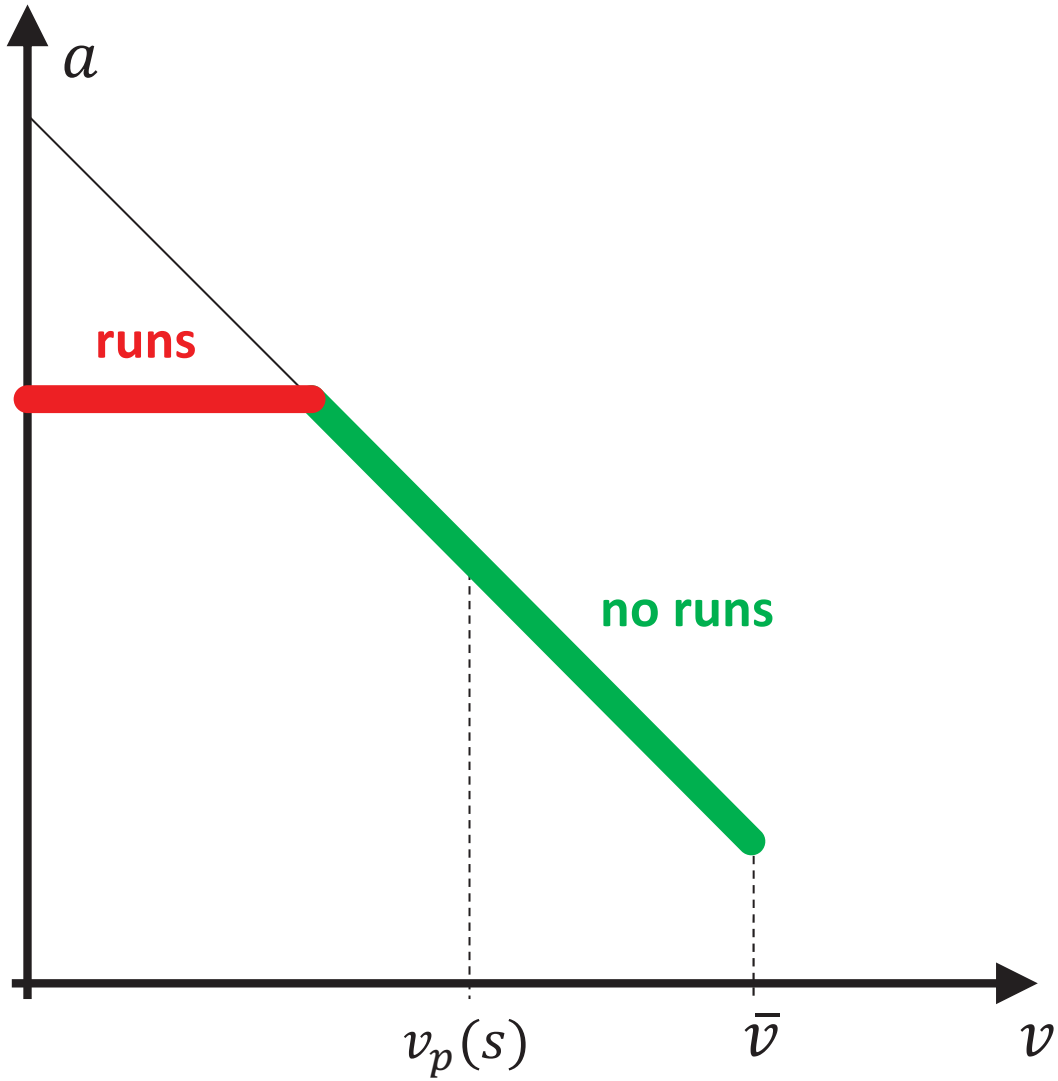

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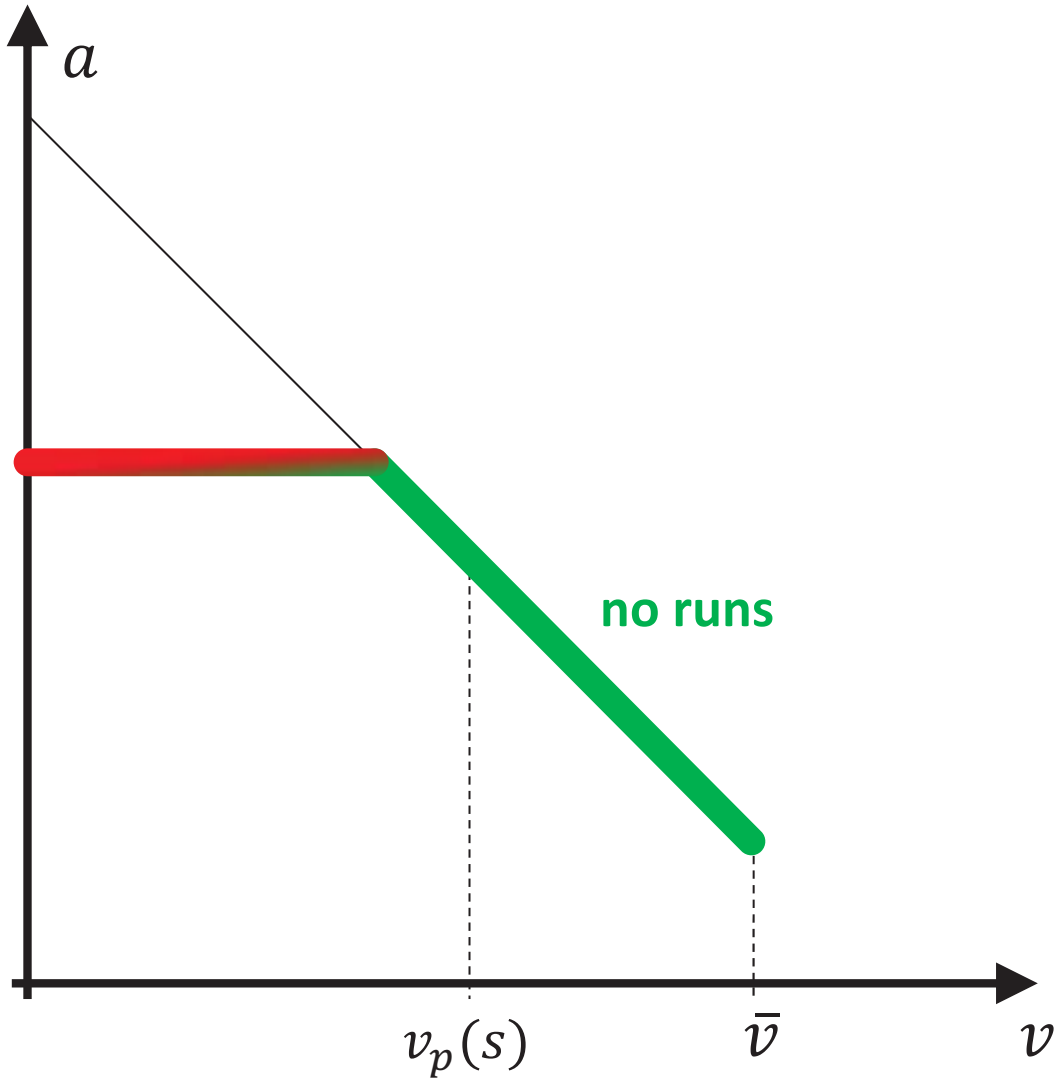

