How Interest Rate Swaps Reshape the Yield Curve

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Abstract

Interest rate derivatives are the most heavily traded derivatives worldwide, yet we know little about **the economic roles of Interest Rate Swaps (IRS).** In particular, **what are the asset pricing implications, especially for the yield curve, of an active IRS market?** This paper provides the **first causal evidence** that access to superior interest rate swaps (i.e., lower-cost and lower-basis-risk) significantly flattens the yield curve, and develops a **new theoretical mechanism** through which derivatives affect underlying asset prices.

Introduction

Identification Challenges. Introductions of new interest rate derivatives, such as treasury futures or interest rate swaps, are not suitable for DiD because:
- Market adaption is slow, making event windows difficult to define.
- Hard to control for duration-specific confounding effect when a policy affects similar-duration bonds in the same way.
- Substitution and complementarity effects mix, complicating interpretation.

China's IRS market liberalization is a unique setting. Swap Connect, announced on 4 July 2022, opened China's well-developed onshore IRS market to foreign investors, who previously could freely trade China's bonds but could only use offshore non-deliverable IRS in London. Onshore IRS provides more efficient duration risk management for foreign investors due to lower costs and reduced basis risk. The policy affects only bonds demanded by foreign investors, and prohibits speculative use. This clean settings offers:
- Introduction of established instruments
- Variation across similar-duration bonds
- Clean identification of complementarity effects.

