ECB FORUM ON CENTRAL BANKING

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Bailout Expectations, Default Risk and the Dynamics of Bank Credit Spreads

EUROPEAN CENTRAL BANK

EUROSYSTEM

Motivation & Questions

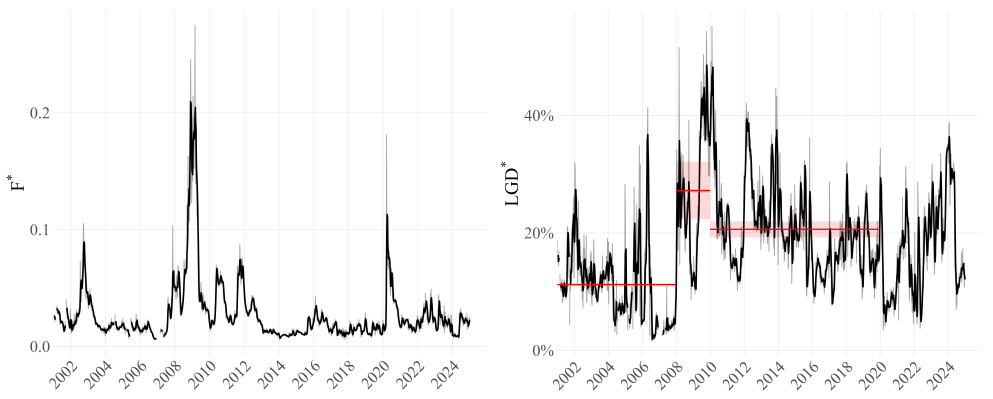
- After 2010, US reforms aimed to make the financial system safer
  - Basel III → increase bank equity buffers
  - Title II of Dodd-Frank → reduce bailout expectations
- Research Questions:
  - Were promises to reduce bailouts perceived as *credible* by markets?
  - What are the consequences for bank risk-taking behavior?
- Consistent with permanent rise in banks credit spreads post-2010
  - Weaker fundamentals could also explain higher spreads

Preview of Results

- Estimating Default Risk: use equity options to recover risk-neutral default prob.
  - Default prob. went back to pre-2008 levels while spreads remained elevated
- Quantitative Analysis: decompose 34 bps increase in spreads post-2010
  - **28 bps** due to drop in bailout probability from **94%** to **77%** on average
  - 18 bps due to worse fundamentals
  - Tighter regulation *reduced* spreads by 12 bps
- Implications for bank risk-taking and asset pricing
  - Post-2010, lower bailout expectations and tighter regulation contribute ≈ equally to drop in leverage and increase in expected returns on bank assets

    → abstracting from changes in bailout expectations **overstates** the effect of regulation

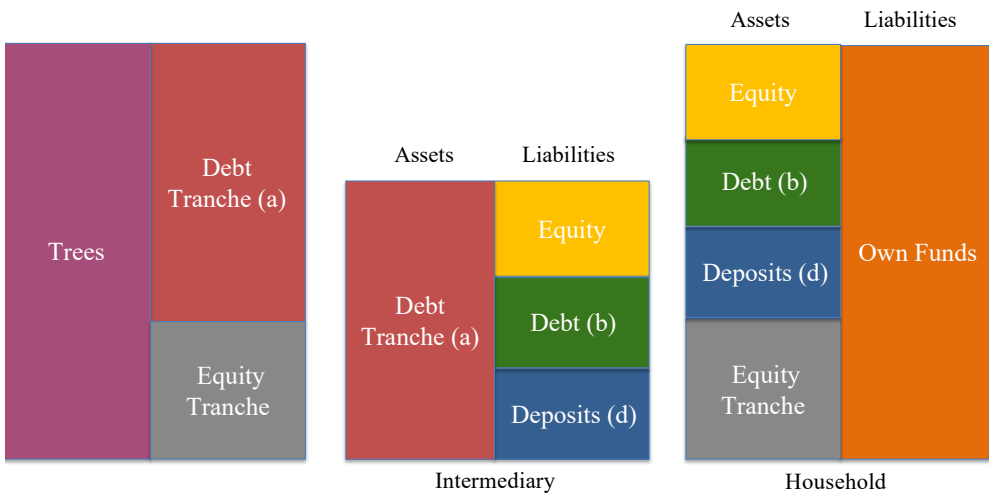
Default Probabilities and Expected Losses



