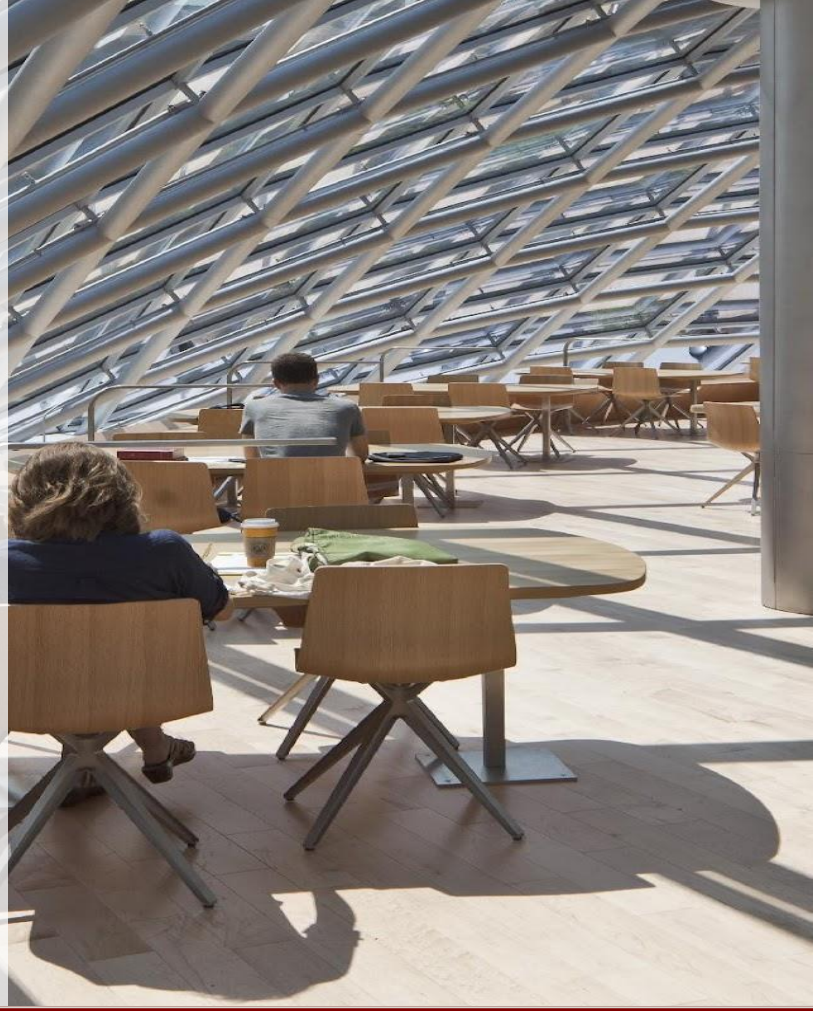
Prime Trading

Project Lab - The University of Chicago
May 9th meeting

Futures Basis Model



Presented by

Armand Dang, Haoshu Wang, Kevin Xu,

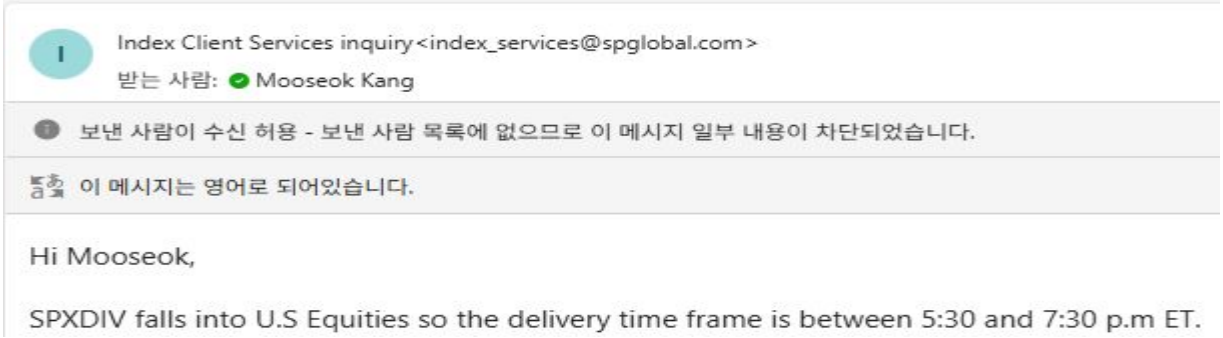
Mooseok Kang, James Chen

1. **Theoretical value for basis**
   - Data check
   - Adjustment

1. Theoretical value for basis

Data Batch time

- **SPXDIV Data (SP DJI)**
- 5:30-7:30 PM E.T
- Next day's index is published and distributed a day before
- However, looks like for unsubscribers, 10:30 AM ET looks like an update time
- We assume we are subscribed to SPXDIV index



Data Batch time

- **Term SOFR**
- 5:00 AM CT
- As of March 1st, non subscribers experience 24 hour delay
- We also assume we are subscribed to it.

To determine when Term SOFR data is available on Bloomberg, consider the following:

1. CME Term SOFR is published at 5:00 am CT (US Central Time) each day.
2. Effective March 1, 2025, real-time data requires a subscription. Non-subscribers experience a 24-hour delay.
3. To check the last update time, use {QR <GO>}. Note that {QR <GO>} shows the time in the user's time zone set by {TZDF <GO>}.
4. For non-subscribers, data for a specific date will likely be visible the morning of the next day.
5. To determine if you have real-time data, run {TSFR3M Index EXC <GO>}. If you are not subscribed, "Not Subscribed" will appear in red.
6. To subscribe, in {TSFR3M Index EXC <GO>}, click the checkmark next to CME Term SOFR and request access.
7. As of March 1, 2025, if users are not subscribed to real-time data, the delay on the terminal will be 24 hours.
8. For the SOFR Index, the New York Fed publishes the data at approximately 8:00 a.m. ET, reflecting data for the prior business day.
9. For the SOFR index, the end-of-day delay is until 21:30 GMT.
10. The {FLDS ACTUAL_TIME_LAST_SETTLE_RECEIVED <GO>} will show the exact settlement time, adjusted for your time zone in {TZDF <GO>}

