

ECB FORUM ON CENTRAL BANKING

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Luigi Falasconi



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



EUROPEAN CENTRAL BANK

EUROSYSTEM

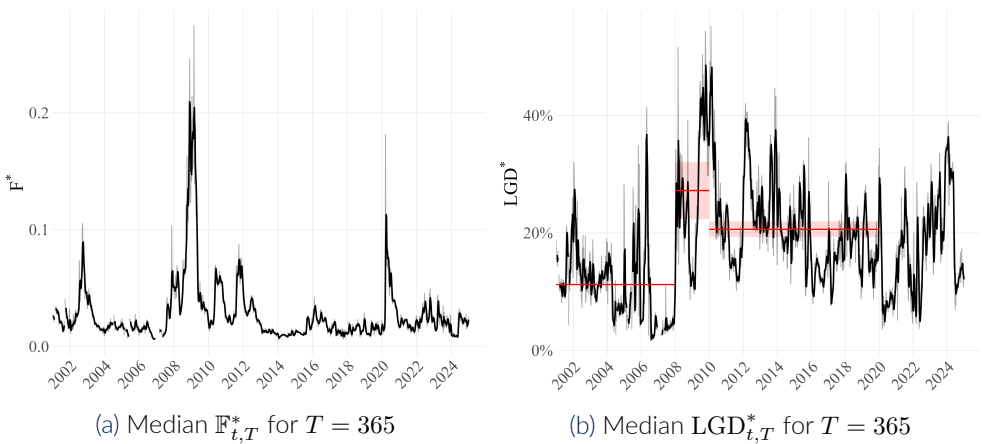
Motivation & Questions

- 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

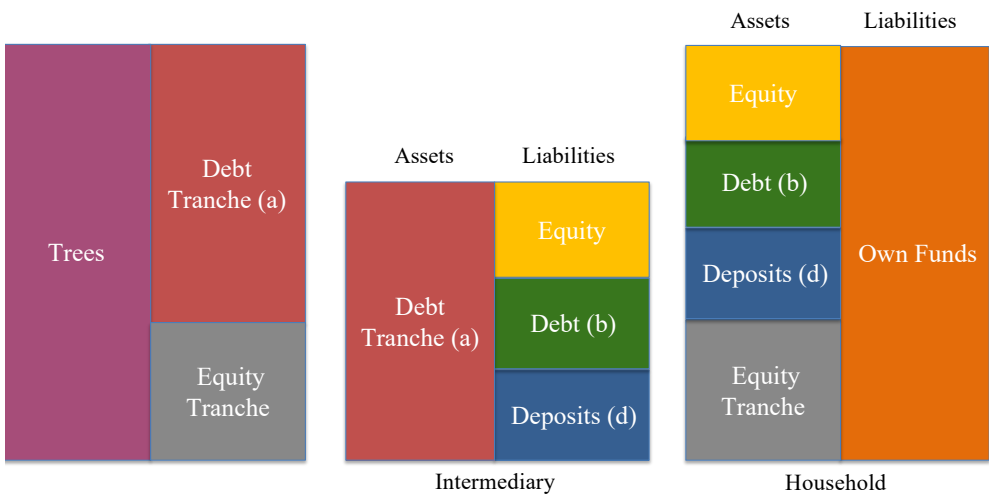
- Estimating Default Risk:** use equity options to recover risk-neutral default prob.
 - Default prob. went back to pre-2008 levels while spreads remained elevated
- Quantitative Analysis:** decompose 34 bps increase in spreads post-2010
 - 28 bps due to drop in **bailout probability** from 94% to 77% 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 $\approx$ 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

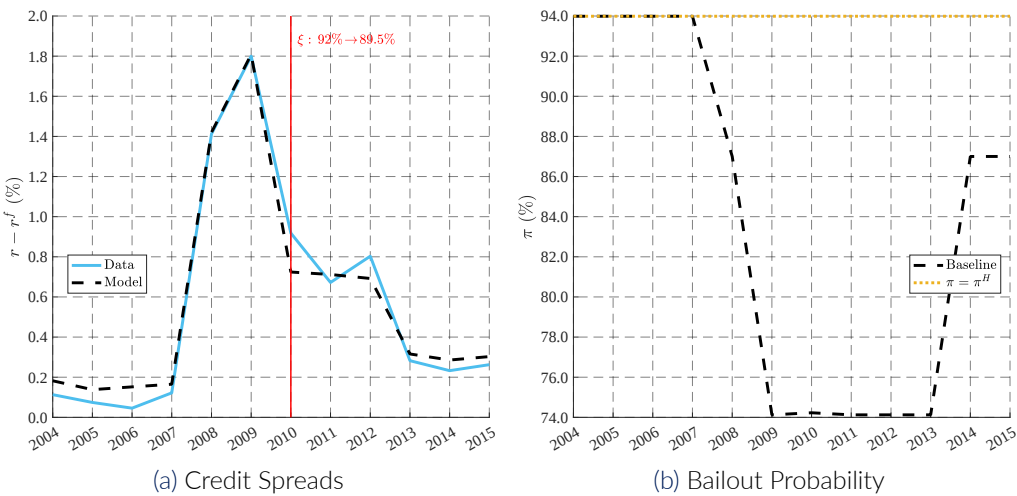


- Increase in $\text{CS}_{t,T}$ post-2010 is due to $\text{LGD}_{t,T}^* \uparrow$ while $\mathbb{F}_{t,T}^* \downarrow$
 - $\text{LGD}_{t,T}^*$ increases from 11% pre-2008 to **21%** post-2010

