The Financial (In)Stability Real Interest Rate, r**

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Why do we need another *?

- The *natural rate of interest* r* is associated with the notion of *macroeconomic* stability: the rate consistent with output equaling its natural rate and constant inflation (Wicksell, Woodford, ..., Laubach & Williams, ...)

- This paper introduces **r****, the **financial stability interest rate**: the *threshold real rate above which financial instability arises*

- Goal of r**: Map the notion of financial stability onto the interest rate space, and complement r* as a guide to policy

Outline

1. Illustrate r** in the context of a simple macrofinance model with an occasionally binding financing constraint

2. Discuss the drivers and dynamics of r**
   - e.g., "financial dominance": persistently low real interest rates trigger an eventual drop in r**

3. Provide an empirical measure of r**
   - Show that the Fed effectively tracked r** in periods of financial stress

A Model With Financial (In)Stability Regimes

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- Simple dynamic macrofinance model with financial intermediaries that face *agency frictions* in raising funds → (Gertler & Kiyotaki '10)
- Occasionally binding leverage constraint → two regimes depending on whether the constraint is binding
  - *Tranquil times*: dynamics resemble run-of-the-mill DSGE
  - *Financial instability*: financial accelerator, asset fire-sale dynamics
- The real rate is one of the state variables determining in which regime we are in

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- The real rate is one of the state variables determining in which regime we are in
- **r**** is the threshold real rate above which financial instability arises:
  → *the real interest rate that makes the financial constraint just bind*
- Use r** as a summary statistic for financial stability, just like r* is for macro conditions

Sketch of the model

- Bankers
  - Hold (risky) capital s_t and safe asset b_t
- Households
  - Consume, supply labor, save through bank deposits d_t
- The real interest rate, R_t, follows an exogenous process

  $\rightarrow$ In the background we will be thinking of monetary policy as determining R_t, although we do not explicitly model that in this paper

Bankers' Problem

$$V_t(n_t) = max_{s_t, b_t} \; E_t \Lambda_{t+1}[(1-\sigma)n_{t+1} + \sigma V_{t+1}(n_{t+1})] \qquad \text{subject to}$$

1. Evolution of net worth: $n_t = (R_{Kt} - R_{t-1})Q_{t-1}s_{t-1} + R_{t-1}n_{t-1}$
2. *Occasionally binding* leverage constraint:

$$\underbrace{\frac{Q_t s_t}{n_t}}_{\text{leverage}} \leq \underbrace{\frac{V_t'}{\Theta(x_t)}}_{\text{max. leverage}} \quad \text{where } x_t = Q_t s_t / b_t,\ \Theta' > 0$$

$\hookrightarrow$ *time-varying and forward-looking*

- Banks use "augmented" stochastic discount factor (SDF) in pricing assets

$$\Omega_{t+1} \equiv \underbrace{\Lambda_{t+1}}_{\text{HH SDF}} [1 - \sigma + \sigma V_{t+1}']$$

Financial (In)Stability Regimes

- When the constraint does not bind (financial stability):
  - $\mathbb{E}_t(\Omega_{t+1} R_{Kt+1}) = \mathbb{E}_t(\Omega_{t+1}) R_t$
  - $\mathbb{E}_t(R_{Kt+1}) \approx R_t$: *spreads are low* when the economy is far away from the constraint
  - Responses of the economy to shocks resemble frictionless RBC
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- When the constraint binds (*financial instability*):
  - Risky asset holdings constrained by net worth
  - Responses of the economy to shocks reflect the *nonlinear financial accelerator* effect: $N_t(\equiv \int n_t) \downarrow \Rightarrow Q_t \downarrow \Rightarrow N_t \downarrow$
  - $\mathbb{E}_t(\Omega_{t+1} R_{Kt+1}) > \mathbb{E}_t(\Omega_{t+1}) R_t \rightarrow$ *spreads are large and volatile*
- Compute fully nonlinear solution (Akinci and Queralto '21)

