Two Monetary Tools: Interest-Rates and Haircuts

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Motivation

- **Credit cycles:**
  - Good times:
    - Build up of leverage and large credit supply
  - Funding crisis:
    - Financial institutions hit their funding constraint
    - Shrinking credit supply sends economy into recession

- *Two monetary tools:* interest-rates and haircuts
- The haircut tool affects financial institutions’ credit supply
  - Good times:
    - Impose regulatory capital requirements
  - Funding crisis:
    - Market-imposed funding requirements are binding
    - Lower haircuts using lending facilities
What We Do

- **Theory**: macro model with financial frictions:
  - Two types of agents facing margin constraints
  - Firms that differ in the haircut of their securities
  - Derive effect of margin constraints on required returns, real investment, and output
  - Effect of interest-rate cuts and haircut cuts

- **Empirical evidence**:
  - Unique survey evidence: how does demand for securities depend on haircuts?
  - Effect on market prices
Results: Theory

- Margin CAPM:
  \[ E_t(r^j) = r^f_t + \lambda_t \beta^j_t + \psi_t \times m^j_t \]

- Output and real investment decrease with credit constraints

- Propagation of business cycles:
  binding constraint → high required return → low investment
  → low future income → future binding constraint → ...

- Interest-rate cuts
  - Increase shadow cost of capital \( \psi_t \), steepen the haircut-return relation
  - Can increase the required return and lower real investment for high-haircut assets

- Haircut cuts
  - Lower required returns in affected sectors
  - Large or broad cuts: Lower required returns in all sectors
Results: Empirical

- Survey evidence:
  - Bid price increases on average 18% with access to 3-year low-haircut loan
  - This reduces the yield by 3% for super senior bonds

- Response of market prices
  - Study of bonds that are rejected vs. accepted from TALF
  - TALF reduced yields by more than 0.40% (likely much more)

- Model:

\[
E_t(r^j) = r_t^f + \lambda_t \beta_t^j + \psi_t x m_t^j
\]

\[
\Delta E_t(r^j) \approx \psi_t x \Delta m_t^j = 10\% \cdot 40\% \cdot (-80\%) = -3\%
\]

Large effect on real investment, capital, and output
Bagehot (1873): “If it is known that the Bank of England is freely advancing on what in ordinary times is reckoned a good security [...] the alarm of the solvent merchants and bankers will be stayed. [Otherwise] the alarm will not abate, the other loans made will fail in obtaining their end, and the panic will become worse and worse.” (p. 198)


Margin constraints and leverage:
- Margin spirals, market liquidity and funding liquidity: Brunnermeier and Pedersen (2009)
- “Margin-Based Asset Pricing and Deviations from the Law of One Price,” Garleanu and Pedersen (2009)
- Funding constraints affect equity markets, Treasury markets, and credit markets, Frazzini and Pedersen (2010)

Recent monetary economics: Kiyotaki and Moore (2008), Adrian and Shin (2009), Gertler and Karadi (2009), Gertler and Kiyotaki (2009), Curdia and Woodford (2009), Reis (2009)
Model Setup: Agents

- **Agents**
  - Supply labor inelastically
  - Invest in securities with haircuts/margin requirements $m_j^t$
  - Choose portfolio to maximize utility subject to margin requirement $\sum_j m_j^t |\theta^j| P_j^t \leq W^n_t$

- **Agents differ in their risk aversion $\gamma^a > \gamma^b$:**
  - Risk *averse*: $\gamma^a$
  - Risk tolerant (brave): $\gamma^b$
    - Leveraged in equilibrium – hits his margin requirement
    - Lagrange multiplier $\psi_t$
Proposition (Margin CAPM)

The required return on security $i$ depends on its market beta and its margin requirement:

$$E_t(r_{t+1}^i) = r^f + \lambda_t \beta_t^i + m_t^i \psi_t x$$

where $\lambda_t$ is covariance risk premium, $\psi$ is the shadow cost of capital, and $x$ is the importance of constrained agents.
**Introduction**

**Theoretical Results**

**Empirical Results**

**Haircuts: Required Returns and Real Investment**

**Margin-Constraint Accelerator**

**Two Monetary Tools**

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**Margin CAPM**

![Graph showing the relationship between Haircut (m) and Required Return.](image)

- Blue line: Constraint does not bind
- Red line: Constraint binds (crisis)

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Model Setup: Firms, Output, and Real Investment

- **Firms**
  - Produce consumption goods using labor and capital
  - Face productivity shocks and choose labor to maximize profit
  - Choose real investment to maximize PV given required return
  - Financed by securities that differ in their haircuts (liquidity)
Haircuts and Real Investment

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**Proposition**

- *Without margin constraints, i.i.d. productivity leads to i.i.d. output, wages, and income*
- *With margin constraints, output, income, real investment, consumption, wages, and risk premia are correlated over time.*

This follows from the propagation of a productivity shock that is so severe that investors’ margin requirement binds:

- the required return increases
- reducing real investment
- reducing next period’s expected output and income
- the low income then weakly increases the required return
- and so on
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Haircuts: Required Returns and Real Investment

Margin-Constraint Accelerator

Two Monetary Tools

Margin-Constraint Accelerator

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Proposition

Suppose that the interest rate is reduced at time $t$ when the constraint is binding. Then:

- the required return decreases and real investment increases for assets with low haircuts ($m^l_t < \bar{m}_t$).

