Topics

1.) Testing the Monetary Model of Ex. Rates
  - Campbell-Shiller Tests
  - Long-Run Tests [Mark (AER, 1995); Mark+Sul (JIE, 2001)]

2.) Engel-West Theorem
  - Engel+West (JPE, 2005)

3.) Accounting for Ex. Rate Volatility
  - Engel + West (AER, 2004)

4.) Uncovered Interest Parity / Forward Premium Puzzle

5.) Risk Premia in the FX Market
  - Fama Regressions

6.) General Equilibrium Models
  - Lucas (JME, 1982)

Campbell-Shiller Tests

Consider the no-bubbles solution,

$$s_t = (1-\beta) E_t \sum_{j=0}^{\infty} \beta^j f_{t+j}$$

2 Possibilities

1.) Agents & Econometrician have same info. set

$\Longrightarrow$ s_t is an <u>exact</u> function of the variables used to forecast f_t.

2.) Agents have more info.

$\Longrightarrow$ s_t Granger causes f_t

But if (2) is true, how do we test?

<u>Answer</u>: Include s_t in the VAR used to forecast f_t.

2 Cases

1. f_t is stationary, $I(0)$

$$\begin{pmatrix} f_t \\ s_t \end{pmatrix} = \Psi \begin{pmatrix} f_{t-1} \\ s_{t-1} \end{pmatrix} + \varepsilon_t$$

$$(0 \quad 1) = (1 \quad 0)(1-\beta)\left[I - \beta\Psi\right]^{-1}$$

or in linear form,

$$(0, 1)\left[I - \beta\Psi\right] = (1-\beta, 0)$$

2. f_t has a unit, $I(1)$, and is cointegrated with s_t

Can re-write ex. rate eq. as follows,

$s_t - f_t = \eta E_t(s_{t+1} - s_t)$

Using the PV model + law of iterated expectations,

$$\eta E_t(s_{t+1} - s_t) = \eta\left[(1-\beta)E_t\sum_{j=0}^{\infty}\beta^j f_{t+1+j} - (1-\beta)E_t\sum_{j=0}^{\infty}\beta^j f_{t+j}\right]$$

since $\eta = \frac{\beta}{1-\beta}$, we then have

$$\boxed{s_t - f_t = E_t\sum_{j=1}^{\infty}\beta^j \Delta f_{t+j}}$$

Define $\phi_t = s_t - f_t$ as the "spread".

Interpretation

$\phi_t > 0 \Longrightarrow f_t$ expected to rise in future

Now have a VAR in "Error Correction" form (VECM).

$$\begin{pmatrix} \Delta f_t \\ \phi_t \end{pmatrix} = \Psi \begin{pmatrix} \Delta f_{t-1} \\ \phi_{t-1} \end{pmatrix} + \varepsilon_t$$

Therefore, the model implies the following 2 cross-equation restrictions,

$$\boxed{(0 \quad 1) = (1 \quad 0)\beta\Psi[I - \beta\Psi]^{-1}}$$

And the predicted spread is,

$$\boxed{\hat{\phi}_t = (1 \quad 0)\beta\Psi[I - \beta\Psi]^{-1}\begin{pmatrix} \Delta f_t \\ \phi_t \end{pmatrix}}$$

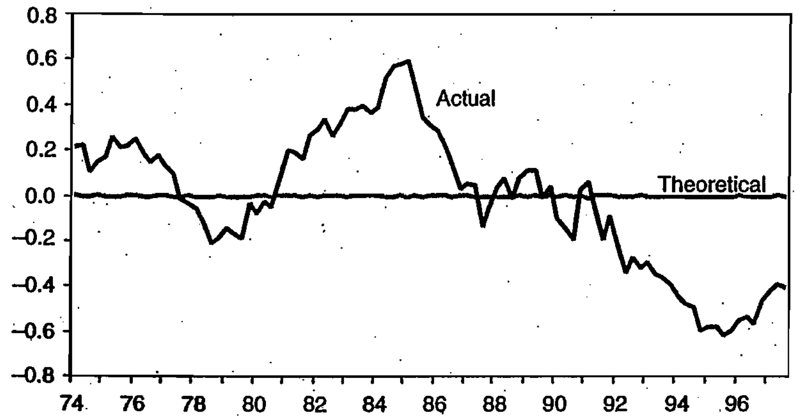

Figure 3.5 Theoretical and actual spreads, $s_t - f_t$.

