EXCHANGE RATE ECONOMICS – LECTURE 3
ASYMMETRIC INFORMATION AND ORDER FLOW

3. "Once in a Generation" Yen Volatility in 1998: Fundamentals, Intervention, and Order Flow

1998: Most volatile year since early 1970s

- **Asian crisis, Russian bond default, interventions, near-collapse of LTCM**
- **shifting macroeconomic fundamentals**
- **"hedge funds and panic trading"**
  - **yen carry-trade**
  - **liquidity crunch**
  - **herding to unwind positions**

1998: Laboratory to assess determinants of exchange rates

- **Public information via macroeconomic news**
- **Private information via order flow**

Data

- **Yen/dollar quotes for 1998**

- **bid & ask and time stamp to nearest second**

- **use log mid-price weighted by inverse distance to 5-min. endpoint**

- **n = 1,2,...288 obs per day, t = 1,2,...260 days → 74,880 obs**

- **delete 21:00 Friday - 21:00 Sunday**

Intradaily Patterns

- **Returns are random but volatility has predictable components**
  - **business hours open and close**
  - **lunch**
  - **daylight saving time shift**
  - **scheduled government announcements**

Calendar Effects

- **Holiday dummies**
- **Tokyo opening**
- **Summer U.S. afternoon**
- **Winter Asian Monday morning**
- **Friday afternoon in America**
- **Lunch in Tokyo & Europe**
- **Day-of-week**

Estimation strategy for 5-minute returns:

$$R_{t,n} = s_{t,n} \cdot \sigma_{t,n} \cdot Z_{t,n}$$

$\sigma_{t,n}$ *is daily volatility factor*

$Z_{t,n}$ *is* $i.i.d.(0,1)$ *innovation*

$s_{t,n}$ *is seasonal component*

Estimate logarithmic seasonal component $\ln(S_{t,n}^2)$ using FFF regression:

$$2\ \ln\frac{|\ R_{t,n}\ -\ \overline{R}\ |}{\hat{\sigma}_t\ /\ N^{1/2}} = c + \beta O_{t,n} + \sum_{k=1}^{D} \lambda_k \cdot I_k(t,n) + \delta_{0,1}\frac{n}{N_1} + \delta_{0,2}\frac{n^2}{N_2}$$

$$+ \sum_{p=1}^{P}\left(\delta_{c,p}\cdot\cos\frac{2\pi p}{N}n + \delta_{s,p}\cdot\sin\frac{2\pi p}{N}n\right) + \varepsilon_{t,n},$$

Regression Variables:

$\bar{R}$ = sample mean
$\hat{\sigma}_t$ = *a priori* estimate of daily volatility component
O = order flow of large institutions
I_k = indicator for calendar & news events
N_1,N_2 = normalizing constants
P = tuning parameter for expansion order

Macroeconomic Announcements

- **32 U.S. news releases from Reuters**
- **33 Japanese news releases from Bloomberg**

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- **due to 5-minute frequency, use 3rd order polynomial and estimate effect of each event "loading onto" the pattern**
- **reported results for significant announcements**
  - **identified by using each release in turn with separate "all other news" variable**

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- **Employment reports most important**
- **9 U.S. & 6 Japanese "major announcements"**

Intervention Effects

- **Dummy variables for:**

  - **April 10: BOJ supported weak yen**

  - **June 17: First Clinton Ad. intervention supporting weak yen**

- **Despite rumors of intervention in 4th qtr., only 2 actual interventions**

- **Positive & significant effect on volatility**

Order Flow

- **Order flow reveals private info. regarding position switches**
  - **unwinding yen carry-trade learned through trades**
  - **may be orthogonal to public info.**

- **No market-wide data exist**

- **U.S. Treasury requires weekly position data from big participants**
  - **purchases & sales of spot, forward, & futures contracts**

- **Purchases → ↑volatility Sales→ ↓volatility**

Relative Importance of Components

- **Construct forecasts containing day-of-the-week & holiday effects**

- **Omit or include each of 4 components**

- **Ascending order of importance, daily cumulative absolute returns**
  - **calendar, announcement, intervention, & order flow effects**

- **Ascending order of importance, 5 minute absolute returns**
  - **with time-varying daily volatility factor**
  - **order flow, announcements, intervention, & calendar effects**
  - **with constant daily volatility factor**
  - **announcements, intervention, calendar, & order flow effects**

Concluding Remarks

- **Independent role for order flow**
  - **account for announcement, intervention, & calendar effects**
- **Portfolio shifts responsible for much of 1998 yen volatility**
- **A step toward moving beyond exchange rate models based on "fundamentals"**
  - **practitioners have long stated that order flow was major source of price changes**
  - **with lack of transparency & asymmetrically-informed traders we might expect that order flow contains independent info.**

Reference: Cai, Cheung, Lee, & Melvin
http://public.asu.edu/~mmelvin/