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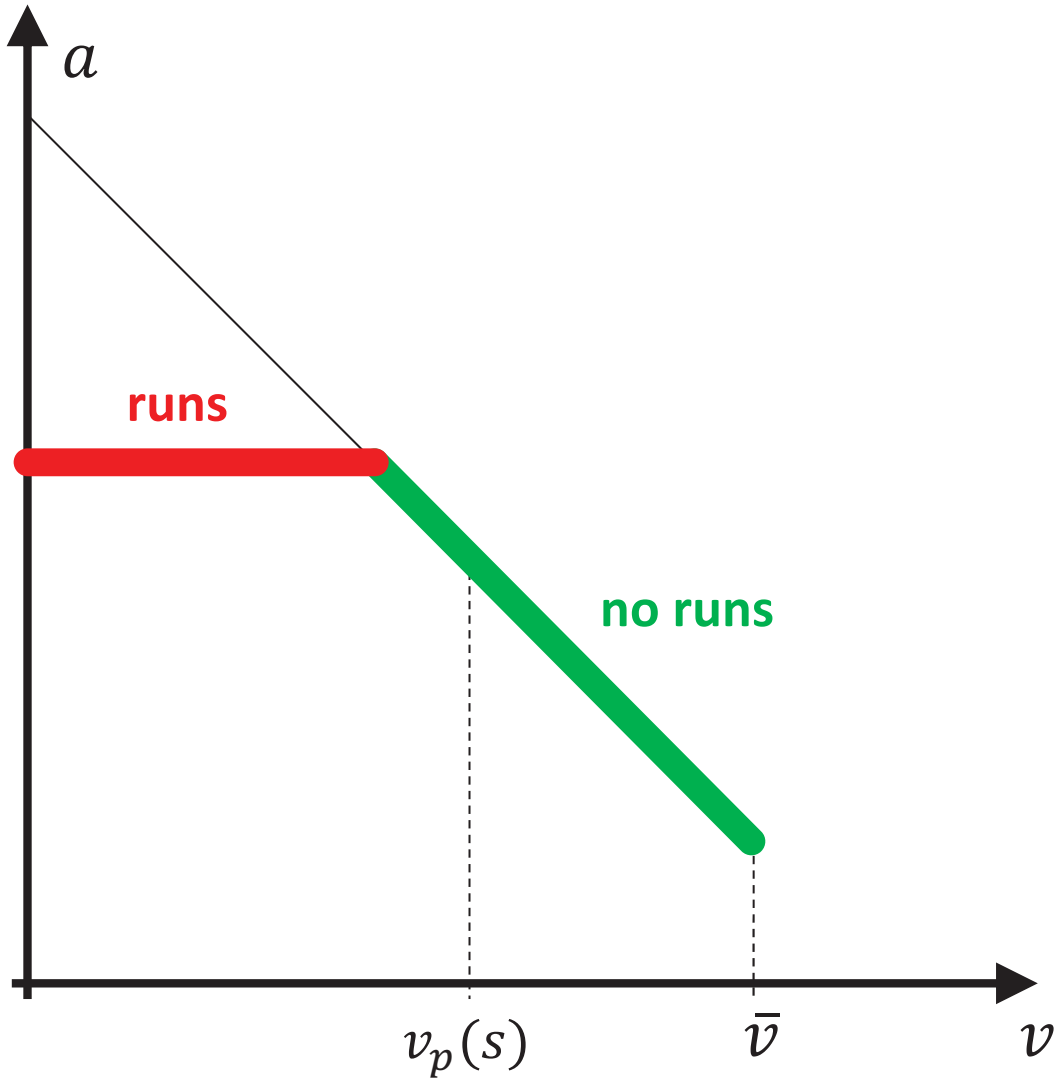