Long-Run Implications

There are many reasons why the monetary model might not hold at short horizons (e.g., failure of PPP).

A less demanding implication is that s_t and f_t should be cointegrated.

Mark + Sul (JIE, 2001)

Engel, Mark & West (NBER Macro Annual, 2008)

This implies an Error-Correction Model,

Mark (1995, AER)

$$\boxed{\Delta s_{t+k} = \alpha + \beta(f_t - s_t) + v_{t+k} \qquad \beta > 0}$$

Caveats

1.) s_t + f_t may not be cointegrated

2.) In principle, Δf_{t+k} may do the adjusting

3.) Need to correct for small sample bias. Results sensitive to Monte Carlo assumptions. Killian (1997)

4.) Results seem dependent on currency + sample.

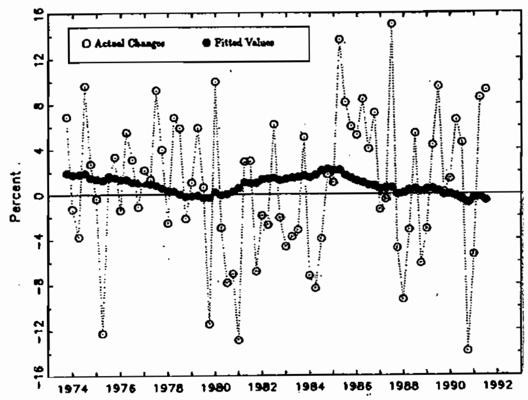

FIGURE 1. ONE-QUARTER CHANGES IN THE LOG DOLLAR/DEUTSCHE-MARK EXCHANGE RATE

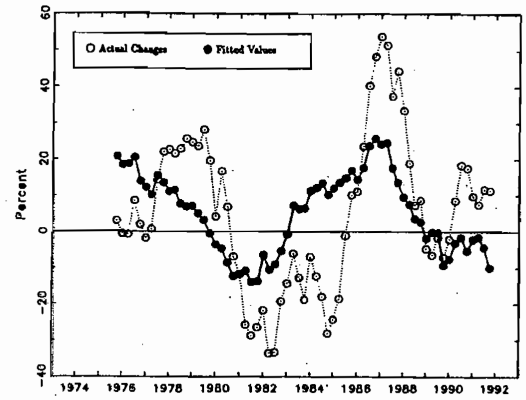

FIGURE 3. EIGHT-QUARTER CHANGES IN THE LOG DOLLAR/DEUTSCHE-MARK EXCHANGE RATE

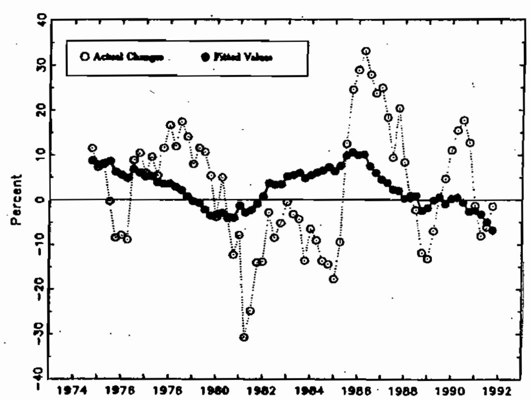

FIGURE 2. FOUR-QUARTER CHANGES IN THE LOG DOLLAR/DEUTSCHE-MARK EXCHANGE RATE

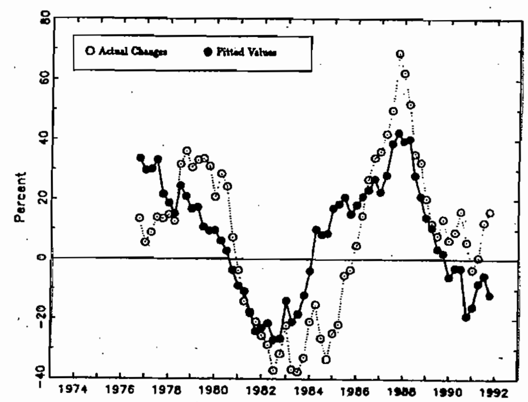

FIGURE 4. TWELVE-QUARTER CHANGES IN THE LOG DOLLAR/DEUTSCHE-MARK EXCHANGE RATE

$$\Delta e_{t+k} = \alpha + \beta(f_t - e_t)$$

$$f_t = (m_t - m_t^*) - (y_t - y_t^*)$$

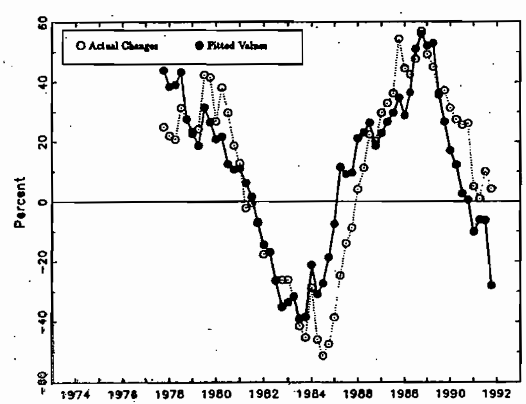

FIGURE 5. SIXTEEN-QUARTER CHANGES IN THE LOG DOLLAR/DEUTSCHE-MARK EXCHANGE RATE

Table 3.2 Monetary fundamentals out-of-sample forecasts of US dollar returns with nonparametric bootstrapped *p*-values under cointegration

	One quarter ahead		*16 quarters ahead*	
Country	*U-statistic*	*p-value*	*U-statistic*	*p-value*
Australia	1.024	0.904	**0.864**	0.222
Austria	**0.984**	**0.013**	**0.837**	0.131
Belgium	**0.999**	0.424	**0.405**	**0.001**
Canada	**0.985**	**0.074**	**0.552**	**0.009**
Denmark	1.014	0.912	**0.858**	0.174
Finland	1.001	0.527	**0.859**	0.164
France	**0.994**	0.155	**0.583**	**0.004**
