

Haircuts and Credit Risk Over the Cycle

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Rapid tightening of haircuts exacerbated deleveraging pressures during the crisis.

To generate countercyclical haircuts, *Brunnermeier-Pedersen (2009)*, *Geanakoplos (2010)*, *Jurek-Stafford (2010)*

1. Haircuts such that loans are riskfree
2. Underlying risk is countercyclical

This paper: [countercyclical haircuts with risky loans](#)

This Paper

A dynamic GE model in continuous-time

- Heterogeneous beliefs as motive to trade
- Collateral equilibrium *à la Geanakoplos* → endogenous interest rates and haircuts

Preview of results:

- Endogenously determined haircuts are countercyclical
- Credit risk accumulates at the background before erupts
- Countercyclical equity premium, potentially negative

A Model of Haircuts

- A tree (asset) produces apples

$$y_t = a k_t.$$

- A Poisson shock with intensity λ and size $u \sim G(\cdot)$, on $[\underline{u}, 1)$ with positive density

$$dk_t = gk_{t-} dt + (uk_{t-} - k_{t-}) M(dt).$$

- Optimists and pessimists only disagree on the intensity

$$\lambda^o < \lambda < \lambda^p$$

Portfolio

Agents choose among

- Shares of the tree/asset x ,
- Lending under contracts indexed by C
- Borrowing under contracts indexed by C

Holding the asset:

1. Exogenous risk: asset depreciates from $k \rightarrow uk$
2. Endogenous risk: asset price $q \rightarrow v(u)q$
3. Amplification of risk: $qk \rightarrow \underbrace{v(u)u}_z \cdot qk$

Portfolio

Agents choose among

- Shares of the tree/asset x ,
- Lending under contracts indexed by C
- Borrowing under contracts indexed by C

Short-term contracts indexed by C

1. Borrow 1 apple at t with interest rate $R(C)$
2. Use assets that worth C apples as collateral
3. If hit by Possion shock, value of collateral jumps $C \rightarrow Cz_t$
4. Repay $\min\{1, Cz_t\}$ at $t + dt$

Collateral Equilibrium

1. Agents of group i solve

$$V(N_t, t) = \sup_{x, c, \mu_{+, -}} \mathbb{E}_t^i \left[\int_t^\infty \exp(-\rho s) \log(c_s N_s) ds \right]$$

$$\text{s.t. } \frac{dN_t}{N_t} = x_t dr_t^k - c_t dt + \int_C \left[R_t(C) dt + ((Cz_t \wedge 1) - 1) dM_t^i \right] d\mu$$

- * All collaterals $\leq \alpha \cdot$ Total Asset
- * Budget constraint

2. All markets clear.

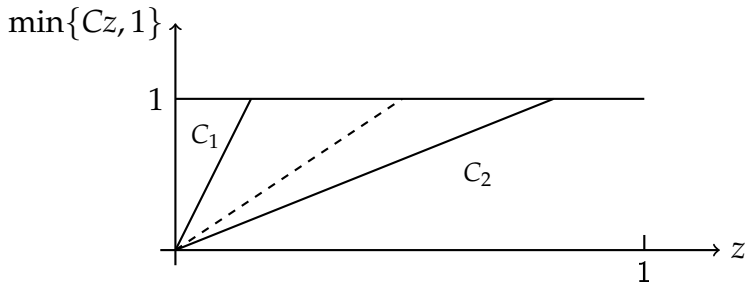
Proposition

Only a single contract is actively traded in nonzero quantities given the current (single) state variable

$$\eta_t = \frac{N_t^o}{N_t^o + N_t^p}.$$

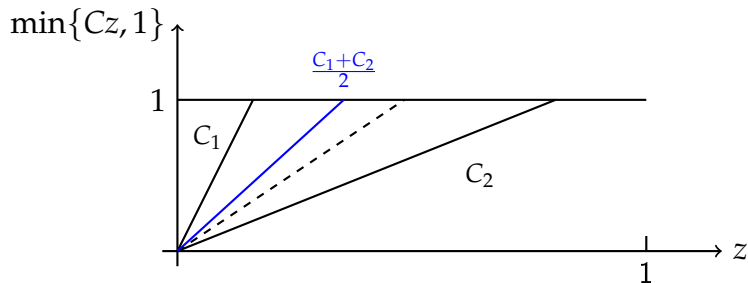
1. $0.5[C_1, R_1] + 0.5[C_2, R_2]$

2. $[0.5C_1 + 0.5C_2, 0.5R_1 + 0.5R_2]$



$$\frac{C_1 + C_2}{2}$$

1. $0.5[C_1, R_1] + 0.5[C_2, R_2]$
2. $[0.5C_1 + 0.5C_2, 0.5R_1 + 0.5R_2]$



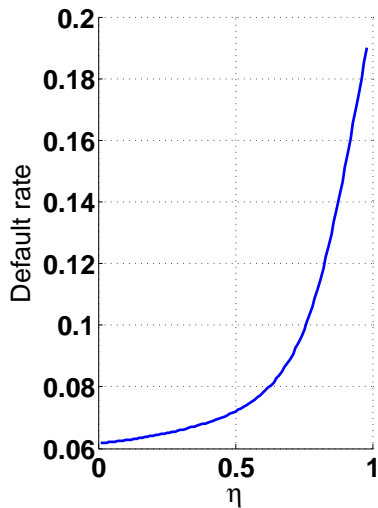
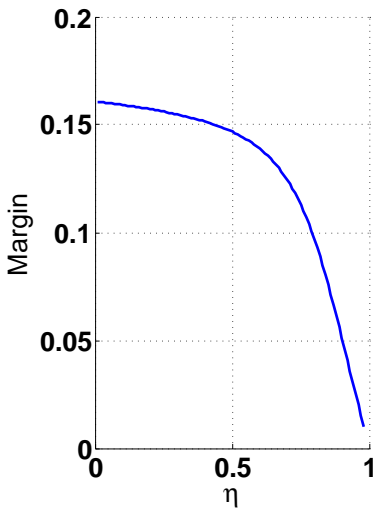
Proposition