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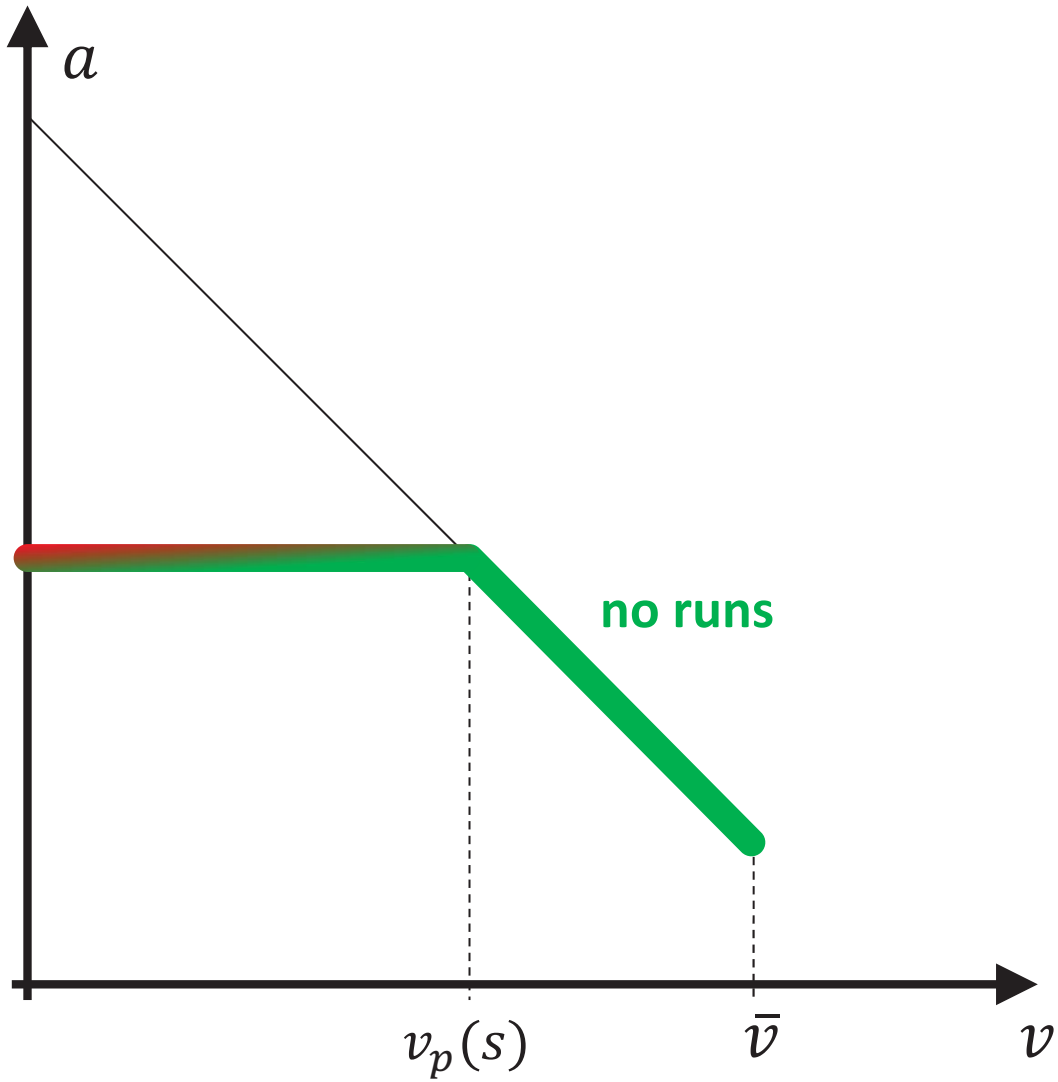