Germany	**0.986**	**0.056**	**0.518**	**0.003**
Greece	1.016	0.909	1.046	0.594
Italy	**0.997**	0.269	**0.745**	**0.016**
Japan	1.003	0.579	**0.996**	0.433
Korea	**0.912**	**0.002**	**0.486**	**0.012**
Netherlands	**0.986**	**0.041**	**0.703**	**0.032**
Norway	**0.998**	0.380	**0.537**	**0.002**
Spain	**0.996**	0.341	**0.672**	**0.028**
Sweden	**0.975**	**0.034**	**0.372**	**0.001**
Switzerland	**0.982**	**0.008**	**0.751**	**0.049**
UK	**0.983**	**0.077**	**0.570**	**0.012**
Mean	**0.991**	**0.010**	**0.686**	**0.001**
Median	**0.995**	0.163	**0.688**	**0.001**

Bold face indicates statistical significance at the 10 percent level.

Engel & West (JPE, 2005)

Facts

1.) Empirically, ex. rates are well approximated by random walks

2.) The Monetary Model does not imply a random walk unless fundamentals are a random walk (which they're not).

Engel-West Theorem

If $f_t \sim I(1)$, then as $\beta \to 1$, s_t converges to a random walk, even if f_t is not a random walk.

Intuition

As $\beta \to 1$, the r.w. permanent component of f_t dominates the PV forecast of f_t

Implication

Inability to beat a random walk forecast may not be a good measure of the success of PV models

Example

Suppose $\Delta f_t = \rho \Delta f_{t-1} + v_t$

Note: $f_{t+k} = f_t + \sum_{j=1}^{k} \Delta f_{t+j}$

$$\Longrightarrow E_t f_{t+k} = f_t + \sum_{j=1}^{k} \rho^j \Delta f_t$$

$$= f_t + \frac{1-\rho^k}{1-\rho} \rho \Delta f_t$$

Therefore,

$$\boxed{\Delta S_t = \rho \frac{1-\beta}{1-\rho\beta} \Delta f_{t-1} + \frac{1}{1-\rho\beta} v_t}$$

Note,

as $\beta \to 1$ $\quad \Delta S_t \to \frac{1}{1-\rho} v_t$ (random walk)

Proof of Engel-West Theorem

Given $f_t \sim I(1)$, we have the following decomposition

$$\boxed{\Delta f_t = (1-L) f_t = \underbrace{A_1(L)\,\varepsilon_{1t}}_{\text{permanent}} + \underbrace{(1-L) A_2(L)\,\varepsilon_{2t}}_{\text{transitory/stationary}}}$$

Theorem (Hansen + Sargent (JEDC, 1980))

