Discussion of "When Do Treasuries Earn the Convenience Yield?"

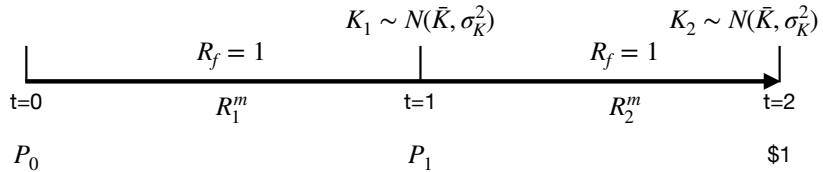
Viral V. Acharya and Toomas Laarits

Discussed by Zhiyu Fu
The University of Chicago

Overview

- A very nice paper on an important topic: the convenience yield
- Main contribution: A new determinant of convenience yields—the hedging demand
  - Moving beyond supply (Krishnamurthy and Vissing-Jorgensen 2012), the fed fund rate (Nagel 2016), or liquidity demand (Krishnamurthy and Li 2021)
  - Extensive empirical results supporting the hypothesis
- A current shortcoming: Unclear about the primitives of the hedging demand
- My suggestion: Use a model framework to clarify
- Following slides: An example of a toy model to help understand empirics

My Own Take on the Empirics using a Toy Model



- Set the risk-free rate $R_f = 1$ for simplicity
- Bonds without convenience flows have $P_0^f = P_1^f = 1$
- Treasuries offer unobserved convenience benefits (flows) K_t at $t = 1, 2$
- K_t is uncertain and comoves with equity returns R_t^m

The Convenience Yield for a Short-Term Bond

- Consider a short-term bond from $t = 1$ to $t = 2$
- Denote the return inclusive of convenience flow as $R_2^K \equiv \frac{K_2+1}{P_1}$, we have:

$$E_1[R_2^K] - R_f = \Lambda Cov_1(R_2^K, R_2^m)$$

- The paper postulates (using notations in the paper, sr_{t+1} unexpected returns):

$$\text{Convenience Yield}_t \approx -\Lambda Cov(sr_{t+1} - sr_{t+1}^T, r_{t+1}^M)$$

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- The convenience yield should be the difference in yields (or, prices):

$$cy_1 \equiv P_1 - 1 = E_1[K_2] - \Lambda Cov_1\left(K_2, R_2^m\right)$$

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- The convenience yield for a short-term bond have two components:
  - The expected convenience flows $E_1[K_2]$
    - Presumably as a function of bond supply, the fed fund rate, etc...
  - The hedging property $-\Lambda Cov_1\left(K_2, R_2^m\right)$: This paper (?)
    - If the convenience flow K_2 is more valued during bad time, ex-ante cy is higher

The Convenience Yield for a Long-Term Bond

- Solve backward to $t = 0$, we have the cy for a two-period bond:

$$cy_0 \equiv \frac{P_0 - 1}{2} = \frac{1}{2}\sum_{t=1}^{2} E_0[K_t] - \frac{1}{2}\Lambda \sum_{t=1}^{2} Cov_0\left(K_t, R_t^m\right) - \frac{1}{2}\Lambda Cov_0\left(cy_1, R_1^m\right)$$

  - The expected convenience flow $E_0[K_t]$
  - Hedging demand from the convenience flows $-\frac{1}{2}\Lambda \sum_{t=1}^{2} Cov_0\left(K_t, R_t^m\right)$
  - Hedging demand from future convenience yield movement

- There are two hedging benefits from a long-term convenient bond!

Map it to Data

- Convenience flows K_t are unobservable, so this paper measures the covariance using observed returns from the convenience yield:

$$Cov(sr_{t+1} - sr^T_{t+1}, r^M_{t+1})$$

- In the model, it measure the hedging property of the future convenience *yield*:

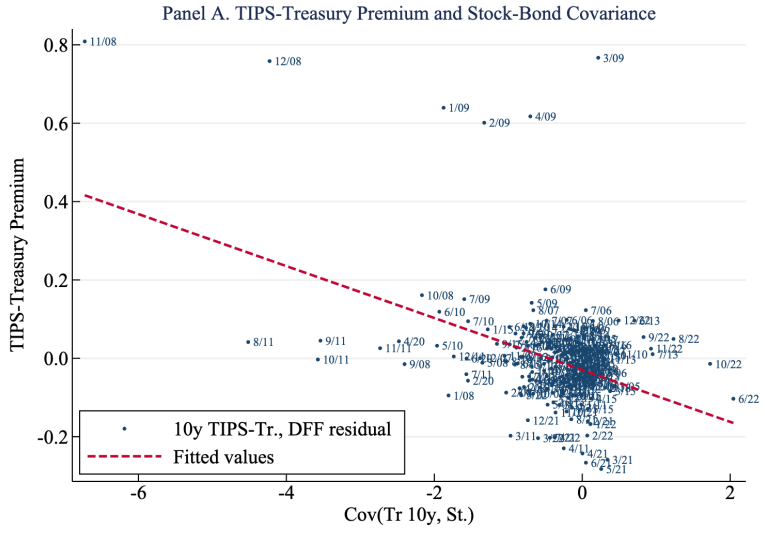
$$Cov_0(\frac{P_1 - P_0}{P_0}, R^m_1) \propto Cov_0\left(cy_1, R^m_1\right)$$

  It does not directly capture hedging from the convenience flow $Cov(K_t, R^m_t)$!