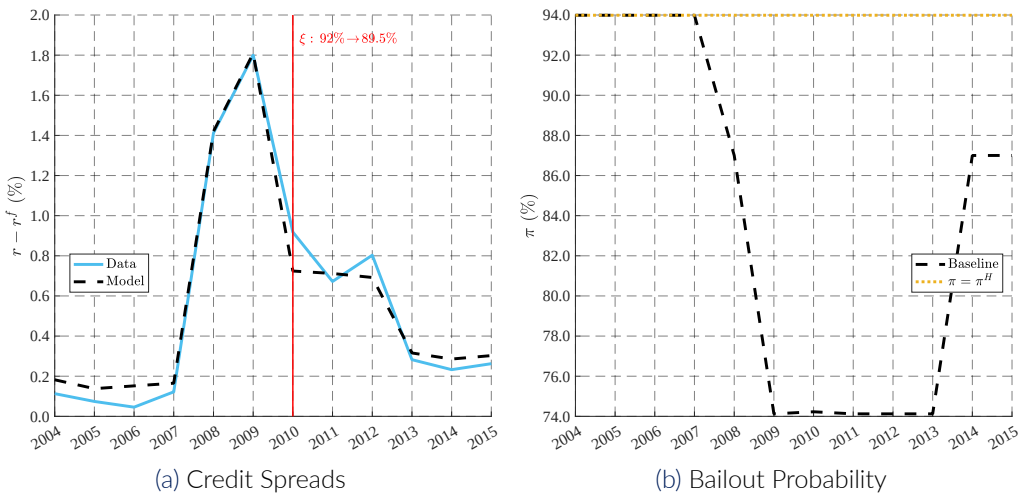
(a) Median $\mathbb{F}^*_{t,T}$ for $T = 365$ (b) Median $\mathrm{LGD}^*_{t,T}$ for $T = 365$

- Increase in $\mathrm{CS}_{t,T}$ post-2010 is due to $\mathrm{LGD}^*_{t,T} \uparrow$ while $\mathbb{F}^*_{t,T} \downarrow$
  - $\mathrm{LGD}^*_{t,T}$ increases from 11% pre-2008 to **21**% post-2010

Market Structure



The Dynamics of Credit Spreads and Bailout Probabilities



(a) Credit Spreads (b) Bailout Probability

- Bailout probability drops in 2009, then rises in 2014 but remains lower

Expected Returns

- Variation in cost/composition of funding alters expected returns on intermediary's assets via net worth
- From intermediary's optimality condition:

$$\mathbb{E}_{\mathbf{S}}\left[R^A(\mathbf{S}',\mathbf{S})\right] = \underbrace{R^I(\mathbf{S})\left(1-\lambda(\mathbf{S})\,\xi - \frac{B'}{p(\mathbf{S})}\frac{\partial q(\mathbf{S})}{\partial A'}\right)}_{\text{Regulation/Default Adjusted Risk-Free Rate}} + \underbrace{\mathrm{cov}_{\mathbf{S}}\left(-\frac{\mathcal{M}^I(\mathbf{S}',\mathbf{S})}{\mathbb{E}_{\mathbf{S}}[\mathcal{M}^I(\mathbf{S}',\mathbf{S})]},\ R^A(\mathbf{S}',\mathbf{S})\right)}_{\text{Risk Premium}}$$

  - ↑ adjusted-$R^I(\mathbf{S})$ → higher required compensation for all assets
    ↑ risk premium → higher required compensation for risky assets
  - Tighter capital req. ($\xi \downarrow$) and lower bailout exp. ($\pi \downarrow$) → $\mathcal{M}^I(\mathbf{S}',\mathbf{S})$ more countercyclical

→ $\mathbf{Cov}\left(\cdot, R^A(\mathbf{S}',\mathbf{S})\right)$ becomes more negative and expected returns rise

This Paper

- Decompose spreads with a dynamic model of financial intermediation
  - Two main ingredients: bank default risk and time-varying bailout probabilities
  - Credit spreads move with shifts in fundamentals and bailout expectations
- **Logic**: comovement of default prob. and spreads helps disentangle the two forces
  - Fundamentals ↓⇒ spread ↑ and **default prob.** ↑
  - Bailout expectations ↓⇒ spread ↑ and **default prob.** ↓
- Combine model with CDS spreads and default prob. estimated from equity options
  - Use model to attribute contributions of fundamentals and bailout expectations
  - Use decomposition to assess effects on banks' willingness to take risk after 2010

Accounting Framework

- LGD: creditors' losses conditional on institution failure (equity price $S = 0$)
- The credit spread is given by

$$\underbrace{\mathrm{CS}_{t,T}}_{\text{credit spread}} \simeq \underbrace{\frac{\mathbb{E}_t[\mathcal{M}_T\,\mathbb{F}_T]}{\mathbb{E}_t[\mathcal{M}_T]}}_{\text{risk-neutral default prob. } \equiv \mathbb{F}^*_{t,T}} \times \underbrace{\frac{\mathbb{E}_t[\mathcal{M}_T\,\mathrm{LGD}_T \mid \mathbb{F}_T = 1]}{\mathbb{E}_t[\mathcal{M}_T \mid \mathbb{F}_T = 1]}}_{\text{risk-neutral expected LGD } \equiv \mathrm{LGD}^*_{t,T}}$$

  where $\mathcal{M}_T$ is SDF that prices maturity-T payoffs at t and $\mathbb{F}_T \equiv \mathbf{1}_{\{S_T=0\}}$
- Goal: isolate component of credit spreads due to default probability
  - $\mathrm{CS}_{t,T}$ from bank CDS contracts and $\mathbb{F}^*_{t,T}$ from bank equity options