If $\quad X_t = C(L)\,\varepsilon_t \quad$ and $\quad y_t = E_t \sum_{j=0}^{\infty} \beta^j X_{t+j}$

then $\quad y_t = \dfrac{L\,C(L) - \beta C(\beta)}{L - \beta}\,\varepsilon_t$

Applying this result,

$$\begin{bmatrix} \Delta f_t \\ s_t - f_t \end{bmatrix} = \begin{bmatrix} A_1(L) & (1-L) A_2(L) \\ \beta \dfrac{A_1(L) - A_1(\beta)}{L - \beta} & \beta \dfrac{(1-L) A_2(L) - (1-\beta) A_2(\beta)}{L - \beta} \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix}$$

Note,

$$s_t = f_t + (s_t - f_t) \Longrightarrow \Delta s_t = \Delta f_t + \Delta(s_t - f_t)$$

Plugging in,

$$\Delta s_t = \left\{ (1-L)\beta \left[\frac{A_1(L) - A_1(\beta)}{L - \beta} \right] + A_1(L) \right\} \varepsilon_{1t}$$

$$+ \left\{ (1-L)\beta \left[\frac{(1-L)A_2(L) - (1-\beta)A_2(\beta)}{L-\beta} \right] + (1-L)A_2(L) \right\} \varepsilon_{2t}$$

Finally, note

$$\boxed{\lim_{\beta \to 1} \Delta s_t = A_1(1)\,\varepsilon_{1t}}$$

Continuity $\Longrightarrow$ When β is <u>close</u> to 1, s_t is <u>close</u> to a random walk.

TABLE 1

POPULATION AUTOCORRELATIONS AND CROSS CORRELATIONS OF Δs_t

	b (1)	φ_1 (2)	φ (3)	Correlation of Δs_t with: Δs_{t-1} (4)	Δs_{t-2} (5)	Δs_{t-3} (6)	Δx_{t-1} (7)	Δx_{t-2} (8)	Δx_{t-3} (9)
1.	.50	1.0	.3	.15	.05	.01	.16	.05	.01
2.			.5	.27	.14	.07	.28	.14	.07
3.			.8	.52	.42	.34	.56	.44	.36
4.	.90	1.0	.3	.03	.01	.00	.03	.01	.00
5.			.5	.05	.03	.01	.06	.03	.01
6.			.8	.09	.07	.06	.13	.11	.09
7.	.95	1.0	.3	.02	.01	.00	.02	.01	.00
8.			.5	.03	.01	.01	.03	.01	.01
9.			.8	.04	.04	.03	.07	.05	.04
10.	.90	.90	.5	.04	−.01	−.03	.02	−.03	−.05
11.	.90	.95	.5	.05	.01	−.01	.04	−.00	−.02
12.	.95	.95	.5	.02	−.00	−.01	.01	−.02	−.03
13.	.95	.99	.5	.02	.01	.00	.03	.01	−.00

NOTE.—The model is $s_t = (1-b)\sum_{j=0}^{\infty} b^j E_t x_{t+j}$ or $s_t = b\sum_{j=0}^{\infty} b^j E_t x_{t+j}$. The scalar variable x_t follows an AR(2) process with autoregressive roots φ_1 and φ. When $\varphi_1 = 1.0$, $\Delta x_t \sim$ AR(1) with parameter φ. The correlations in cols. 4–9 were computed analytically. If $\varphi_1 = 1.0$, as in rows 1–9, then in the limit, as $b \rightarrow 1$, each of these correlations approaches zero.