There exists an implicit solution $I(C, \eta) = 0$ given the parameters. Moreover,

$$\frac{\partial C}{\partial \eta} < 0$$

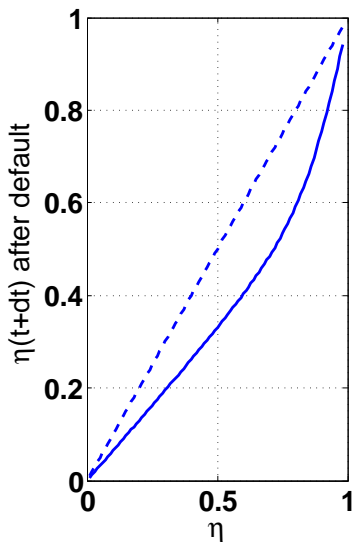
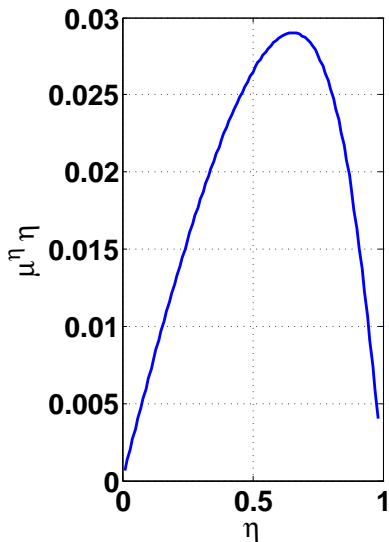
1. In recessions optimists take more risk by leveraging up (only risk-free debt)
2. New channel: take more risk by increasing haircuts

Haircuts and Default Prob.

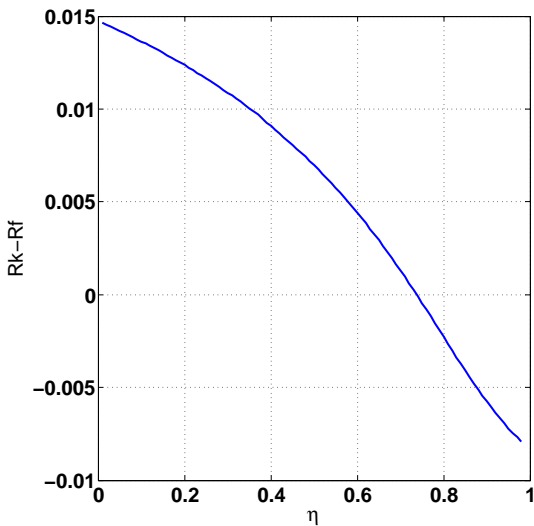


3.

Wealth Share

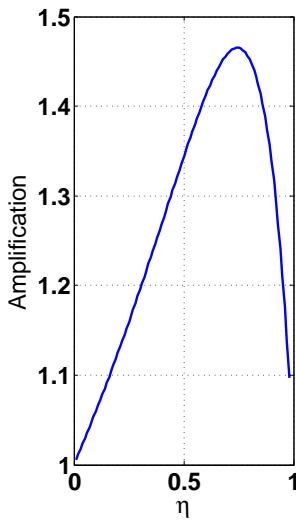
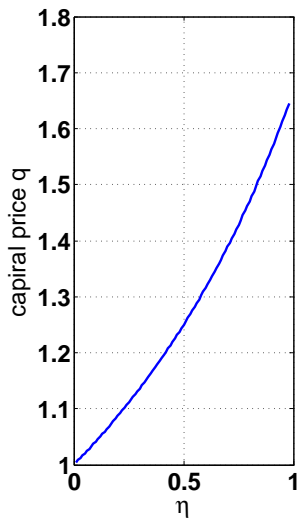


Equity premium



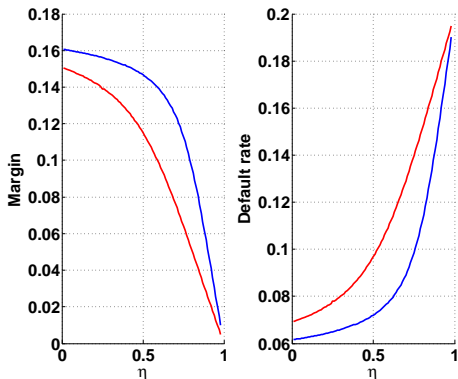
Loss Spiral

Optimists are more patient than pessimists

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Time-varying Belief

- Belief spiral: more pessimistic in bad times
- *Endogenously* underlying risk is higher in bad times



Conclusion

- A model with endogenous haircuts and defaults
- Counterclical haircut without countercyclical underlying risk
- Credit risk accumulates at the background and sows the seeds for the next crisis