Data check

- **Expected Dividends**
- We assumed that dividend futures - dividend index replicates or at least similar to analyst's estimate on bloomberg FAIR Screen
- Unable to check historical data but for June contract, the difference was less than .5pts
- However, it not so common but dividend index only accumulates regular dividend payouts not special dividends

10. **Are special dividends included in the index?** No, only regular cash dividends are included.

Reference: Frequently Asked Questions S&P500 Dividend Points Index

Adjustments

- **Tax on Expected Dividend**
- i: income tax, g: capital gains tax, d(w): expected dividend in points at time w from time t
- It does make a difference! See Paper p687

$$F(t, T)/P(t) = \left[e^{(1-i)r(t,T)(T-t)} - g - \int_t^T (1-i)d(w)e^{(1-i)R(t,w,T)(T-w)}\, dw \right] \Big/ (1-g) \quad (17)$$

Taxes and the Pricing of Stock Index Futures

BRADFORD CORNELL and KENNETH R. FRENCH*

Adjustments

- **Tax on Expected Dividend**
- Income tax (on dividends from market makers perspective)
- Simplest Approach: take out the tax part of dividend points
- What “i” should we use?
- Tax on C-corp on dividends in 21%
- If holds longer than 46days without any hedge among 91day window including ex-date , eligible for deduction in tax 50%
- However, this is highly unlikely so assuming 21% tax is legit
- Bloomberg : https://irc.bloombergtax.com/public/uscode/doc/irc/section_246
- IRS : https://www.irs.gov/publications/p542#en_US_202401_publink1000257827
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Adjustments

- **Time to Maturity**
- Previously we calculated time to maturity as EOD but in reality, as ES futures matures at 9:30 AM ET, we need to calculate only up to 9:30AM.
- Otherwise we are overestimating the time to maturity thus having exaggerated futures price