TABLE 2
BASIC STATISTICS

	CANADA		FRANCE		GERMANY		ITALY		JAPAN		UNITED KINGDOM	
	Mean	ρ_1	Mean	ρ_1	Mean	ρ_1	Mean	ρ_1	Mean	ρ_1	Mean	ρ_1
1. Δs	−.44	−.03	−.35	.10	.15	.07	−1.11	.14	.76	.13	−.44	.15
	(2.20)		(5.83)		(6.06)		(5.79)		(6.22)		(5.26)	
2. $\Delta(m-m^*)$	−.56	.19	.03	.25	−.55	.28	−1.19	.28	−.39	.46	−1.34	.54
	(2.59)		(2.41)		(2.38)		(2.24)		(2.18)		(1.94)	
3. $\Delta(p-p^*)$	−.04	.47	−.13	.62	.49	.42	−.92	.62	.50	.16	−.54	.27
	(.58)		(.68)		(.77)		(1.17)		(.86)		(1.29)	
4. $i-i^*$	−.92	.75	−1.89	.62	2.02	.84	−4.33	.66	3.64	.78	−2.40	.76
	(1.72)		(3.70)		(3.01)		(4.25)		(2.78)		(2.88)	
5. $\Delta(i-i^*)$	−.01	−.39	.06	−.37	−.01	−.34	.06	−.35	−.04	−.15	.06	−.13
	(1.21)		(3.23)		(1.70)		(3.51)		(1.83)		(2.00)	
6. $\Delta(m-m^*)-\Delta(y-y^*)$	−.60	.17	−.24	.17	−.72	.13	−1.42	.24	−.43	.35	−1.53	.41
	(2.65)		(2.59)		(2.92)		(2.35)		(2.54)		(2.19)	
7. $\Delta(y-y^*)$	.04	−.08	.21	.19	.17	.08	.20	.14	.04	.06	.19	−.04
	(.79)		(.88)		(1.47)		(1.01)		(1.21)		(1.06)	

NOTE.—The numbers in parentheses under the means are the standard deviations of the indicated variable; ρ_1 is the first-order autocorrelation coefficient of the indicated variable. Variable definitions: Δs is the percentage change in the dollar exchange rate (a higher value indicates depreciation). In other variables an asterisk indicates a non-U.S. value, and the absence of an asterisk indicates a U.S. value; Δm is the percentage change in M1 (M2 for the United Kingdom); Δy is the percentage change in real GDP; Δp is the percentage change in consumer prices; and i is the short-term rate on government debt. Money and output are seasonally adjusted. Data are quarterly, generally 1974:2–2001:3. Exceptions include an end date of 1998:4 for $m-m^*$ for France, Germany, and Italy; start dates for $m-m^*$ of 1978:1 for France, 1974:1 for Germany, and 1975:1 for Italy; and start dates for $i-i^*$ of 1975:1 for Canada and 1978:3 for Italy and Japan. See the text.

TABLE 3

Bivariate Granger Causality Tests, Different Measures of Δf_t, Full Sample: 1974:1–2001:3

	Canada	France	Germany	Italy	Japan	United Kingdom
	A. Rejections at 1% (***), 5% (**), and 10% (*) Levels of H_0: Δs_t Fails to Cause Δf_t					
1. $\Delta(m - m^*)$		*		**	**	
2. $\Delta(p - p^*)$			***	***	***	
3. $i - i^*$		**			**	
4. $\Delta(i - i^*)$		**			***	
5. $\Delta(m - m^*) - \Delta(y - y^*)$		*		*		
6. $\Delta(y - y^*)$						
	B. Rejections at 1% (***), 5% (**), and 10% (*) Levels of H_0: Δf_t Fails to Cause Δs_t					
1. $\Delta(m - m^*)$						
2. $\Delta(p - p^*)$	*					
3. $i - i^*$					**	
4. $\Delta(i - i^*)$						
5. $\Delta(m - m^*) - \Delta(y - y^*)$						
6. $\Delta(y - y^*)$						

Note.—See the notes to earlier tables for variable definitions. Statistics are computed from fourth-order bivariate VARs in $(\Delta s_t, \Delta f_t)'$. Because four observations were lost to initial conditions, the sample generally is 1975:2–2001:3, with exceptions as indicated in the note to table 2.

Engel & West (AER, 2004)

How much of the volatility of ex. rates can be explained by fundamentals?

From Shiller's var. bound, we already know that ex. rates are "too volatile".

However, it's just a bound, and we'd like to get an estimate of the fraction, without having to assume agents and econometricians have the same info. set. Also, Shiller bounds are uninteresting when there are "unobserved fundamentals".