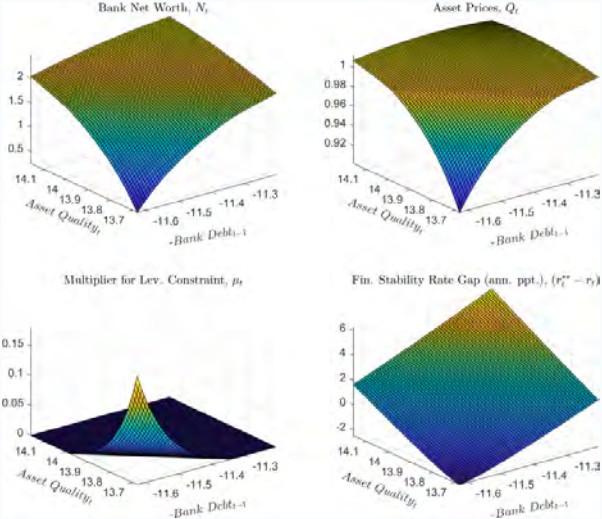
Constructing r**

- If the economy is in the unconstrained/constrained regime: increase/decrease R_t such that the constraint just binds/ceases to bind, *given the other state variables*

  $\Rightarrow$ r** is a *threshold* : real interest rate below r** ensures the economy remains in the financial stability regime

- Financial stability rate gap, $r^{**} - r$, *depends* on the evolution of other state variables, e.g., leverage and the share of risky assets in banks' portfolio

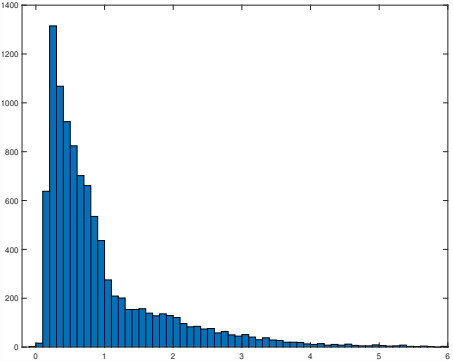
Equilibrium objects as a function of states



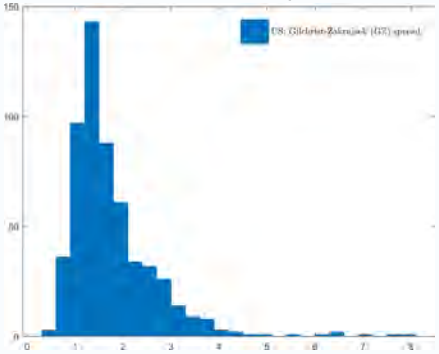
- When the constraint binds net worth and asset prices fall nonlinearly, and r** − r becomes negative

Histogram of Credit Spreads: Model vs GZ Spreads

Model Stochastic Simulation, $E_t(r_{kt+1}) - r_t$



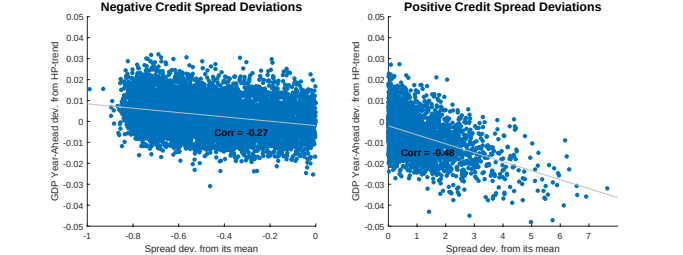
Data, GZ Credit Spreads



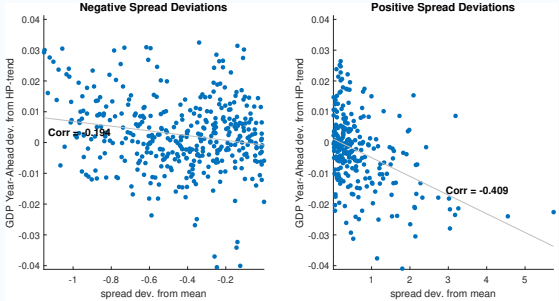
- Credit spreads displays occasional spikes in the model as in GZ spread

