A-2 APPENDIX: Asset price data

Olsen and Associates provide the exchange rate series, which cover about 18 years of data (1987-2004). The series denoted USD/EUR is the composition of USD/DEM returns, prior to January 1, 1999, and USD/EUR returns after January 1, 1999. We use the USD/EUR label for simplicity. The decentralized currency markets trade 24-hours a day. Thus, a trading day consists of 96 15-minute intervals. Consistent with the literature on intraday exchange rate patterns, we define trading day t to start at 21:15 GMT on day $t-1$ and end at 21:00 GMT on day t, as in Bollerslev and Domowitz (1993). Also consistent with the literature, we remove week-ends and a set of fixed and irregular holidays, from the intraday return series, as well as days where there are too many missing values, constant prices, and/or days with the longest constant runs activity. The regular holidays removed are December 24 through the 26, December 31 through January 2 and July 4. Irregular holidays include Good Friday, Easter Monday, Memorial Day, Labor Day, Thanksgiving and the day after. The first two lines of Table 2 report the number of observations and sample days for each asset.

We convert the original database times from GMT to Eastern time (EST) or Eastern time Daylight Saving Time (EST-DST), depending on the appropriate period of the year. We use U.S. time, rather than GMT, because the macro announcements and most other trading regularities—e.g., the start of North American trading—create periodic patterns in U.S. time, rather than in GMT. For simplicity, we simply call the U.S. time scale EST. So the first exchange rate of trading day t is the last price of the 16:00-16:15 EST interval (of calendar day $t-1$).

The Dow Jones and 30-year U.S. T-bonds futures contracts series trade on the Chicago Board of Trade (CBOT), while the Nasdaq and S&P 500 futures trade on the Chicago Mercantile Exchange (CME). We augment the regular trading hours data of Nasdaq and S&P 500 with the GLOBEX electronic platform data, which extends the trading day from 8:30 to 16:15. The Dow Jones and US Treasury futures from the CBOT trade from 8:20 to 16:15 and 8:20 to 15:00, respectively. We sampled the CBOT series from 8:30 on for ease of comparison with other series, however. The availability of the off-hours electronic trading data limits the useful GLOBEX-augmented S&P and Nasdaq sample to about 6.5 years. Trading on this Globex platform before the retained dates is rather thin and contains many missing values.

We construct continuous futures series in the usual way by splicing contracts with liquid trading. We roll-over contracts 6 business days before maturity for most futures and 15 business days for U.S. T-bonds.

Table 1: The sources and time spans of the high frequency asset data.

Asset	Source	Original Freq.	Trading Hours*	Period retained	
NASDAQ 100 Futures (ND)	CME/GLOBEX	tick	8:30-16:15 EST	07/01/1998 -	12/30/2004
S&P 500 Futures (SP)	CME/GLOBEX	tick	8:30-16:15 EST	07/01/1998 -	12/30/2004
US Treasury bonds Futures (US)	CBOT	5-min	8:30-15:00 EST	07/01/1998 -	11/29/2004
Dow Jones Futures (DJ)	CBOT	5-min	8:30-16:15 EST	07/01/1998 -	07/22/2005
USD/EUR	O&A	5-min	24 hours a day	01/01/1987 -	10/01/2004
USD/GBP	O&A	5-min	24 hours a day	01/01/1987 -	10/01/2004
JPY/USD	O&A	5-min	24 hours a day	01/01/1987 -	10/01/2004
CHF/USD	O&A	5-min	24 hours a day	01/01/1987 -	09/30/2004

* CBOT futures (Dow Jones and U.S. bonds) trading actually starts at 8:20 EST. We sampled from 8:30 on for ease of comparison with other series.

Table 2: The macroeconomic announcement data.

Announcement	Variable Name	Starting Date	Time (EST)	Freq.
Real Activity				
Real GDP Advance	GDPADV	4/27/1990	8:30	Q
Real GDP Preliminary	GDPPRE	5/24/1990	8:30	Q
Real GDP Final	GDPFIN	6/21/1990	8:30	Q
Employees on Non-farm Payrolls	NFPAYROL	1/8/1986	8:30	M
Retail Sales	RETSALES	2/11/1980	8:30	M
Industrial Production	INDPROD	2/15/1980	9:15	M
Capacity Utilization	CAPUTIL	4/18/1988	9:15	M
Consumer Credit	CONSCRED	1/11/1996	15:00	M
Personal Income	PERSINC	3/17/1981	8:30/10:00	M
Prices				
Producer Price Index	PPI	1/10/1986	8:30	M
Consumer Price Index	CPI	1/22/1986	8:30	M
Investment				
Durable Good Orders	DURABLE	1/24/1986	8:30	M
Business Inventories	BINVENT	3/14/1988	8:30/10:00	M
Construction Spending	CNSTRSPEND	4/1/1988	10:00	M
New Orders at Factories	ORDERFACT	3/30/1988	10:00	M
Consumption				
Personal Consumption Expenditures	PCE	7/17/1985	8:30/10:00	M
New Home Sales	HOMESALES	3/29/1988	10:00	M
Net Exports				
Trade Balance	TRADEBAL	1/30/1986	8:30	M
Government Deficit				
Government Fiscal Surplus - Deficit	GVFISCDEF	2/22/1988	14:00	M
Forward Looking				
Manufacturing Composite Index	MFGIND	2/1/1990	10:00	M
Housing Starts	HOUSING	1/17/1986	8:30	M
Consumer Confidence	CONSCONF	7/30/1991	10:00	M
Index of Leading Economic Indicators	LEADINGI	1/30/1986	8:30	M
FOMC				
Federal Funds Target	FFRTARGET	9/21/1994	14:15	6-weeks