Model Environment

- Discrete time, infinite horizon $t = 0, 1, 2, \ldots$
- **Agents**: Households, Intermediaries, Government
- **Preferences**: Epstein-Zin utility

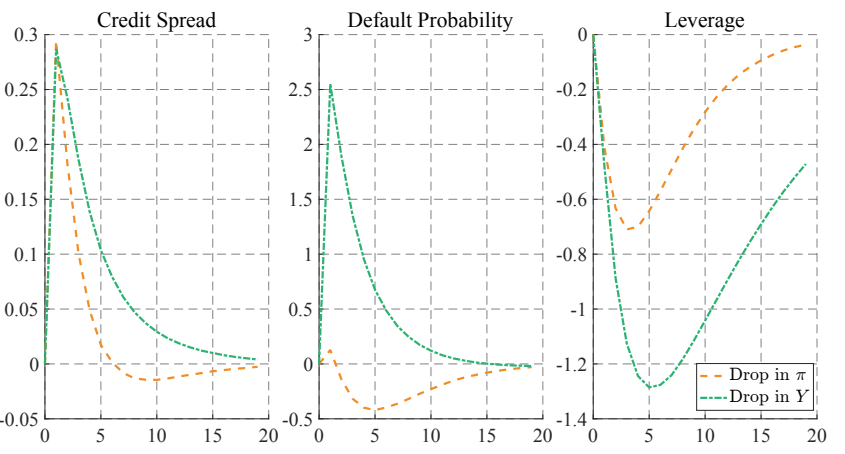
$$U = \left\{(1-\beta)\,(C)^{1-1/\nu} + \beta\left(\mathbb{E}\left[(U')^{1-\gamma}\right]\right)^{\frac{1-1/\nu}{1-\gamma}}\right\}^{\frac{1}{1-1/\nu}}$$

- **Technology**: Lucas orchards

$$y = z\omega\boldsymbol{Y}$$

  where z is tree-specific shock, ω is island shock, and $\boldsymbol{Y}$ is aggregate risk
- **Resource constraint**: $Y = C +$ default/issuance costs

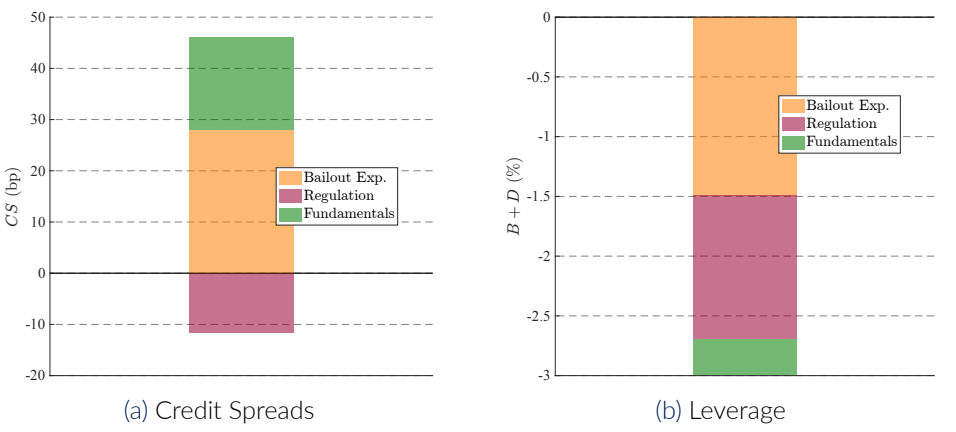
Credit Spread, Bailout Expectations and Fundamentals



IRFs to a drop in $\boldsymbol{\pi}$ and $\boldsymbol{Y}$ (% deviations from steady state)

- Default prob. decreases when bailout expectations decrease ($\boldsymbol{\pi} \downarrow$)
- Default prob. increases when fundamentals worsen ($\boldsymbol{Y} \downarrow$)

Decomposing Spreads and Leverage



(a) Credit Spreads (b) Leverage

Decomposition of pre-2008 vs. post-2010 changes

- Post-2010, banks lost subsidy of ≈ 28 bps in their cost of debt due to $\downarrow \pi$
- Lower π accounted for ≈ half of the drop in leverage

The Impact of Bailout Expectations and Capital Regulation

	Baseline	Bailout Expectations	Regulation
Expected return	108	45.8	52.9
(Adjusted) Risk-free rate	43.6	13.4	26.6
Risk premium	64.4	32.4	26.3

Pre-2008 vs. post-2010 baseline changes and counterfactual economies contributions (bps)

- Lower bailout expectations explain 50% of increase in risk premium
  - Justify shift of portfolios away from very risky assets on top of tighter regulation
- Both lower bailout expectations and tighter regulation contributed to higher cost of credit to firms/households