Credit Spreads and Output

Model



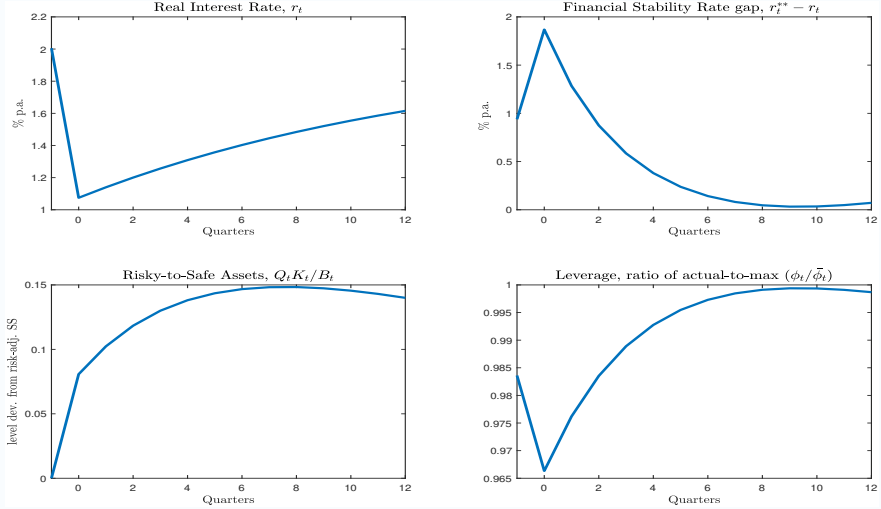
Data



- Model captures asymmetries in the relationship between output and credit spreads

Dynamics of r**

Dynamics of r**: Impulse responses to low interest rates



- Persistently low rates today cause vulnerabilities to build up $\rightarrow$ reduce monetary policy space for maintaining "financial stability" in the future

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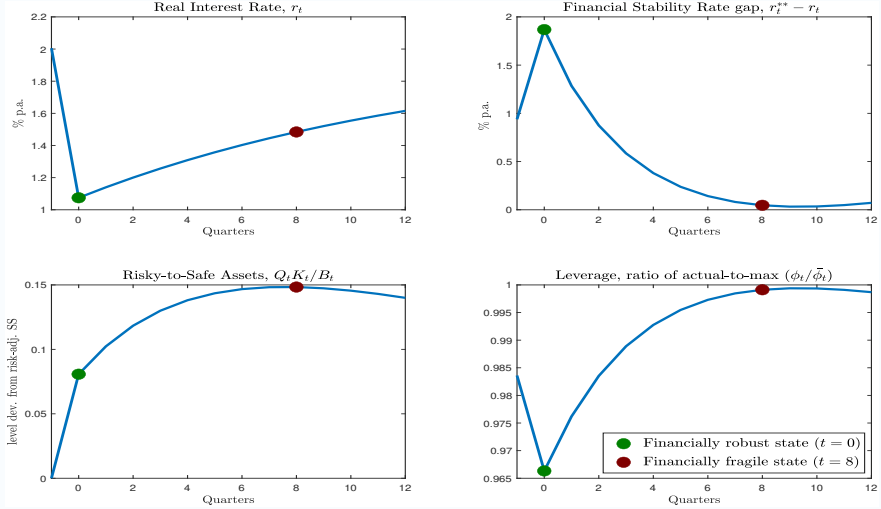
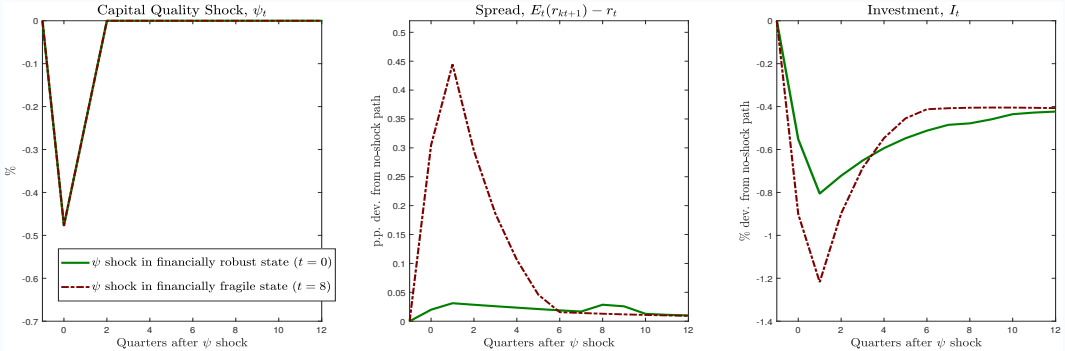


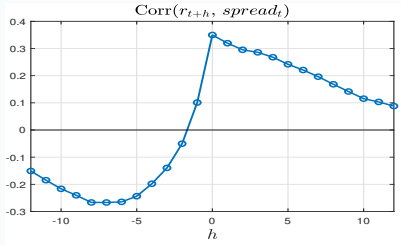
- Persistently low rates today cause vulnerabilities to build up → reduce monetary policy space for maintaining "financial stability" in the future