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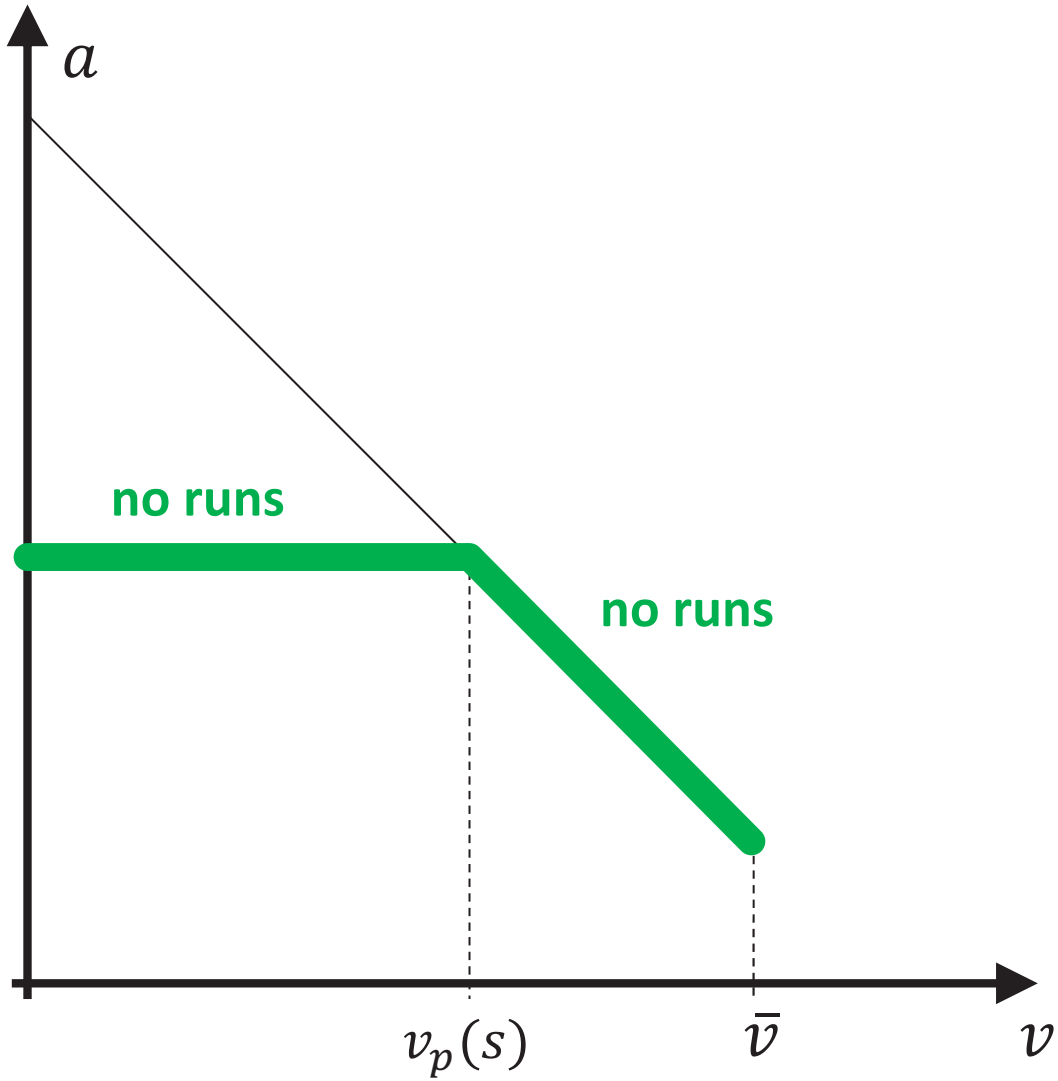

# Comments

- First reflex: Why can't the regulator, by choosing an extremely high $a$, increase bank equity by so much that panics become irrational (like an upper dominance region)
- Answer: Because bail-in and panics are *unrelated*
- Short-term debt $D$ is senior to long-term bonds $B$, does not improve by turning $B$ into equity
- Advantage: concentrate on *pure information transmission*
- Disadvantage: bail-in does not raise bank's debt capacity

- Definition of objective function:

$$W = U(v + a - D - B) - \kappa(v) \times 1_{\text{if run}}$$

but if lenders run, the *argument of the utility function should also change*

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# Comments

- How important is the *continuous* choice of bail-in $a$?
- I would have thought, even a *bail-in is tiny*, it does not induce much confidence in the lenders
- Possible reason: many banks in an economy $\rightarrow$ if one is bailed in, it cannot be *one of the safer types* $\rightarrow$ panic
- Possible reason: lenders *cannot observe a* exactly, *or* cannot observe the ratio between $a$ and other balance sheet data exactly $\rightarrow$ benefit of rollover $\chi$ is small $\rightarrow$ panic
- Possible reason: the *intuitive criterion* deletes some rather "intuitive" equilibria