Market Structure



The Dynamics of Credit Spreads and Bailout Probabilities



- 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:

$$\mathbb{E}_{\mathbf{S}}[R^A(\mathbf{S}', \mathbf{S})] = \underbrace{R^I(\mathbf{S}) \left(1 - \lambda(\mathbf{S}) \xi - \frac{B'}{p(\mathbf{S})} \frac{\partial q(\mathbf{S})}{\partial A'} \right)}_{\text{Regulation/Default Adjusted Risk-Free Rate}} + \underbrace{\text{cov}_{\mathbf{S}} \left(-\frac{\mathcal{M}^I(\mathbf{S}', \mathbf{S})}{\mathbb{E}_{\mathbf{S}}[\mathcal{M}^I(\mathbf{S}', \mathbf{S})]}, R^A(\mathbf{S}', \mathbf{S}) \right)}_{\text{Risk Premium}}$$
 - $\uparrow$ adjusted- $R^I(\mathbf{S}) \rightarrow$ higher required compensation for all assets
 - $\uparrow$ **risk premium** $\rightarrow$ higher required compensation for risky assets
 - Tighter capital req. ($\xi \downarrow$) and lower bailout exp. ($\pi \downarrow$) $\rightarrow \mathcal{M}^I(\mathbf{S}', \mathbf{S})$ more countercyclical
- $\text{Cov}(\cdot, R^A(\mathbf{S}', \mathbf{S}))$ 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 $\downarrow \Rightarrow$ spread $\uparrow$ and **default prob.** $\uparrow$
 - Bailout expectations $\downarrow \Rightarrow$ spread $\uparrow$ and **default prob.** $\downarrow$
- 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

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

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
 - $\text{CS}_{t,T}$ from bank CDS contracts and $\mathbb{F}_{t,T}^*$ from bank equity options

Model Environment

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

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

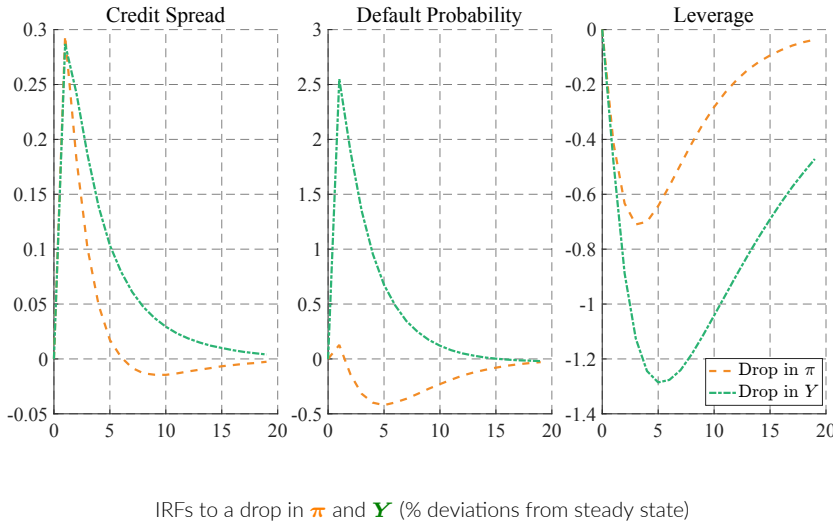
- Technology:** Lucas orchards

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

where z is tree-specific shock, ω is island shock, and $\mathbf{Y}$ is aggregate risk

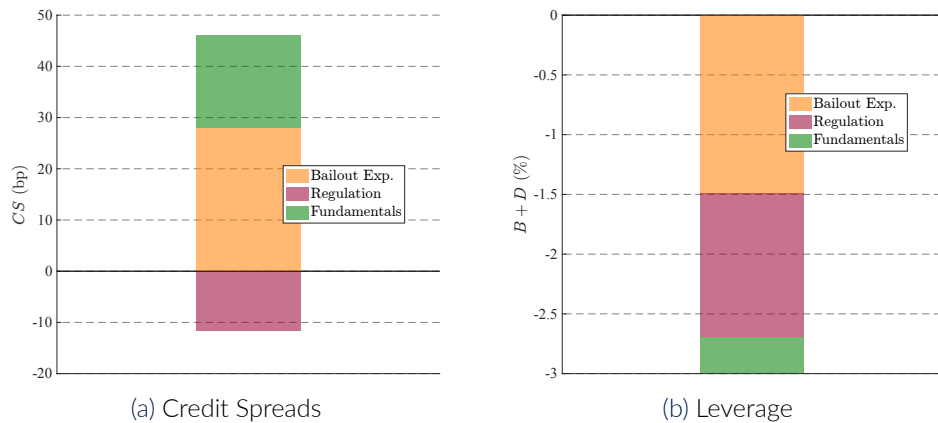
- Resource constraint:** $Y = C +$ default/issuance costs

Credit Spread, Bailout Expectations and Fundamentals



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

Decomposing Spreads and 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 $\approx$ 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