Let $\chi^f_{t,I} = (1-\beta)\sum_{j=0}^{\infty}\beta^j E_t(f_{t+j}\,|\,I_t)$ } Market Forecast

Model says $s_t = \chi^f_{t,I} \Rightarrow var(s_t) = var(\chi^f_{t,I})$

Let $\chi^f_{t,H} = (1-\beta)\sum_{j=0}^{\infty}\beta^j E_t(f_{t+j}\,|\,H_t)$ } Econometrician Forecast

where $H_t \subset I_t$

Let,

$$\left.\begin{aligned} \varepsilon^f_{t,I} &= \chi^f_{t,I} - E(\chi^f_{t,I}\,|\,I_{t-1}) \\ \varepsilon^f_{t,H} &= \chi^f_{t,H} - E(\chi^f_{t,H}\,|\,H_{t-1}) \end{aligned}\right\} \text{Innovations in } \chi^f_{t,I} \text{ and } \chi^f_{t,H}$$

West (Econometrica, 1988)

$$var(\varepsilon^f_{t,H}) = \frac{1-\beta^2}{\beta^2} var(x^f_{t,H} - x^f_{t,I}) + var(\varepsilon^f_{t,I})$$

$\Longrightarrow var(\varepsilon^f_{t,H}) > var(\varepsilon^f_{t,I})$ } Market forecasts have smaller innovation variance

Note, as $\beta \to 1$, two things happen:

1.) $\Delta x^f_{t,I} \approx \varepsilon^f_{t,I}$ and $\Delta x^f_{t,H} \approx \varepsilon^f_{t,H}$

2.) $var(\varepsilon^f_{t,H}) \to var(\varepsilon^f_{t,I})$

$\Longrightarrow$ We can approximate $var(\Delta x^f_{t,I})$ by $var(\Delta x^f_{t,H})$

can estimate with VAR

So the question becomes,

What is $\dfrac{var(\Delta x^f_{t,H})}{var(\Delta s_t)}$?

How does it depend on β ?

TABLE 1—ESTIMATES OF $\mathrm{Var}(\Delta x^{f}_{tH})/\mathrm{Var}(\Delta s_t)$ (CURRENT AND LAGGED FUNDAMENTALS ONLY IN H_t)

		Fundamental		
Country	b	$m - y - (m^* - y^*)$	$p - p^*$	$p - p^* + i - i^*$
Canada	0.90	1.142	0.164	0.162
	0.95	1.181	0.188	0.181
	0.99	1.213	0.211	0.199
	1.00	1.221	0.218	0.204
France	0.90	0.269	0.054	0.070
	0.95	0.309	0.095	0.100
	0.99	0.352	0.187	0.146
	1.00	0.365	0.233	0.163
Germany	0.90	0.257	0.050	0.054
	0.95	0.301	0.077	0.071
	0.99	0.349	0.127	0.095
	1.00	0.364	0.148	0.103
Italy	0.90	0.316	0.146	0.143
	0.95	0.360	0.245	0.226
	0.99	0.407	0.447	0.376
	1.00	0.421	0.543	0.441
Japan	0.90	0.364	0.039	0.020
	0.95	0.406	0.058	0.023
	0.99	0.446	0.090	0.026
	1.00	0.458	0.103	0.027
United Kingdom	0.90	0.444	0.139	0.152
	0.95	0.540	0.201	0.206
	0.99	0.645	0.298	0.284
	1.00	0.677	0.336	0.312

Uncovered Interest Parity (UIP)

The monetary model of ex. rates assumes UIP holds. Maybe this is the source of the problem.

UIP states that expected (nominal) rates of return are equated across countries (in common currency units)

$$\boxed{1 + i_t = (1 + i_t^*) \frac{E_t S_{t+1}}{S_t}}$$

S_t : spot price of fx
$/fc

Note,

1.) Assets must have same risk (usually riskless govt. securities)

2.) Assets must have same maturity (usually 1, 3, 12 months)

UIP is often interpreted as an equilibrium condition under risk neutrality (see below for caveat), or as an expression of fx market "efficiency".

In contrast, Covered Interest Parity (CIP), is a no arbitrage condition

$$\boxed{1 + i_t = (1 + i_t^*) \frac{F_t}{S_t}}$$

F_t : Forward rate, Price set today for future delivery.

Note, CIP + UIP $\Longrightarrow E_t S_{t+1} = F_t$

$\Longrightarrow$ Forward rate is an unbiased predictor of the future spot rate

So UIP can be interpreted as a test of forward rate unbiasedness, since CIP holds to a close approx.

What if $F_t > E_t S_{t+1}$?

1.) Sell fx forward at F_t

2.) Buy it back later at $E_t S_{t+1}$

Or equivalently,

1.) Borrow fx at i^*

2.) Convert to \$ and lend at i

In practice, the combo. of buying spot and selling forward (or vice versa) is typically done via <u>swap contracts</u>.