- Model prediction:

$$Cov_0\left(cy_1, R^m_1\right) \downarrow \Longleftrightarrow cy_0 \uparrow$$

Map it to Data



What's Behind the Correlation (and What's not)?

- The hedging property of the convenience *flow* $Cov(K_t, R_t^m)$ does not directly enter the correlation
- The correlation is driven by the hedging property of future convenience *yield*s:

$$Cov_0\left(cy_1, R_1^m\right) = Cov_0\left(E_1[K_2] - \Lambda Cov_1(K_2, R_2^m), R_1^m\right)$$

Plausible interpretations of $Cov_0\left(cy_1, R_1^m\right) < 0$:

- $Cov_0(E_1[K_2], R_1^m) < 0$: during bad times, expected future convenience benefits are higher
  - Stems from a persistent effect from $Cov_0(K_1, R_1^m) < 0$
- $Cov_0(-\Lambda Cov_1(K_2, R_2^m), R_1^m)$: during bad times, convenience flows are a better hedge

Short-Term vs. Long-Term Debate

- In data, short-term cy also correlated with the Cov(Tr 10yr, St.)
- One common critique:
  - Cov(Tr 10yr, St.) measures hedging from future convenience yields $Cov_0(cy_1, R_1^m)$
  - Short-term cy does not have $Cov_0(cy_1, R_1^m)$
- The model offers a potential reconciliation:
  - The primitive is hedging from convenience flows $Cov_0\left(K_1, R_1^m\right)$
  - $Cov_0(cy_1, R_1^m)$ is linked to $Cov_0(K_1, R_1^m)$ via the persistence in K_t

Panel B.

	1996-2022	
	30y Sw-Tr	GC-Tr 3m
Cov(Tr 10y, St.)	-0.069**	-0.044**
	(-2.17)	(-2.46)
Eff. Fed Funds	0.177***	0.032***
	(10.84)	(5.24)
Constant	-0.254***	0.057***
	(-4.47)	(3.18)
Observations	319	380
R^2	0.636	0.197

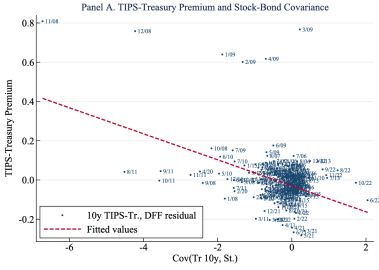
Take-away from the Toy Model

- There can be two (connected) hedging properties
  - Hedging with convenience flows $Cov\left(K_t, R_t^m\right)$
  - Hedging with future convenience yields
    $Cov_0(cy_1, R_1^m) = Cov_0\left(E_1[K_2] - \Lambda Cov_1(K_2, R_2^m), R_1^m\right)$
- The paper seems to be showing the latter
- Outstanding questions:
  - What are the sources of hedging properties?
  - What DGPs can link hedging in convenience flows to hedging in future cy?
  - How do we understand the time-varying covariance?
    - Time-varying uncertainty; shifting in main drivers of shocks; etc...

Empirical I: Generated Regressors

Generated regressors: The covariance is estimated in a 30-day look-back window

- How accurate are the estimates? Maybe plot confidence intervals
- Adjust the standard errors to take into account estimation errors in the covariance (e.g. bootstrapping)
- Using different lengths of the windows for robustness



Empirical II: Event Studies

- Authors show a panel of event studies that Fed's action change cy as well as the $Cov(Tr\ 10yr, St.)$
- Irrelevant to the key message:
  - Authors explain the results using supply-driven mechanism
  - Unclear why covariance will change (sometimes in the inconsistent directions)
- My recommendation: Drop them (unless better interpretations)

Panel B.

	10y TIPS-Treasury Prem.	Cov(Prem. 10y, St.)
Purchases	0.036***	-0.467***
	(4.83)	(-13.26)
Collateral	-0.127***	-0.668***
	(-17.13)	(-19.00)
Foreign	-0.059***	0.064*
	(-7.87)	(1.82)
Exclude	-0.097***	-0.248***
	(-13.03)	(-7.06)
Constant	0.004	0.016
	(0.55)	(0.46)
Observations	104	104
R^2	0.053	0.057

Conclusion

- An important new determinant of the convenience yield via hedging
- My suggestions:
  - Using a theoretical framework to clarify the primitives
  - Providing some thoughts on the sources of time variation in covariances
  - Refining empirical results to sharpen the key message

References

References

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