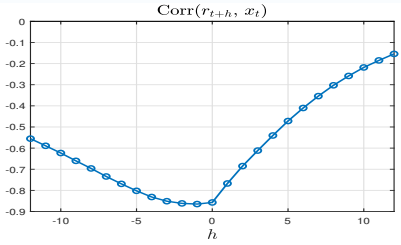
Decline in Capital Quality: State-Dependent Effects

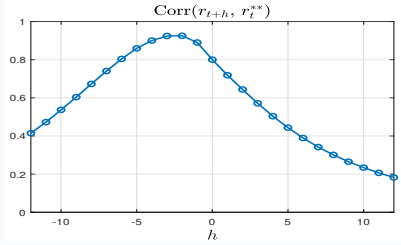


- Credit spreads increase, and investment falls 50 percent more if the economy is in financially fragile state when the shock hits

Real Rate, Credit Spreads and r**, Lead-Lag Correlations



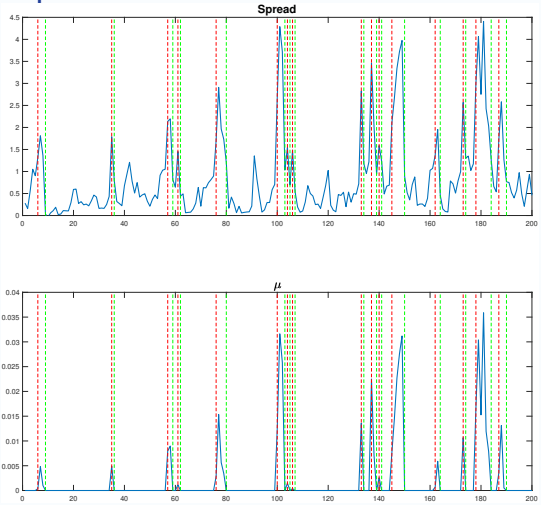




- Low real interest rates today predict high credit spreads and low r** in the future

Measuring r**

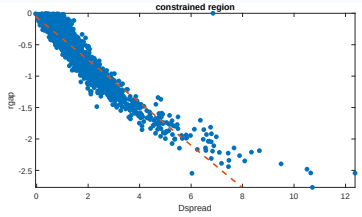
Spreads and financial constraints

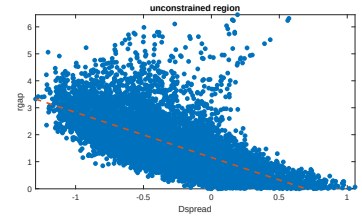


- **Financially constrained** regime: spreads are very *volatile* and *correlated with* the degree of constraints μ ($\Rightarrow$ with r^{**}-r)
- **Un**constrained regime: spreads only loosely correlated with the proximity of the constraint

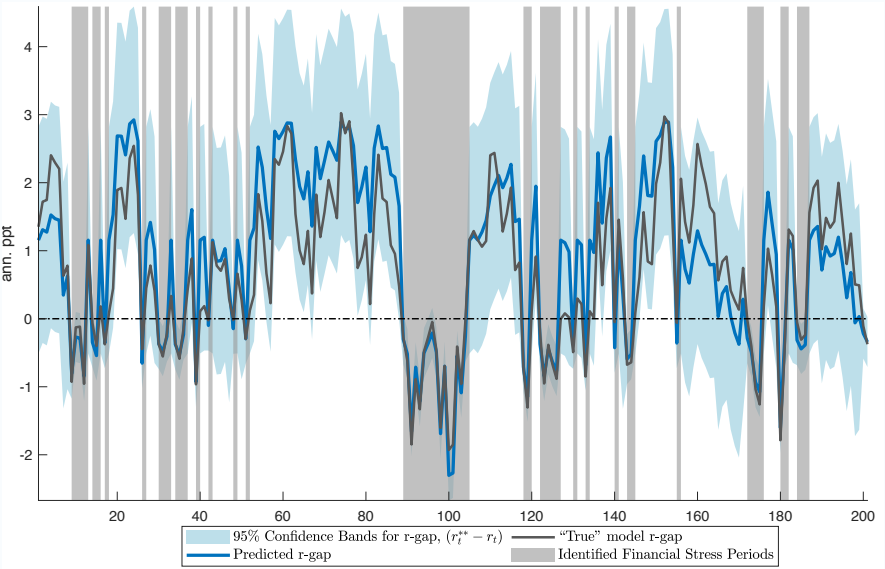
Spreads, financial constraints, and r**-r

