Homework: Futures Spread Dynamics

Sunday 9th January, 2022

1 Introduction

Here we will practice obtaining data for spreads in futures markets, and characterizing their dynamics.

2 Data

Obtain second month quarterly [1] futures prices from the Quandl OWF database for two pair W, X; Y, Z (where W, X and Y and Z depend on your student ID number) for 3 Dec 2019 though 31 Aug 2021. Our definition of second month is the contact where the number of days to futures expiration is the smallest available value greater than 30 [2].

Form the spreads $s_t^{(1)}, s_t^{(2)}$ between these numbers as the difference $s_t^{(1)} = X_t - W_t$ and $s_t^{(2)} = Z_t - Y_t$.

3 Analysis

Characterize the relative dynamics of $s_t^{(i)}$ in reasonable ways, using charts and statistics.

For example, compute the median and standard deviation of the difference $d_t^{(N)}$ between $s_t^{(i)}$ and an N-day rolling average of s_t for some values of N.

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[1] Quarterly in this context means expiring in March, June, September, or December.

[2] In other words, for each date in the analysis date range, you have to grab all available futures contracts for that date. Then choose the one with lowest time to expiration so long as it is over 30 days. Note the OWF data set is not entirely fit for purpose and will sometimes be missing data for a futures contract just because the options have expired.

Examine more quantiles than just the median. Look at tails. Do the spreads correlate? How about their difference (d) values? Do spreads exhibit patterns over time?

3.1 Data

Futures pairs W, X; Y, Z (in order) are as given by the last two distinct digits[3] of your student number as follows:

0. ICE_B_B ICE_G_G 0.1342281879194631 (1/7.45)

1. ICE_B_B ICE_G_G 0.1342281879194631 (1/7.45)

2. ICE_B_B ICE_T_T

3. ICE_T_T ICE_G_G 0.1342281879194631 (1/7.45)

4. CBT_FV_FV CBT_TU_TU

5. CBT_FV_FV CBT_TY_TY

6. CBT_FV_FV CBT_US_US

7. CBT_TU_TU CBT_TY_TY

8. CBT_TU_TU CBT_US_US

9. NYM_RB_RB ICE_G_G 0.003198489678291494 (100 /118.35 / 264.172)

The final number, where present, is a multiplier you should apply to X or Z before computing the spreads s.

When downloading from Quandl, you have to use the years and the quarterly codes (H, M, U, Z) individually, there is no facility for Quandl to combine them itself.

Examples of s_t on various dates that you should be matching in your own data are as follows:

0. ICE_B_B ICE_G_G

    - 2021-02-08 6.606510

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[3]So, if your student ID ends in 6222 then use 6 and 2.

- 2021-02-09 6.719866

1. ICE_B_B ICE_T_T

   - 2021-01-19 -2.54
   - 2021-01-20 -2.86

2. ICE_T_T ICE_G_G

   - 2021-01-19 8.966309
   - 2021-01-20 9.279866

3. CBT_FV_FV CBT_TU_TU

   - 2021-02-18 -15.000000
   - 2021-02-19 -14.496875

4. CBT_FV_FV CBT_TY_TY

   - 2021-02-18 10.382812
   - 2021-02-19 9.375000

5. CBT_FV_FV CBT_US_US

   - 2021-02-18 39.023438
   - 2021-02-19 36.593750

6. CBT_TU_TU CBT_TY_TY

   - 2021-02-18 25.382812
   - 2021-02-19 23.871875

7. CBT_TU_TU CBT_US_US

   - 2021-02-18 54.023438
   - 2021-02-19 51.090625

8. NYM_RB_RB ICE_G_G 0.003198489678291494 (100 /118.35 / 264.172)

   - 2021-01-26 -0.124285
   - 2021-01-27 -0.200692