Discussion of "The Banking View of Bond Risk Premia"
by Haddad & Sraer

Monika Piazzesi
Stanford & NBER

NBER Summer Institute 2015
short summary

- banks are marginal investors for interest rate risk
- Euler equation checks for banks
- measure of aggregate bank exposure predicts bond returns

comments

1. nice contribution to an important agenda

2. model:
   a. objective function of banks
   b. equilibrium interest rates

3. quantitative implementation
   a. exposure through derivatives
   b. predictability in samples with few recessions
1. important agenda

- Euler equations of households
  - with aggregate NIPA data (Hansen & Singleton 1982, etc or individual CEX, PSID data (Brav, Constantinides, Geczy 2002, etc)
- Households do not participate in many markets
  - equities in 1980s/1990s, many fixed income instruments (MBS), etc
- Banks participate, they are marginal investors
- Euler equations of banks
  - great position data from regulatory filings by banks
  - many different fixed income instruments, but factor structure helps!
    - level of safe interest rates = 1st principal component in safe bonds
    - other factors, for example: credit risk
- Example: Bocola 2015 JPE, Italian banks hold Italian gov bonds
2.a objective function in the model

- banks maximize myopic mean-variance criterion

- motivated in the paper:
  - overlapping generations, live $dt$ (Greenwood & Vayanos 2014)
  - log utility

- may be a useful first step,
  - but are at the heart of Euler equation tests for banks

- bank shares are held by long-lived households

- other constraints: capital requirements, VaR etc.

- principal-agent conflicts
2.b equilibrium bond prices in the model

- equilibrium (log) price of $\tau$-year bond

\[- \log P_t^{(\tau)} = A_r(\tau) r_t + A_g(\tau) g_t + C(\tau)\]

- affine model with 2 factors: interest rate $r_t$, average gap $g_t$

- in particular, any 2 (log) bond prices ....

\[
\begin{pmatrix}
- \log P_t^{(1)} \\
- \log P_t^{(2)}
\end{pmatrix} =
\begin{pmatrix}
1 & 0 \\
A_r(2) & A_g(2)
\end{pmatrix}
\begin{pmatrix}
r_t \\
g_t
\end{pmatrix} +
\begin{pmatrix}
0 \\
C_g(2)
\end{pmatrix}
\]

..... can be inverted to get the two factors

\[
\begin{pmatrix}
r_t \\
g_t
\end{pmatrix} =
\begin{pmatrix}
1 & 0 \\
A_r(2) & A_g(2)
\end{pmatrix}^{-1}
\begin{pmatrix}
- \log P_t^{(1)} - 0 \\
- \log P_t^{(2)} - C_g(2)
\end{pmatrix}
\]

- factors are "spanned" by bond prices, equivalently interest rates
in equilibrium, expected excess return on long bonds

\[ A_r(\tau) \lambda_{r,t} + A_g(\tau) \lambda_{g,t} \]

where

\[ \lambda_{i,t} = g_t \gamma \sigma_i^2 \int_0^\infty e^{-\theta \tau} A_i(\tau) d\tau \]

expected excess returns are linear in gap \( g_t \)

\[ \implies \text{run OLS of excess returns from } t \text{ to } t+1 \text{ on time } t \text{ gap} \]

interest rates should predict excess returns as well as gap!

gap is better predictor than yields:

may want to modify model so that gap is unspanned factor
3.a exposure data in quantitative implementation

- measurement of risk exposure by U.S. banks:

  income gap = (short assets − short liabilities)/ total assets averaged across banks

- simple, easy to compute, textbooks

- exposure through derivatives?

  HS: compute gap for banks who have zero notionals of derivatives, "nonuser" series has 93% correlation with average gap

  should average gap be different?
3.a exposure data in quantitative implementation ctd.

**Notionals by bank size**

- not for tr.
- top 4 tr.
- other

**Notionals by maturity**

- < 1 year
- 1-5 years
- > 5 years

Begenau, Piazzesi & Schneider 2015, Figure 4
3.a exposure data in quantitative implementation ctd.

- banks have many different fixed income instruments (e.g., various loans, MBS, ABS, Treasuries, etc.)
- strong factor structure
- represent bank positions as simple factor portfolios
- figure plots $ portfolio holdings of 5-year swap bond that represent the interest-rate risk in overall positions for trading derivatives not–for-trading derivatives other positions (loans & securities etc)
3.a exposure data in quantitative implementation ctd.

Begenau, Piazzesi & Schneider 2015, Figure 10
3.b predictability in samples with few recessions

- gap data 1986:Q3 - 2013:Q3
- predict excess returns over next year on $\tau$-maturity bond

$$rx_{t+1}^{(\tau)} = a + brhv_t$$

<table>
<thead>
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<th>FB: $f_t^{(\tau)} - r_t$</th>
<th>CP: $\gamma^\top f_t$</th>
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<td>3</td>
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- gap data 1986:Q3 - 2013:Q3
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$$rx_{t+1}^{(\tau)} = a + brhv_t$$

<table>
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<th>$t(b)$</th>
<th>$R^2$</th>
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<th>$b$</th>
<th>$t(b)$</th>
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<td>5</td>
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<td>4.1</td>
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<td>-50.4</td>
<td>-4.4</td>
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</table>

- nice: large int rate exposure = small gap = high exp excess returns
3.b predictability in samples with few recessions

- gap data 1986:Q3 - 2013:Q3
- predict excess returns over next year on $\tau$-maturity bond

Both:

$$r_{t+1}^{(\tau)} = a + b \left( \gamma^\top f_t \right) + c \, \text{gap}_t$$

<table>
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<th>c</th>
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<td>0.43</td>
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</tbody>
</table>

- higher $R^2$ in unrestricted regressions on interest rates, gap
- according to model, gap should be driven out by interest rates
summary of comments

1. nice contribution to an important agenda

2. model:
   a. objective function of banks – myopic?
   b. equilibrium interest rates – affine model without unspanned factors

3. quantitative implementation
   a. exposure through derivatives
   b. predictability in samples with few recessions

more on cross sectional implications
("risk aversion parameters" of banks, etc)