If agents are sufficiently risk averse:

- the shadow cost of capital $\psi_t$ increases
- the required return increases and the real investment decreases for high-haircut assets ($m^h_t > \bar{m}_t$)
Interest-Rate Cut: Steepening the Haircut-Return Curve

Graph showing the relationship between haircut (m) and expected return for different interest rates. The graph illustrates how an interest-rate cut affects the steepness of the haircut-return curve.
Proposition

Suppose the haircut \( m^j_t \) on asset \( j \) is reduced at time \( t \) when the constraint is binding. Then:

- The required return for that asset decreases and its real investment increases. The real investments in other assets either all increase or all decrease.
- If \( m^j_t \) is reduced sufficiently or if the haircuts on sufficiently many assets are reduced by a given fraction, then required returns on all assets decrease and their real investment increase.
Haircut Cuts

Haircut (m) vs. Required Return before and after asset-j haircut cut.

- Blue line: before asset-j haircut cut
- Red dashed line: after asset-j haircut cut
Capital Injection and Asset Purchases

Proposition

- If agent b’s wealth is increased, required returns go down and real investment increases for all assets.

- If the government buys shares in asset i, then the real investment in that asset increases and the investments in all other assets either all increase or decrease. If the government purchase is sufficiently large, then all real investments increase.
Monetary Policy and Lending Facilities

- Term Auction Facility (TAF) – 12/2007
- Term Securities Lending Facility (TSLF) – 3/2008

Goal: Improve funding conditions and “help market participants meet the credit needs of households and small businesses by supporting the issuance of asset-backed securities”

The model suggests that when the Fed offers lower haircuts, required returns go down:

$$E(r_{i,Fed}) - E(r_{i,no Fed}) \approx \psi_x(m_{Fed,i} - m^i) + \Delta \psi x m^i < 0$$

I.e., ABS yield down, access to credit eases, helping the real economy
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Monetary Policy and Lending Facilities

Survey Evidence

Evidence from Market Prices

CMBS Yield Spreads

<table>
<thead>
<tr>
<th>Date</th>
<th>Announcement</th>
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<tr>
<td>11/25/2008</td>
<td>Initial TALF for ABS, suggesting possible expansion for CMBS</td>
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<tr>
<td>3/19/2009</td>
<td>Legacy securities will be part of TALF</td>
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<tr>
<td>5/19/2009</td>
<td>Super senior legacy fixed-rate conduit CMBS eligible for TALF</td>
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<tr>
<td>5/26/2009</td>
<td>S&amp;P considers methodology change for fixed-rate conduit CMBS</td>
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<tr>
<td>6/26/2009</td>
<td>S&amp;P implements new methodology</td>
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<tr>
<td>7/16/2009</td>
<td>First subscription for legacy TALF</td>
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Potential Stress Loss for Each CMBS Pool

Most Pessimistic Participant: No Stress Loss for Safest Super Senior Bonds
Survey Bid Price vs. Haircut

Safest Super Senior Bonds

Price Relative to No-TALF Price

3-year
5-year
Matched

Low TALF haircut
High TALF haircut
No TALF

Haircut regime

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Implied Survey Yield vs. Haircut

Super Senior Bonds

Yield

3-year 5-year Matched

Low TALF haircut High TALF haircut No TALF

Haircut regime

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The yield spread of rejected bonds rises as these bonds will not benefit from the low haircuts provided by TALF.

Acceptance is expected and therefore associated with small effect.
The effect of rejections is significantly larger July-September 2009 (the ending of the financial crisis) than October 2009-March 2010 (when conditions improved).

Consistent with model’s prediction that haircuts have a larger effect when capital constraints are tight.
Regulatory Capital Requirements

- Basel requirement is similar to the margin constraint
  \[ \sum_{i} m^{\text{Reg},i} \|\theta^i\| P^i \leq W \]
- Required return increased by \( m^{\text{Reg},i} \psi \)
- Pressure to free capital by moving assets off the balance sheet or titling portfolios towards low capital-requirement assets
- Two monetary policy tools
  1. Interest rate
  2. Capital/margin requirement:
     - Good times: capital requirement
     - Bad times: lending facilities at moderate haircut
Haircuts Two Thousand Years Ago

Use of haircuts:

“One lends money with a mortgage on land which is worth more than the value of the loan. The lender says to the borrower, ‘If you do not repay the loan within three years, this land is mine.’”

— Mishnah, circa 200 AD.

Return the haircut?

“Rav Huna: If this condition was made when the money was given, then it is binding, even if the field is worth more than the loan. If the condition was made after the money was given, then the lender can only take the portion of the land equivalent to the value of the loan.”

— Talmud
Conclusion

- Binding margin requirements
  - Affects required returns
  - Propagates business cycles, esp. high-haircut sectors
- Interest-rate cuts:
  - Steepen haircut-return curve
- Haircut cuts:
  - Move assets down the haircut-return curve
  - Flatten the haircut-return curve itself
  - Effect of TALF, survey evidence: 3%
  - Effect of TALF, price effect of rejections: more than 0.40%
  - Large implied effect on investment, capital, and output