Adjustments

- **Term SOFR**
- When we interpolate the corresponding interest rate, we used Term SOFR
- It is quoted as 1M, 3M, 6M SOFR etc but previously we calculated 1M : 30days
- We modified the code such that it incorporates different month days
- (e.g. March 31days, April : 30days)
- We converted the data to produce continuously compounded rates

Adjustments

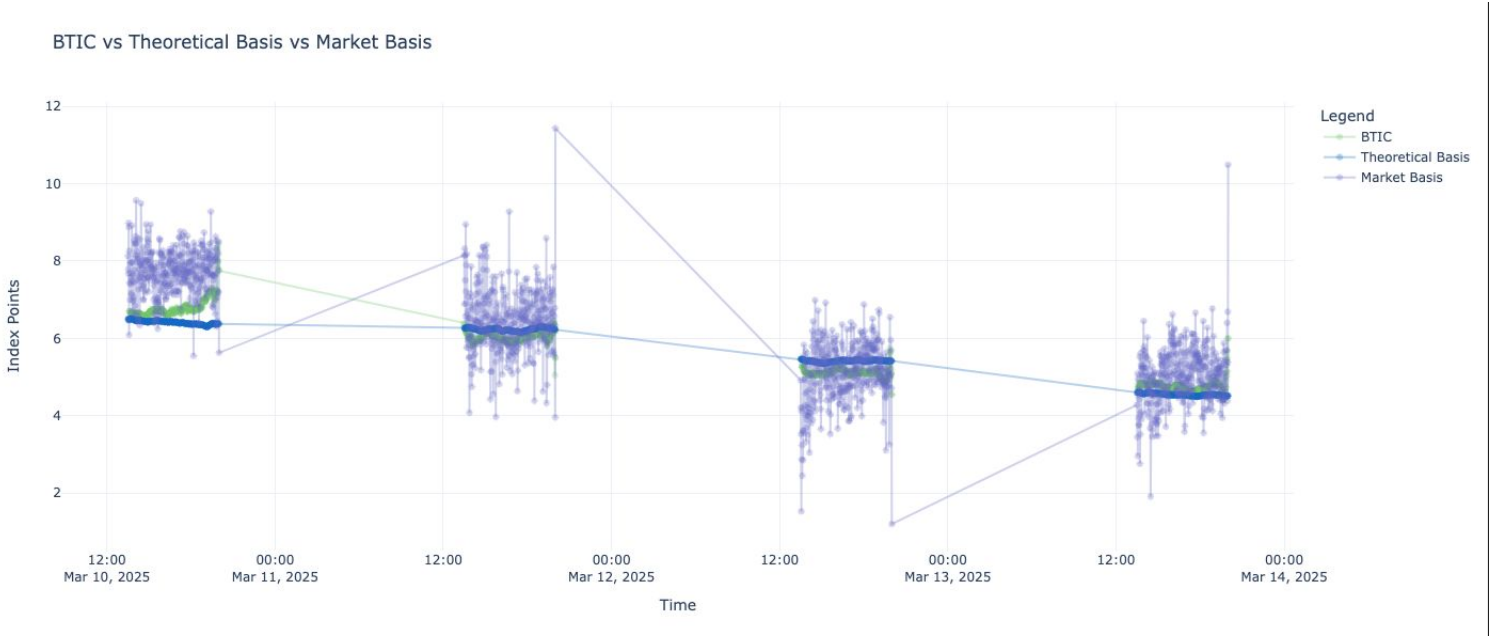
- **Financing Cost**
- Spread over the risk-free rate to borrow against the index
- Significant runup starting in early 2024, peaked at over 1.4% in December 2024
- Record-high demand for long S&P 500 futures from asset managers
- Banks with constrained balance sheet – limited supply

Figure 1: Implied S&P 500® Financing Spread (Rolling 20-Day Average)
Jul 2012 – Dec 2024

Sources: Bank of America Global Research; the D. E. Shaw group.

Adjustments

- **Financing Cost**



Thank you!