Fig 1: Onshore Swap Rates Are More Closely Correlated with Onshore Yields
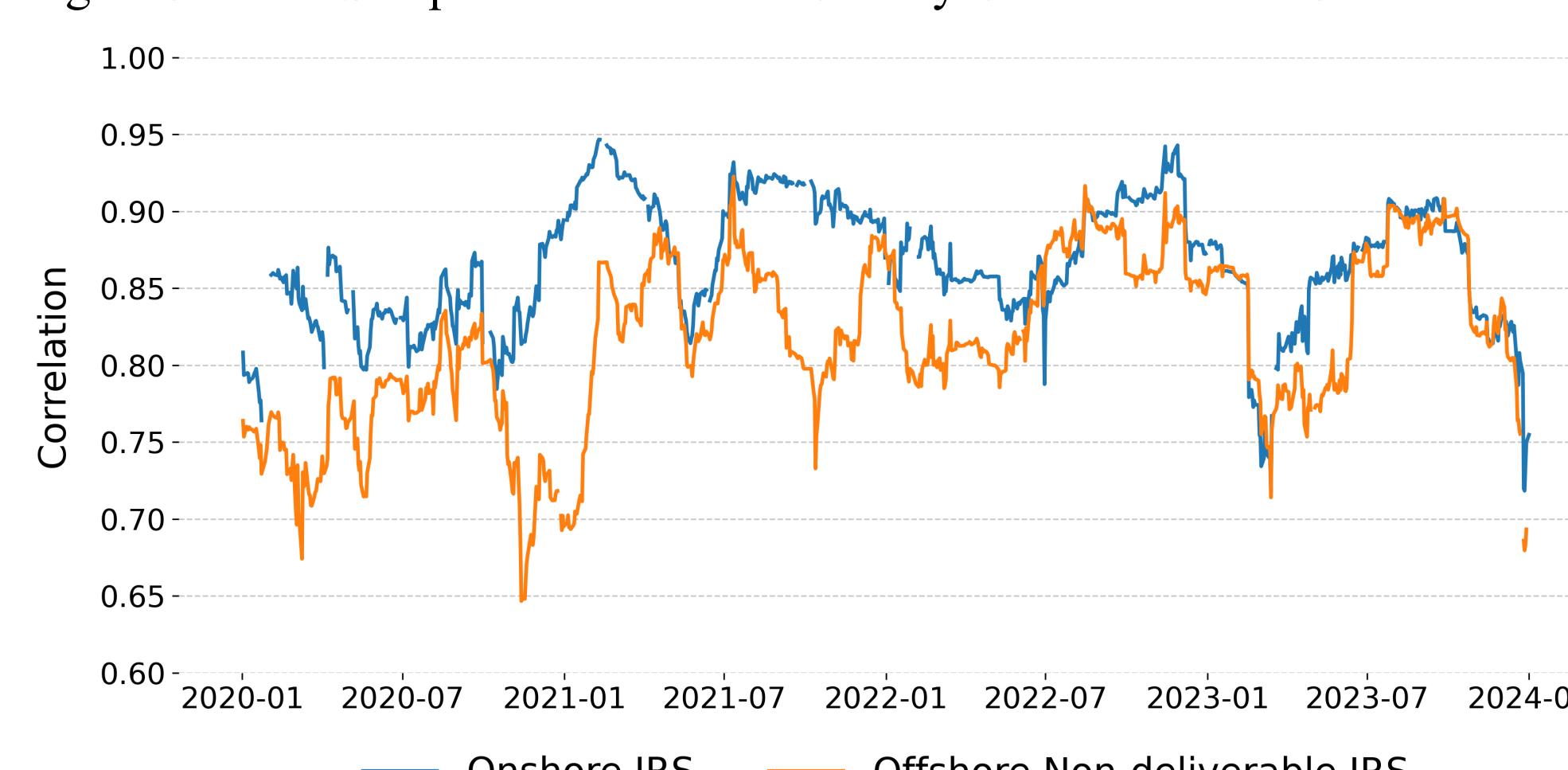
Fig 3: Foreign investors demand specific types of China's bonds
