Do options contain information about excess bond returns?

by Almeida, Graveline, & Joslin

Discussion by

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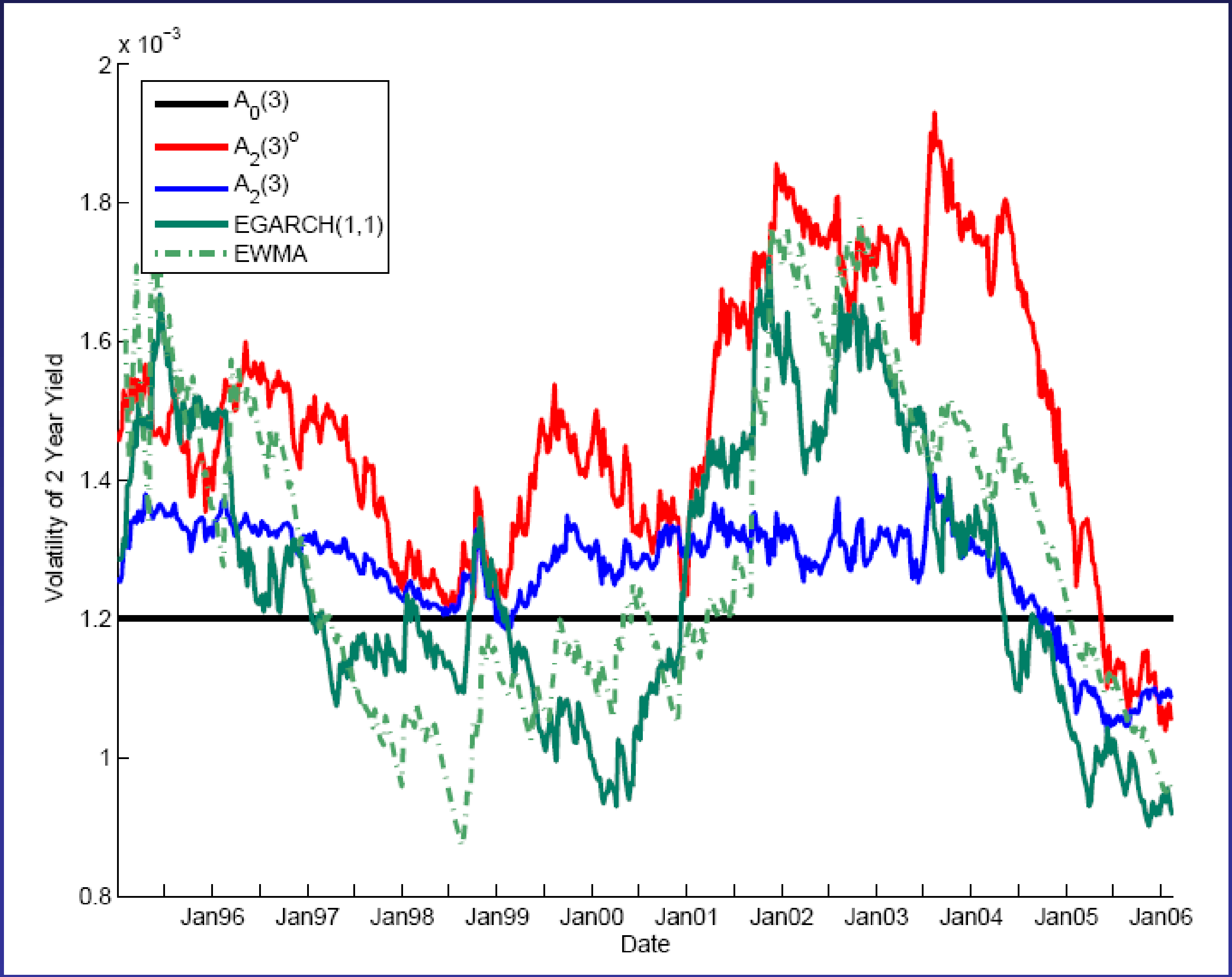
Motivation