Testing UIP

Write UIP as,

$$\frac{E_t S_{t+1}}{S_t} = \frac{1+i_t}{1+i_t^*} = \frac{F_t}{S_t}$$

Take logs of both sides

$$\ln E_t S_{t+1} - \ln S_t = \ln F_t - \ln S_t = \log(1+i_t) - \ln(1+i_t^*)$$
$$\approx i_t - i_t^*$$

<u>Fact</u>: If $\ln x \sim N(\mu, \sigma^2)$, then $x \sim$ log-Normal and $E(x) = e^{\mu + \frac{1}{2}\sigma^2}$

So if $S_t \sim$ log-Normal,

$$E_t s_{t+1} + \tfrac{1}{2} var_t(s_{t+1}) - s_t = f_t - s_t$$
$$= i_t - i_t^*$$

where $s_t = \log(S_t)$ $f_t = \ln(F_t)$

Assuming RE, $s_{t+1} = E_t s_{t+1} + \varepsilon_{t+1}$

$$\boxed{\Delta s_{t+1} = \alpha + \beta(f_t - s_t) + \varepsilon_{t+1}}$$

$H_0: \beta = 1$ $\quad\quad$ $H_A: \beta \neq 1$

Table 1

Regressions of Quarterly Depreciation on 3-Month Forward Premium

$\Delta s_{t+1} = \alpha + \beta(F_t - s_t) + \varepsilon_{t+1}$

	USD/GBP	USD/DEM	USD/JAY	GBP/DEM	GBP/JAY	DEM/JAY
			1976:I-1994:I			
$\hat{\alpha}_{OLS}$	-1.340	0.638	3.294	1.622	7.702	1.041
	(0.895)	(0.886)	(0.964)	(1.116)	(1.687)	(0.648)
$\hat{\beta}_{OLS}$	-1.552	-0.136	-2.526	-0.602	-4.261	-0.755
	(0.863)	(0.839)	(0.903)	(0.782)	(1.133)	(1.042)

Table 1: Predictable Excess Returns

$q_{t+1} = \alpha + \beta(i_t - i_t^*) + \epsilon_{t+1}$

Currencies	β	$\sigma(\beta)$	R^2
DEM	-1.8344**	0.8189	0.05
GBP	-2.9537***	1.1214	0.10
JPY	-4.0626***	0.7438	0.16
CND	-1.5467***	0.5305	0.05
CHF	-2.3815***	0.8068	0.09
EW Average	-2.5558***	0.6192	0.09
GDP Average	-2.9821***	0.6223	0.11

Note: $q_{t+1} = \Delta s_{t+1} - (i_t - i_t^*)$. Δs_{t+1} refers to the 3-month change in the log exchange rate. The exchange rate is measured as net-of-period rate from IFS. Interest rates are 3-month rates as quoted in the London Euromarket and were obtained from Datastream (Thomson Financial). *** and ** denote significance at respectively the 1% and 5% level. SUR system estimated from 109 quarterly observations over sample from December 1978 to December 2005. Newey-West standard errors with 1 lag. "EW Average" refers to the equally weighted average of the regression coefficients. The last row reports the GDP weighted average.

Caveats

1.) UIP works better for developing countries
- Bansal & Dahlquist (JIE, 2000)

2.) UIP works better at very low frequencies (Chinn & Meredith (2005
and very high frequencies, [Chaboud & Wright (JIE, 2005)]

Potential Explanations

1.) Jensen's Inequality

2.) Real vs. Nominal Returns

3.) Risk Aversion / Time-Varying Risk Premia

4.) Peso Problems. $E_t S_{t+1}$ not well approximated by sample average. Infrequent "regime changes".

5.) Simultaneity Bias / Endogenous Monetary Policy
- McCallum (JME, 1994)

6.) Adaptive Learning
- Evans + Chakraborty (2007)

7.) Non-Rational Expectations (Froot + Frankel)
- Noise-Traders (Mark + Wu (EJ, 1998))
- Distorted Beliefs [Gourinchas + Tornell (JIE, 2004)]

8.) Info. Processing Constraints [Bacchetta + VanWincoop (2006)]

9.) Heterogeneous Beliefs / Higher-Order Belief Dynamics
- Bacchetta + vanWincoop (AER, 2006)
- Kasa, Walker, Whiteman (2007)