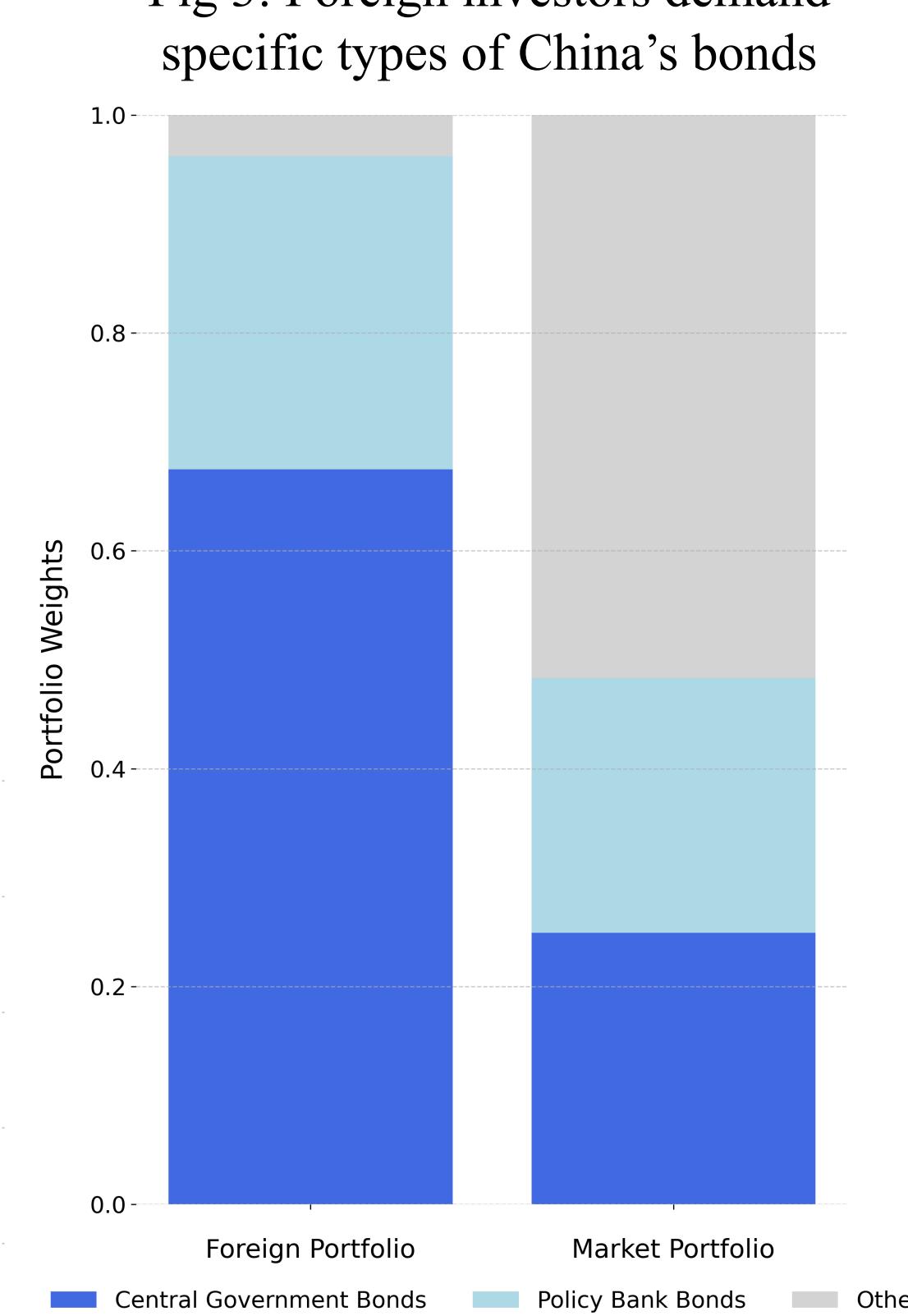
Fig 2: Onshore Swaps Are More Liquid than Offshore Swaps
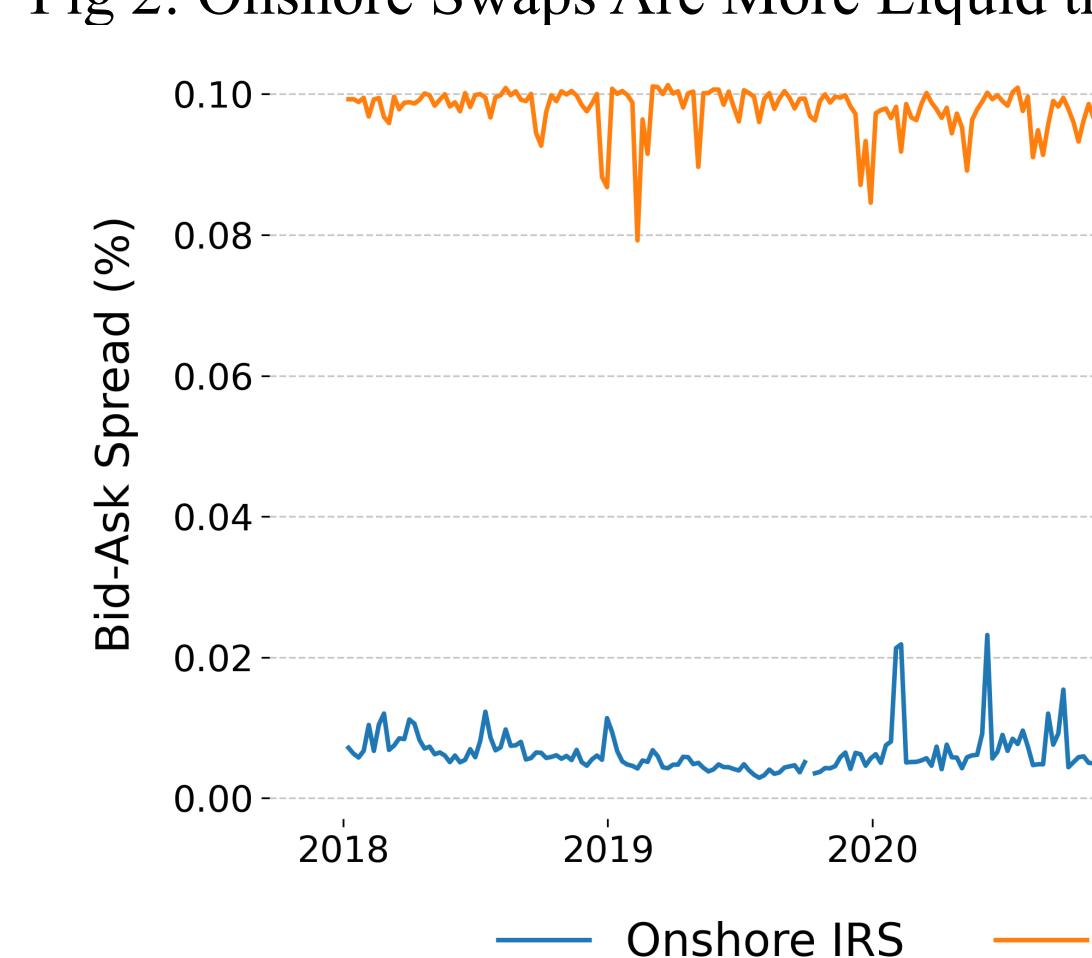
Methodology and Data

