Discussion of "Segmented Arbitrage"

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Great paper, sure to become key reference in intermediary asset pricing (IAP)

29 arbitrage trades considered across asset classes - 6 equity, 8 FX, 13 FI, 2 credit

Question: how many and what frictions do we need in IAP?

Two main results:

1. low commonality in deviations from LOOP (need10 factors to explain 90%)

    ↪ challenges the implied seminal 1-factor model for IAP

2. event studies showing importance of specific frictions (particularly funding)

    ↪ argue both funding *and* balance sheet (BS) segmentation are key

⇛representative intermediary balance sheet not enough, separate funding frictions

My discussion:

- convincing evidence funding segmentation as separate from BS

- general implications rely on factor structure results → *my focus*

Unclear what is driving 10-factor structure (*hence what it implies for IAP*)

Need 10 factors to explain 90% arbitrage trade variation

↪very weak factor structure, far from 1 (or 2) factors IAP literature implies

↪ in bonds, 1 factor > 90%, 3 factors nearly 99%

Challenge: how can this be true if we have other results suggesting 1 IAP factor

can explain many phenomena across asset classes? *Is it just t-stat vs R2?*

Key assumption is that there is no risk in these arbitrage trades

If there is risk, then 10 factors may say little about IAP factor structure,

and more about the rich factor structure of risks these trades are exposed to

Paper emphasizes arbitrage spreads are riskless, fundamentally different from realized returns: 'arbitrage spreads are accurate measures of expected returns'

 Stress this difference throughout:

- upfront in motivation, conclusion

- suggest reason Adrian et al (14) and He et al (17) fail to reject null of integration (because use realized returns)

- stylized model arbitrage trades are riskless

 But many of them do not appear to be riskless!

Like saying holding a UST 30-year bond is risk-free? True only if held to maturity, otherwise substantial interest rate risk. Also financing risk if position is financed through short-term funding markets (why there is term premium)

There is risk in attempting to arbitrage the several basis trades studied, in some cases just issue of being able to hold to maturity, in others roll-over financing risk

Kondor (09) convergence trading risk: "prices can diverge even if the constraint that arbitrageurs face is not binding, and arbitrageurs can suffer losses in the absence of any shock" (most famous example LTCM)

Authors acknowledge convergence risk, but quickly dismiss it (less than third space devoted to measurement error)

1. show correlations for short tenor (less than 6 months). Is 6 months enough to remove (convergence) risk as a factor? Not clear (Barth and Kahn (21))

2. cite Du et al (22) and Hanson et al (22) to claim convergence risk, in absence of BS/funding segmentation, adds at most 1 more factor

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Du et al (22) and Hanson et al (22) show demand risk is a second *asset-specific factor* (in addition to BS factor).

↪ *if demand factor is asset specific* (plausible, true in these papers), then multi-factor structure may just reflect multi asset-specific (demand) risk

Alternative hypothesis: 2 (3) IAP factors + sector specific (demand) risks

↪**2(3) factors explaining 55(64)% strong IAP factor structure** if there is a lot of asset-specific risk

Examples briefly discussed:

1. Treasury cash-futures basis (Barth and Kahn (21))

2. Inflation swaps - inflation-linked bond (UK micro evidence)

Treasury cash-futures basis is one of the 'short tenor' arbitrage trades used to dismiss convergence risk concern

Barth and Kahn (21):

- trade is exposed to repo market liquidity and margin risk (+ optionality)

- arbitrage spread highly correlated with margins, MOVE/VIX and repo spread

- widens in periods of market stress

- repo friction also linked to dealers BS constraint

Model that fits evidence has demand risk (MMF), limits to arbitrage + margin/rollover risk

MI: optionality may be more material with large interest rate changes; spread in Europe was driven first by ECB buying bonds and then by ECB lending in repo market.

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To earn arbitrage need short sell long term nominal bonds for many years (+buy inflation linked bond and receive fixed inflation rate on swaps). No equivalent horizon repo markets - refinancing risks

MI: Given the volatility of the spread, the risk of holding this position seems to far outweigh the return and most arbitrageurs would not look to hold the position to maturity. Mark-to-market losses along the way would make this an unattractive basis to arbitrage.

Barria and Pinter (23) use UK transaction data to study UK equivalent mispricing identified by Fleckenstein et al (14), show

- LDI flows (demand risk) main determinant of inflation swap mispricing

- hedge funds *do not* trade this mispricing

- Replicate He et al (17) using arbitrage expected returns (t-stat vs R^2?)

- Estimate panel LHS arbitrage expected returns , RHS:

  – He et al BS factor
  – funding proxies (with interacting dummy for sec/unsec)
  – hedge fund return indices (aggregate/sector specific)
  – risk proxies (VIX, MOVE, FX vol, option adjusted credit spreads) with interacting dummies for asset classes
  – include GFC period: results also indicative of common stress risk?

- Interpret first 1-3 PCs (explain 40-64%); remaining PCs group-specific risks?

Some time series properties of engaging in these arbitrage trades (mark-to-market max loss, SR, std dev, % time price corrects vs deviate further); financing risks of engaging in strategies (e.g. short selling treasuries for 10 years)

- Will surely spur more effort to model and quantify segmentation

- Event studies/narrative convincing evidence that funding is a separate friction

- More analysis needed to determine IAP factor structure

  – more discussion of risks (convergence/demand/financing)

- Questions:

  – what are the first 2/3 factors (explain 55/64%)?

  – clarify nature of funding frictions/segmentation vs BS segmentation

  – different intermediaries (dealers/arbitrageurs) vs different investors/risks (demand risk and fundamental risk)

  – what drives segmentations in funding/BS? Expertise/information, regulation, geography?

  – role of post-GFC regulation