# Comments

- The regulator's information $V$ must be soft (non-verifiable)
- Otherwise, in fairly bad states (but not too bad), the regulator could communicate the true $s$, prevent a panic, and bail in as much as he likes $\rightarrow$ *partial unraveling*
- Cannot be information from stress tests, accounts, ...
- *What is V?*

# Global Games

"For tractability, we assume that with multiple equilibria, one of the stable equilibria is picked based on the realization of *independent sunspots*. In particular, suppose that the bank run $\varphi = 1$ is played with probability $\pi > 0$, and $\varphi = 0$ is played with probability $1 - \pi$. The global games approach of *Goldstein and Pauzner (2005)* could, in principle, be used to endogenize $\pi$. We work with an *exogenous* $\pi$ in order to obtain a more tractable characterization of regulatory trade-offs."

- Questions: *How modeled?* *What would change?*
- Example: investors observe $s + \varepsilon$ with idiosyncratic (small) $\varepsilon$, regulator observes true $v$ (and $s$)?
- Assumption of $\chi$ small would not work
- Lower dominance region: $E_\beta[V] \geq D$
- Communication strategy would involve a trade-off

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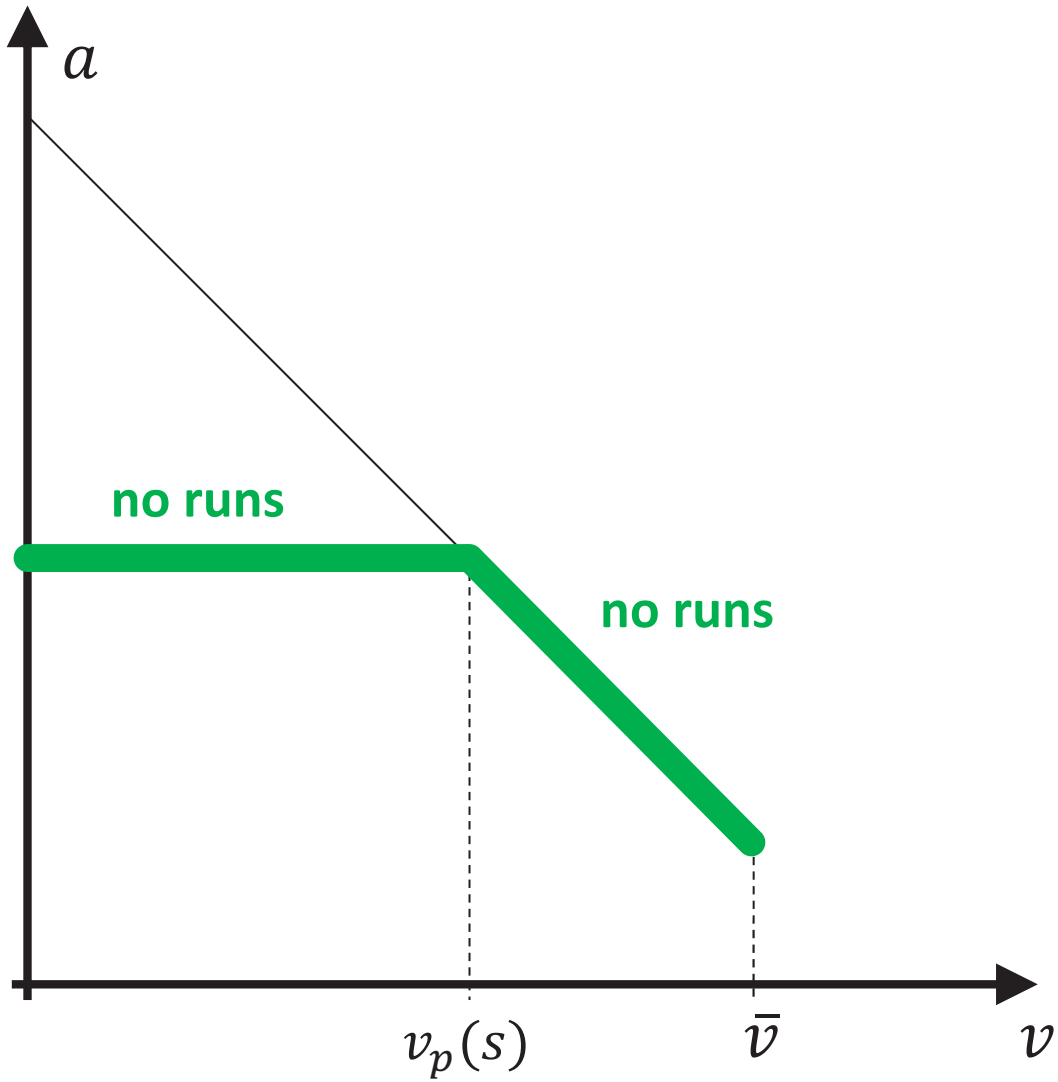

