Discussion of "The Cross Section and Time Series of Stock and Bond Returns"
by Koijen, Lustig & Van Nieuwerburgh

Monika Piazzesi
Stanford University & NBER

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Summary

• Affine model in which:
  
  – 3 priced factors explain the cross section of bond and stock returns:
    level, CP, DP
  
  – 2 factors explain the time variation in bond and stock returns:
    CP, DP

• Affine model outperforms Fama-French 3 Factor model (market, size, value) in explaining the cross section of bond and stock portfolios
Discussion

- Brief review of the affine model

- Comments:
  
  (i) contribution of the paper
  
  (ii) outperformance relative to 3FF:
      
      stock portfolios versus bonds portfolios
  
  (iii) other model comparisons that I would find more interesting,
       
       justification/motivation for parsimony
  
  (iv) asset prices as factors, economic interpretation
Brief review of the affine model

state vector: \( X_t = (\text{CP, level, slope, curvature} : \text{DP}) \)

affine bond pricing model

Cochrane & Piazzesi 2008 additional state variable for stocks

homoskedastic VAR dynamics of the state vector:

\[
\begin{bmatrix}
\text{CP} \\
\text{level} \\
\text{slope} \\
\text{curva} \\
\text{DP}
\end{bmatrix}_t = \begin{bmatrix}
\star & \star & \star & \star & 0 \\
\star & \star & \star & \star & 0 \\
\star & \star & \star & \star & 0 \\
\text{?} & \text{?} & \text{?} & \text{?} & \star \\
\text{?} & \text{?} & \text{?} & \text{?} & \text{?}
\end{bmatrix}
\begin{bmatrix}
\text{CP} \\
\text{level} \\
\text{slope} \\
\text{curva} \\
\text{DP}
\end{bmatrix}_{t-1} + \begin{bmatrix}
\star & 0 & 0 & 0 & 0 \\
\star & \star & 0 & 0 & 0 \\
\star & \star & \star & 0 & 0 \\
\text{?} & \text{?} & \text{?} & \text{?} & \star \\
\text{?} & \text{?} & \text{?} & \text{?} & \text{?}
\end{bmatrix} \varepsilon_t
\]

autonomous subblock for bond pricing

DP appended
Brief review of the affine model

pricing kernel: \( \mathcal{M}_t = \exp \left( -r_t - \frac{1}{2} \lambda_t^\top \lambda_t - \frac{1}{2} \lambda_t^\top \varepsilon_t \right) \)

\[
\lambda_t = \begin{bmatrix}
\star \\
\star \\
0 \\
0 \\
\ldots \\
\star \\
\end{bmatrix} + \begin{bmatrix}
0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 \\
\ldots & \ldots & \ldots & \ldots & \ldots & \ldots \\
0 & 0 & 0 & 0 & \star \\
\end{bmatrix} \begin{bmatrix}
CP \\
level \\
slope \\
curva \\
\ldots \\
DP \\
\end{bmatrix}
\]

**rows 1-4**: bond pricing model (Cochrane & Piazzesi 2008)

only level shocks get priced

time variation only because of CP

**row 5**: additionally for stock pricing

also CP and DP shocks get priced

time variation because of CP and DP
Comments: (i) contribution of the paper

- Joint pricing of bonds and stocks: "festival" approach

  Fama and French 1993, Mamaysky 2001 with affine model:
  MKT, SMB, HML + two bond factors

- Bekaert and Grenadier 2001, Bekaert, Grenadier & coauthors,
  Brennan, Wang and Xia 2004, Lettau and Wachter 2008:
  more parsimonious: mix of macro variables and bond factors

- This paper adopts state of the art for bonds:
  level of interest rates determines bond returns, CP their predictability
  DP and CP determine stock returns, both their predictability
Comments: (ii) outperformance relative to 3 FF: bonds versus stocks

- 3 FF: market, size, value, designed for the cross section of stocks

<table>
<thead>
<tr>
<th></th>
<th>RN  SDF</th>
<th>Our Model</th>
<th>Level</th>
<th>Level-only bonds</th>
<th>DP</th>
<th>Level + DP</th>
<th>FF</th>
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</thead>
<tbody>
<tr>
<td>Panel A: Pricing Errors (in % per year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>1-yr</td>
<td>1.11</td>
<td>-0.43</td>
<td>-0.41</td>
<td>0.69</td>
<td>1.00</td>
<td>0.68</td>
<td>0.91</td>
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<tr>
<td>2-yr</td>
<td>1.31</td>
<td>-0.55</td>
<td>-1.62</td>
<td>0.50</td>
<td>1.15</td>
<td>0.53</td>
<td>0.97</td>
</tr>
<tr>
<td>5-yr</td>
<td>1.69</td>
<td>-0.19</td>
<td>-4.10</td>
<td>0.09</td>
<td>1.43</td>
<td>0.19</td>
<td>1.08</td>
</tr>
<tr>
<td>7-yr</td>
<td>1.99</td>
<td>0.38</td>
<td>-4.82</td>
<td>0.11</td>
<td>1.61</td>
<td>0.15</td>
<td>1.22</td>
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<tr>
<td>10-yr</td>
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<td>0.17</td>
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<td>-0.49</td>
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<tr>
<td>Market</td>
<td>6.00</td>
<td>-0.74</td>
<td>4.22</td>
<td>5.51</td>
<td>-1.55</td>
<td>-0.06</td>
<td>-0.06</td>
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<tr>
<td>BM1</td>
<td>4.97</td>
<td>0.02</td>
<td>3.38</td>
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<td>-3.28</td>
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<td>BM2</td>
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<td>BM4</td>
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<td>MAPE</td>
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<td>0.40</td>
<td>4.83</td>
<td>4.81</td>
<td>1.50</td>
<td>1.23</td>
<td>0.57</td>
</tr>
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</table>
Comments (iii) other model comparisons

- Q: "Which 3 factor model does better on bonds, on stocks, on everything jointly?"
  3 FF use market, size, value designed for the cross section of stocks
  model here uses CP, level, DP
  A: on bonds, model here wins; on stocks, 3FF wins;
  on everything jointly, model here wins

- Q: "Which factor model does better on bonds, on stocks, on everything jointly?"
  add two bond factors for the cross section of bonds, 5 factor models
  Fama-French 1993: excess return on a long bond, default spread
  Mamaysky 2001: short bond yield, long bond yield
  A: ?

- if festival approach does better, give good justification/motivation for parsimony
Comments (iv) asset prices as factors, economic interpretation

- CP factor predicts real GDP growth one — three years ahead

paper here: Chicago Fed National Activity Index
Comments (iv) asset prices as factors, economic interpretation

- CP high in recessions:
  
  CP predicts growth, activity with a positive sign
  
  CP predicts excess returns on bonds with a positive sign
Comments (iv) asset prices as factors, economic interpretation

- CP high in recessions, forecasts better times

- estimated model here: shock that raises CP is interpreted as "good times"
  (e.g., market price of risk is positive, value stocks are risky because their returns covary with CP shocks)

- "good times" here: "good news about future consumption", not current consumption

- can't replace CP with macro variables
  - financial data is clean, macro variables are dirty
  - leading indicators (e.g., summer 2007: default spreads were high although GDP growth was still high)
Conclusion

- nice paper

- main insight:

  **CP is a factor that helps with the cross section of stock returns!**

  (it also predicts stock returns)

- more comparisons with "festival approach" that throws everything in

- economic interpretation:

  CP itself is bad (high in recessions, looks like unemployment),
  but indicates better times to come