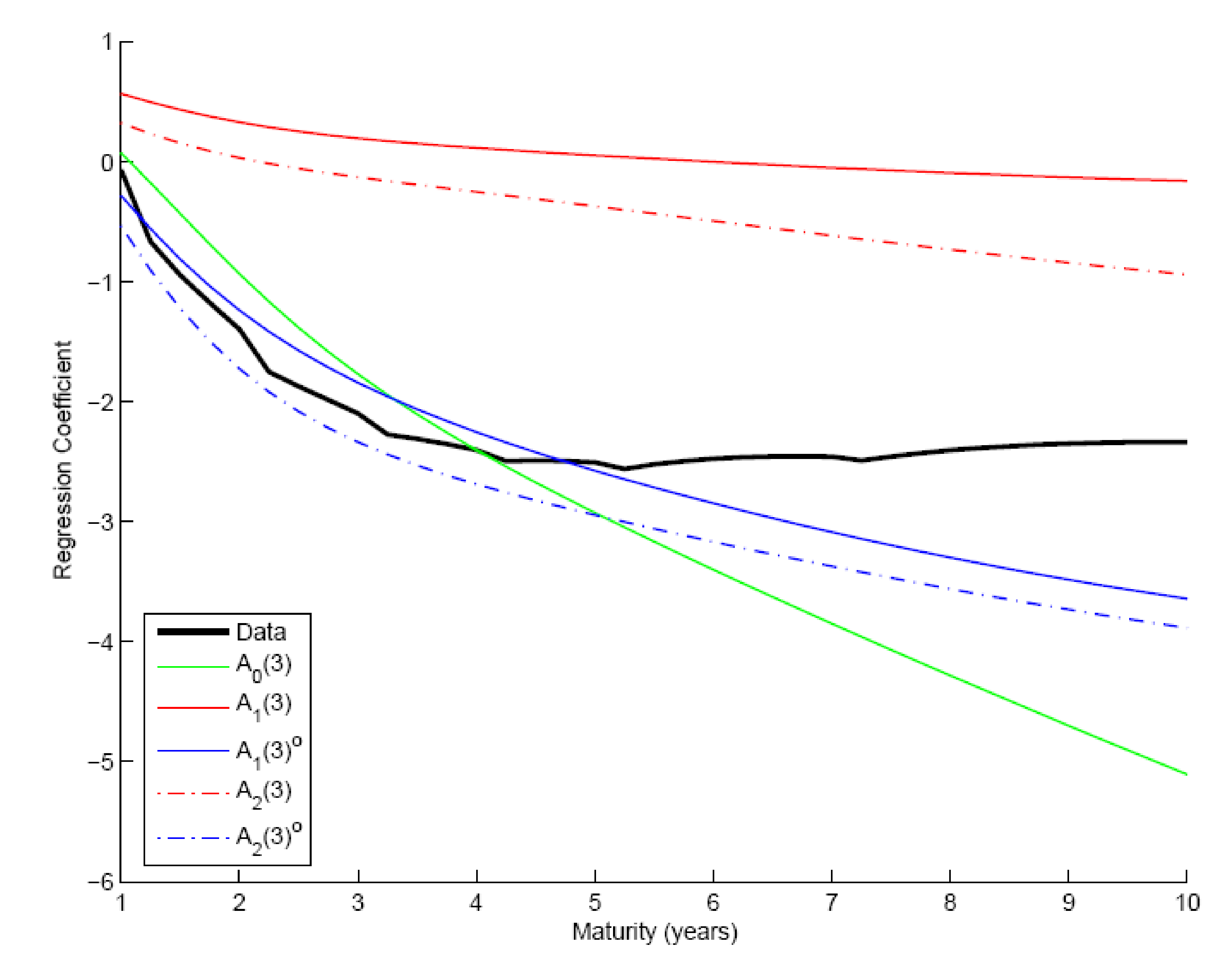
$$E[\Delta Y_{t+1}] = \text{slope} - \lambda_t \sigma_t$$

- Need good models of both λ_t and σ_t.
- Option prices contain information about
  - Volatility
  - Risk premia (esp. volatility risk premia)
- In general, all factors and risk premia are in theory recoverable from yields.
- In practice, options may add substantial info.

The results: improved vol fit using options…



… and better yield forecasting



An example: $A_1(3)$

- Risk-neutral dynamics:

$$dr(t) = \mu^Q(t)\,dt + \sqrt{V(t)}\,dB^r(t)$$

$$d\mu^Q(t) = [a_0 + a_r\,r(t) + a_\mu\,\mu^Q(t) + a_V\,V(t)]\,dt + \ldots$$

$$dV(t) = \kappa[\theta - V(t)]dt + \sigma\sqrt{V(t)}\,dB^V(t)$$

- $V(t)$ has two roles here + 1 more under P
- Performance as “volatility” is lacking
- CDGJ (2005): separate processes are needed

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- By including caps, we put volatility in the CS.

What is really going on?

- In affine models:

$$E[\Delta Y_{t+1}] = p_0 + p_1 X_t$$

- But since

$$[Y_t^{3M} \;\; Y_t^{2Y} \;\; Y_t^{10Y}] = A + B X_t,$$

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- Thus, all models/data sets imply that

$$E[\Delta Y_{t+1}] = q_0 + q_1 [Y_t^{3M} \;\; Y_t^{2Y} \;\; Y_t^{10Y}]$$

- Coefficients are restricted ($\approx$10 free parameters, $\approx$30 coefficients).

What is really going on?

- Without caps, the role of the λ's is to fit

$$E[\Delta Y_{t+1}] = q_0(\lambda) + q_1(\lambda)\,[Y_t^{3M} \quad Y_t^{2Y} \quad Y_t^{10Y}]$$

- With caps, the best fit for λ is a compromise.

- Yet R^2's are much lower *without* caps.

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  - Model is misspecified – weekly component overfit without caps – long horizon forecasts are “out of sample”
  - Restrictions are more complex than I realize.
  - ?

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Suggestions

- Formalize motivation.
- More intuition for key results.
- Use a longer sample.
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  - Could use yields since 1970, caps since 1995.
- Report more standard errors, esp. R^2s.
- Better tool for “inverting” for state vector.
  - If vol is unspanned, this method doesn’t work.
  - Better to use MC or invert vol from caps?
- Use a 4-factor model?