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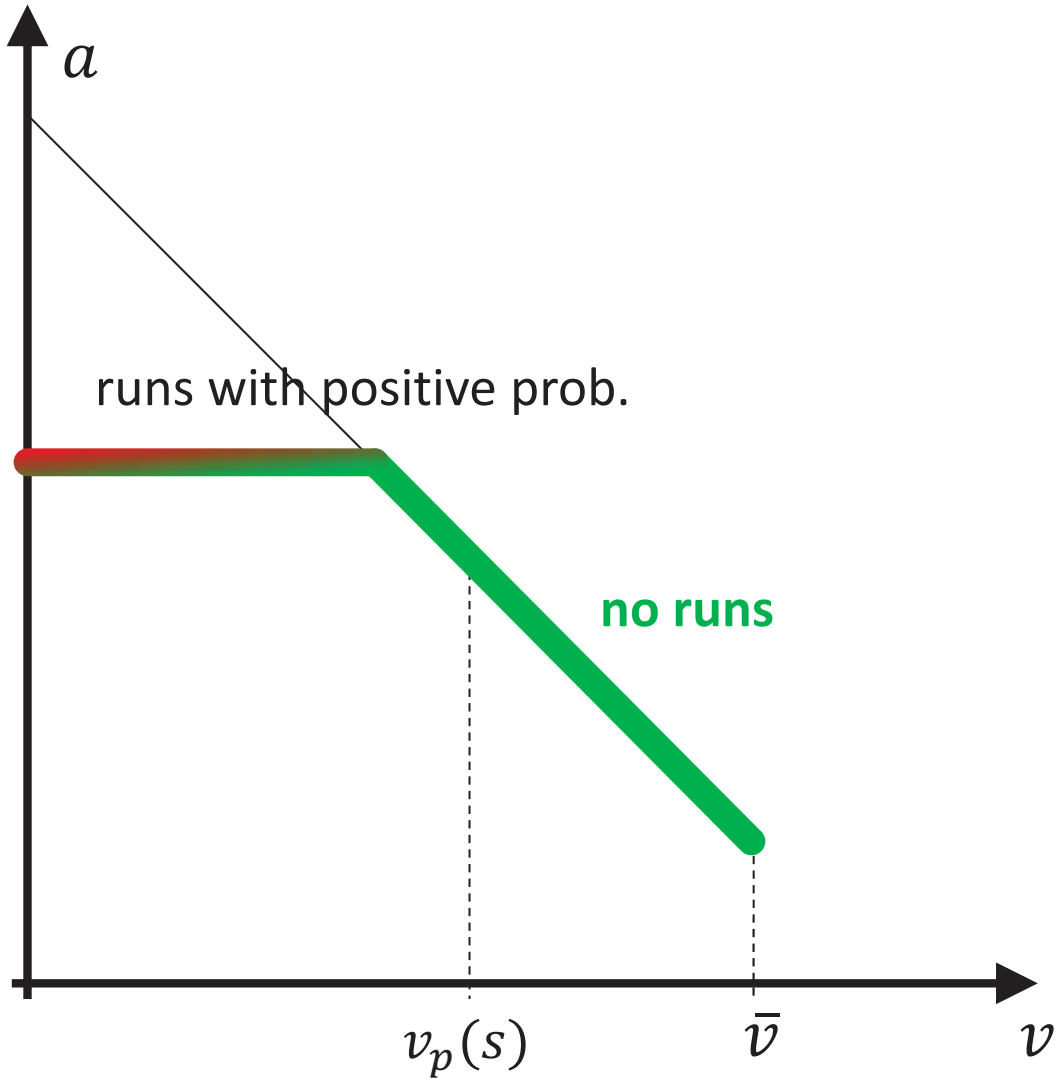

# Optimal "Regimes" and Contingent Capital

- Section title?
- New game: The regulator chooses some interval $[\underline{s}, \bar{s}]$ of states in which he commits to an action $a(s)$. In all other states, he can pick a policy (based on his private info $V$)
- Value of commitment (in comparison to 0, not in comparison to the situation without commitment):

$$VC(s) = \max_A E[U(W)|s]$$

- *Proposition 2*: The optimal commitment set is an interval at the lower end. The optimal action maximizes $VC(s)$, it is decreasing in $s$.


- *Proposition 3*: Garbling the public signal moves $s^*$ outwards

# Contingent Capital as a Commitment Device

- Contingent capital: amount $\varphi(s)$ of $B$ is converted into equity
- Insight: contingent capital can implement the optimal commitment strategy, *but not more!*
- *I would have guessed*: use contingent capital ($s$) for coarse tuning, then use bail-in ($v$) for fine tuning
- *Comment*: verifiability for conversion of coco bonds?
- If not verifiable, *market trigger* may be necessary
- How does $W$ differ from the bank's objective function?
- If not much (ex ante), the bank could design its coco-bonds
- *"Commitment device"*: does not cure time inconsistency, but suppresses information transmission