- **Financially constrained** regime:
  - $(r_t^{**} - r_t) = \beta_c Dspread_t + \epsilon_t,\ Var(\epsilon_t) = \sigma_c^2$.
  - $\rightarrow \beta_c = -0.34$ and $\sigma_c^2 = 0.034$.
- **Un**constrained regime:
  - $(r_t^{**} - r_t) = \beta_u Dspread_t + \epsilon_t,\ Var(\epsilon_t) = \sigma_u^2$.
  - $\rightarrow \beta_u = -1.67$ and $\sigma_u^2 = 0.693$.
- where $Dspread_t = (spread_t - spread_{\tau-1})$, with τ = period before/after the economy enters/exits a financial stress episode
- $Dspread_t$ = *level* of spreads relative to just before the stress period begins (r**-r ~ 0)





True vs Predicted r-gap, $r_t^{**} - r_t$, **Model**

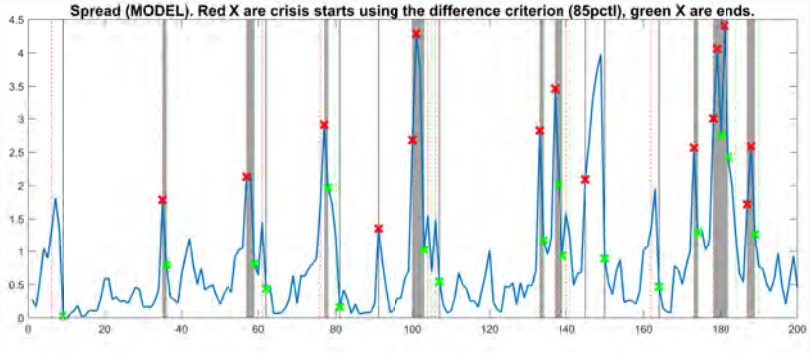


Identifying financial stress regions

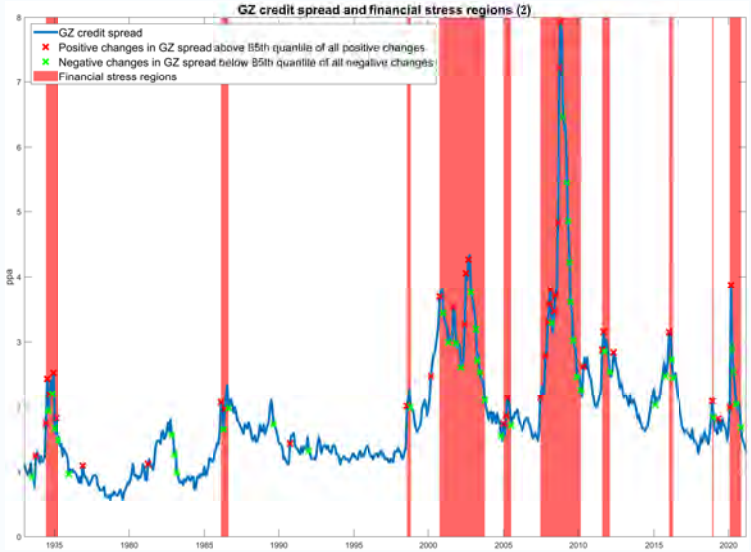
- **Financially constrained** regions 1) have very *volatile* spreads; 2) begin with spreads *rising* and finish with spreads *declining*