Triple Difference-in-Difference: comparing yield spreads across: (1) Treated vs. comparable non-treated bonds; (2) Long- vs. short-duration segments; (3) Post- vs. pre-policy announcement periods.

$$Yield_{it} = \alpha * Post_t * Dur_{it} * Treat_i + FE + \varepsilon_{it}$$

$Yield_{it}$: yield to maturity of bond i on date t
$Post_t$: 1 for dates after the policy announcement; 0 for others
Dur_{it} : modified duration of bond i on date t
$Treat_i$: 1 for central government (CGB) and policy bank bonds (PBB); 0 for AAA corporate bonds
FE : multiple fixed effects including Bond, Date, Date x Treat, Date x Duration and Treat x Duration

We also replace $Post_t$ with week dummies to examine parallel trends and dynamic effects, and replace $Treat_i$ with CGB and PBB dummies to allow subgroup effects. Standard errors are clustered at both the bond and week levels.

Our sample includes all CGB, PBB and AAA plain vanilla corporate bonds in China's onshore market. I collect daily bond yields, durations, trading volumes and bid-ask spreads from 1 May to 14 August 2022.

Results

- Access to more effective interest rate swaps significantly flattens the yield curve for treated bonds relative to controls.
- The 10-year/1-year term spread of Chinese government bonds narrowed by 8 basis points, a 9% decline from its pre-policy level.
- No evidence of confounding from credit risk or international spillovers: placebo tests on AAA vs. AA and offshore vs. onshore spreads show no changes.