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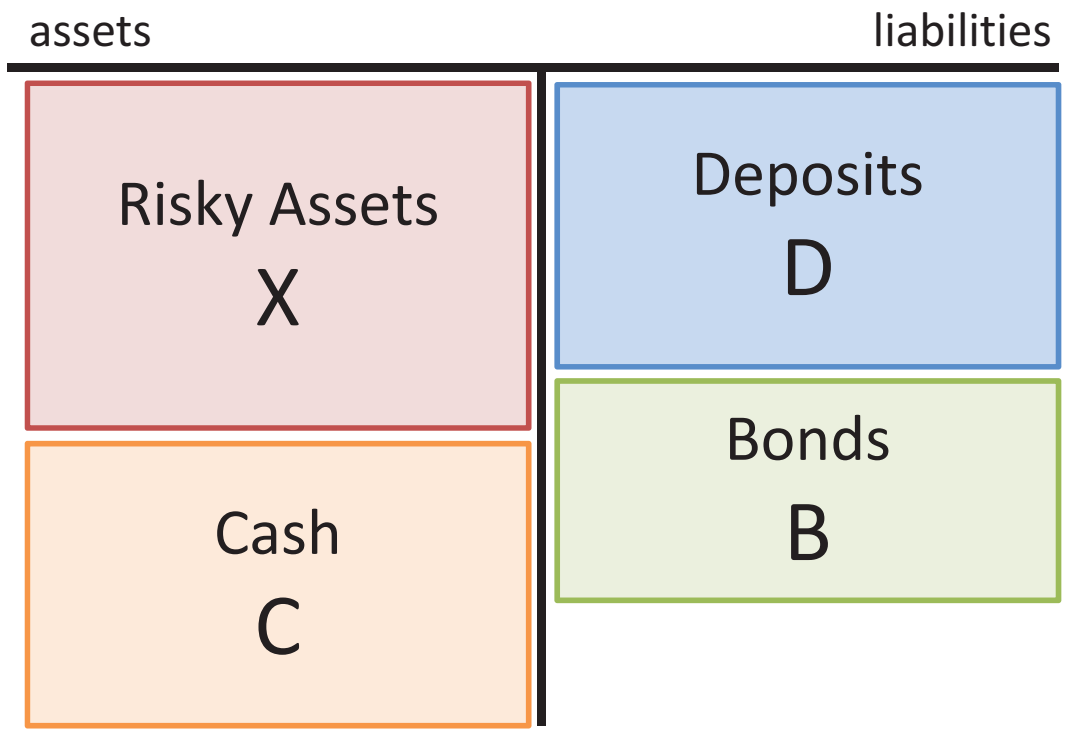

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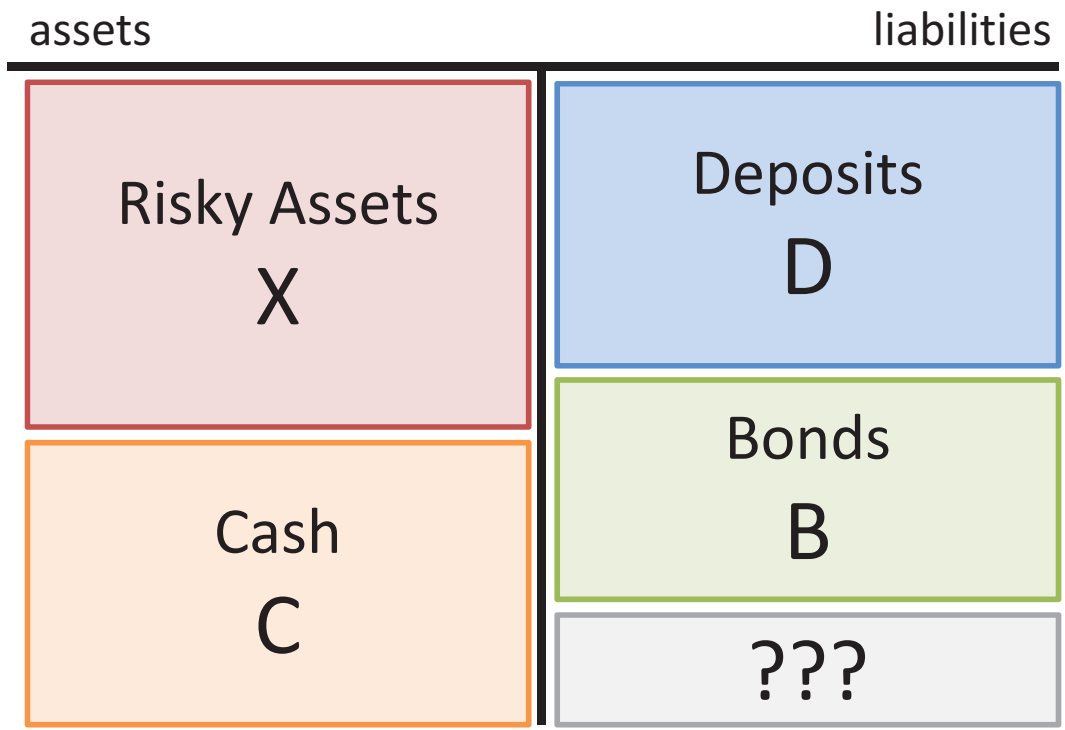