Identifying financial stress regions

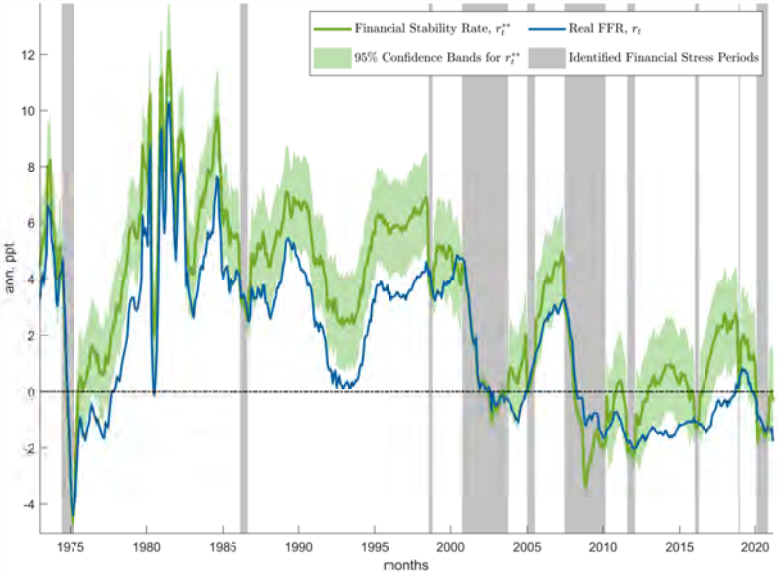
- **Financially constrained** regions 1) have very *volatile* spreads; 2) begin with spreads *rising* and finish with spreads *declining*
- Identify "spread jumps" as changes in spread that are above some quintile of the distribution ($|\Delta spread| > q_{85}$).
- Construct financial stress region in which many of these jumps occur closely together ("a sequence of jumps no less than 6 months apart")



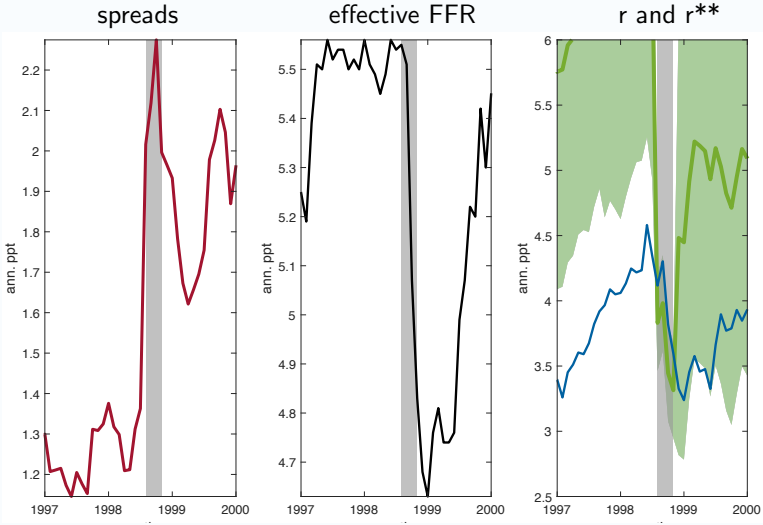
Credit spreads and financial stress regions, **data**



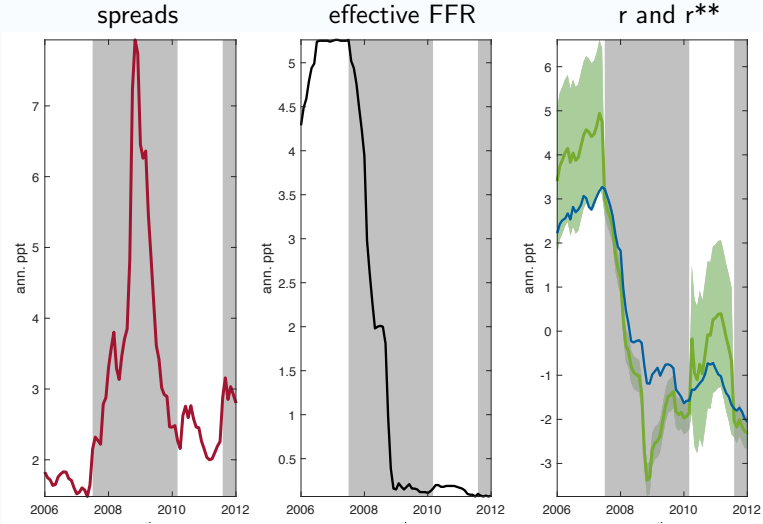
The financial stability interest rate r_t^{**} in the **data**



LTCM episode



Financial Crisis



Conclusion

- Introduce a new concept: **r****
  - threshold real interest rate above which the tightness of financial conditions may generate financial instability
  - enables us to translate financial vulnerabilities into an object comparable to the monetary policy rate and to the natural real interest rate
- Thank you for your attention!