Fig 4: Parallel Trends and Dynamic Effects
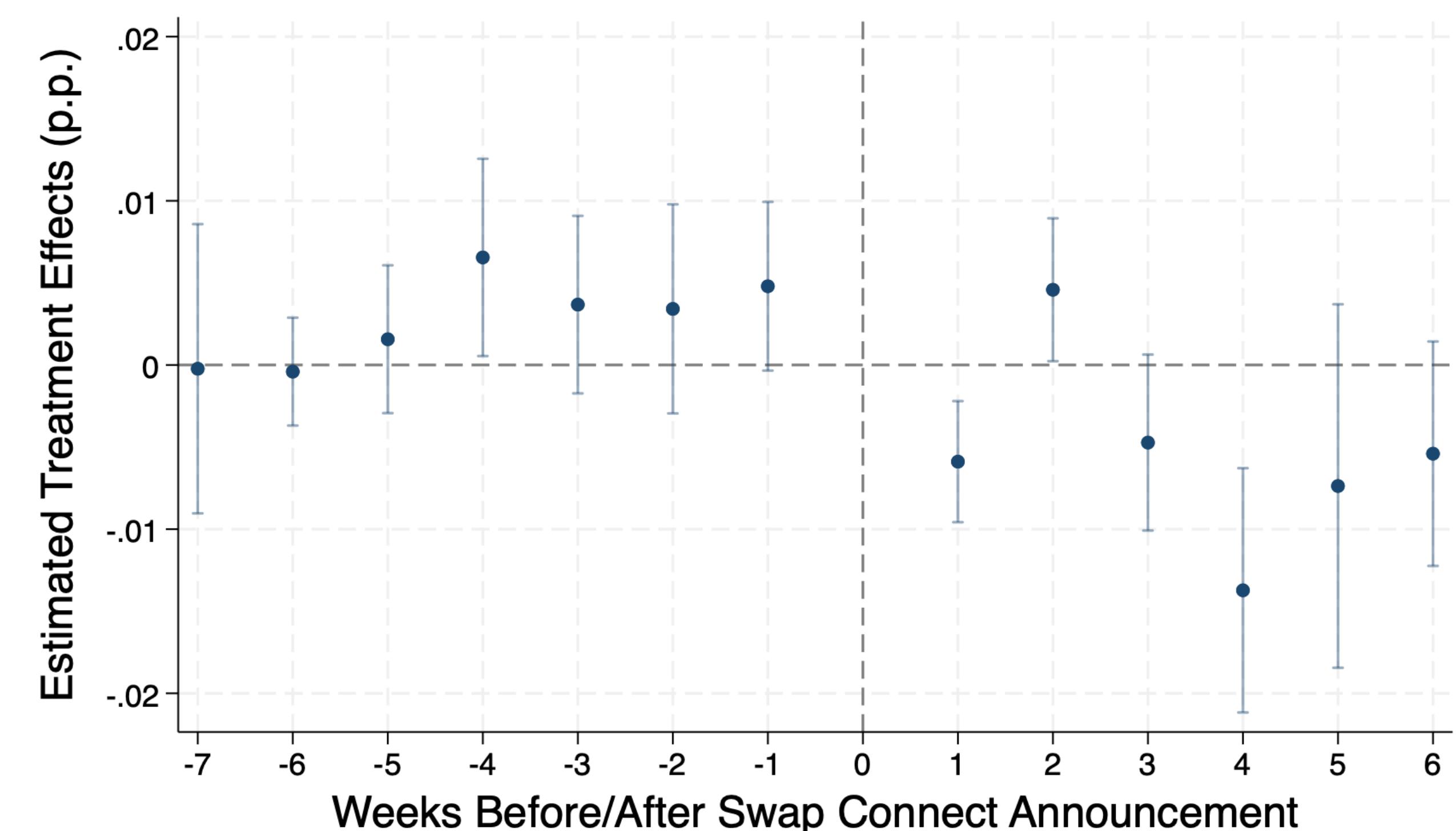
Table 1: Triple and Quadruple DiD Results

Dependent variable: Yield	(1) Pooled	(2) Separate	(3) Illiquidity	(4) Extensions
Triple-Difference Terms				
Post×Dur×Treat	-0.012*** (0.004)		-0.020*** (0.004)	
Post×Dur×CGB		-0.016** (0.006)		-0.024*** (0.005)
Post×Dur×PBB		-0.007 (0.005)		-0.016*** (0.004)
+ Illiquidity Interactions				
Post×Dur×Treat×Illiq			0.016** (0.007)	
Post×Dur×CGB×Illiq				0.014* (0.007)
Post×Dur×PBB×Illiq				0.015** (0.007)

Mechanisms

How Do Interest Rate Swaps Reshape the Yield Curve?
- **Dynamic Duration Risk Management (New Channel)**
  - Enables flexible duration adjustment in bond investing.
  - Increases willingness to bear duration risk ⇒ lower term premia.
- Static Hedging via Basis Traders (Oehmke & Zawadowski, 2015)
  - Allows efficient liquidity-risk holders to hedge unwanted duration risk.
  - Improves allocation of liquidity risk ⇒ lower liquidity premia.

Empirical Test of the Mechanism: a Quadruple DiD, further interacting the triple-difference term with an Illiquidity dummy constructed from bid-ask spreads.
- No evidence of lower liquidity premia and quadruple term is even positive.
- The yield-curve flattening effect strengthens after accounting for illiquidity.

The dynamic risk management channel plays the dominant role in this setting.

Conclusions

The existence of an active Interest Rate Swap (IRS) market can significantly flatten the yield curve. In China's derivative market liberalization, **the 10-year/1-year government bond term spread narrowed by 8 basis points**, a 9% decrease.

IRS improve duration risk management in bond investing, encouraging investors to take on more duration exposure. As a result, financial intermediaries absorb less duration risk and therefore charge a lower duration risk premium.

Questions & Comments?