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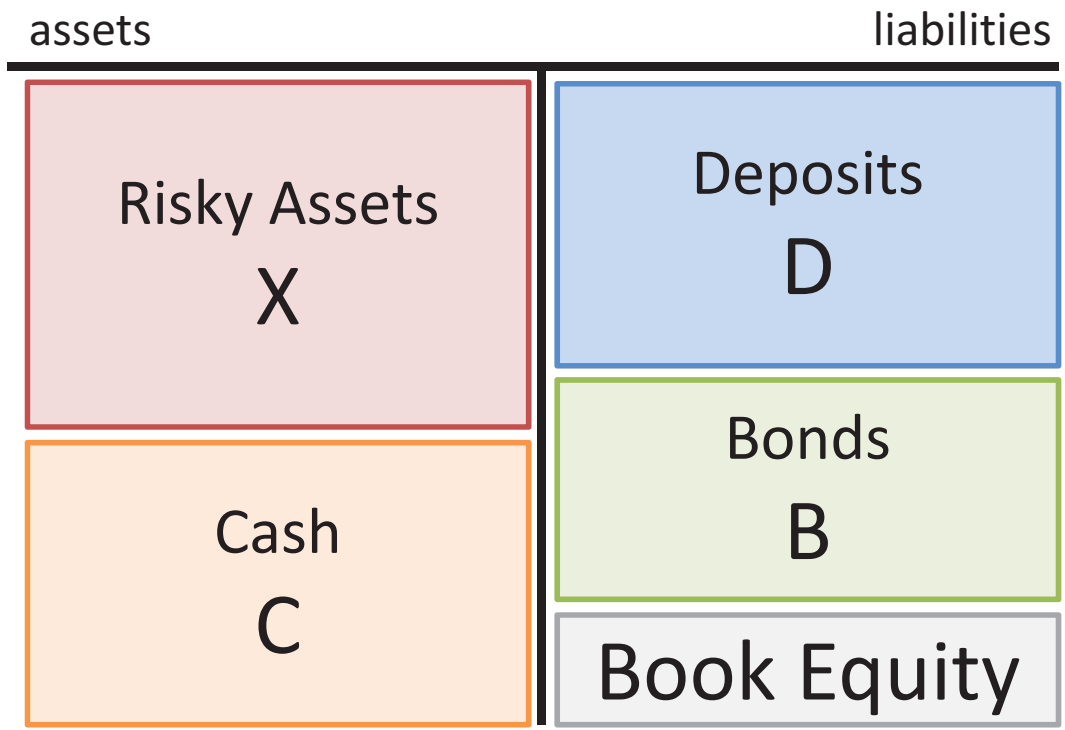

# The Bank's Balance Sheet and ex ante Regulation

- New definition of $v_P(s)$ is $C + \lambda E[X\,V | V \leq v_P(s), s] = D$,

$$E[V|V \leq v_P(s), s] = \underbrace{\frac{D-C}{\lambda X}}_{=:\Delta}$$

- $\Delta$ can be interpreted as liquidity coverage ratio (LCR)
- Book equity is $X + C - D - B$, thus capital regulation:

$$\frac{X + C - D - B}{w\,X} \geq \kappa \qquad \Longrightarrow \qquad 1 - \kappa\,w \geq \lambda \Delta + \frac{B}{X}$$

- Because $C$ appears always in the *net* $D - C$, what's its role?
- Reason for the second result: Capital regulation affects both $D$ and $B$, but $B$ is only a "playground" for information transmission

# The Lender of Last Resort

- Partial liquidity support: LoLR gives $L$ per unit of risky investment, but "can only take on a fraction $\eta$ of the bank's assets as collateral"
- Bank sells fraction $z$ of its assets, obtains $\lambda E[V] z$
- Has $1 - z$ for LoLR, of which $\lambda (1 - z)$ serve as collateral
- LoLR *lends* $\eta (1 - z) L$
- Paper: LoLR lends $\max\{\eta, 1 - z\} L$; assumption: assets are heterogenous, only *subgroup* serves as collateral for LoLR
- In both cases, LoLR assistance mitigates the problem of excessive weakness *at the margin*
- *Comment:* If bail-in is intended to reduce time-consistency problem of LoLR, then lenders might anticipate to be rescued if bail-in is insufficient
- *Comment:* not liquidity support, rather *equity injection*

# Summary

- Insights into the mechanics of the information game between regulator and banking system
- Coco bonds implement optimal commitment strategy
- At the margin, *liquidity regulation* mitigates the excessive weakness problem
- Capital regulation $\rightarrow$ effects unclear
- At the margin, *LoLR* mitigates excessive weakness
- I wish I had written this paper