Exchange-Rate Dynamics
Chapter 11

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Exchange Rate Risk

Outline:

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   ii. The Carry Trade
2. Macro Models
   i. Stochastic Discount Factors
   ii. Reverse Engineering the Forward Premium Puzzle
   iii. Euler Equation Models
   iv. Peso Problem Models
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   i. A Micro-Based Model of the Risk Premium
   ii. Micro-Based Explanations for the Forward Premium Puzzle
   iii. Excess Returns, Risk Premia and Order Flows

11.1 FX Returns and Interest Rates

Interest Parity

Table 1: UIP Regressions

	β_0	β_1	t-stat.	R^2	Sample
Canada	0.000	-0.632	-3.331	0.004	76:01-08:01
	(0.001)	(0.490)			
France	0.000	0.091	-1.288	0.000	76:01-98:12
	(0.003)	(0.706)			
Germany	0.003	-0.657	-1.992	0.003	76:01-98:12
	(0.002)	(0.832)			
Italy	-0.001	0.196	-2.072	0.001	76:01-98:12
	(0.003)	(0.388)			
Japan	0.010	-2.400	-5.097	0.026	78:06-08:01
	(0.003)	(0.667)			
Switzerland	0.007	-1.408	-3.495	0.014	76:01-08:01
	(0.003)	(0.689)			
UK	-0.002	-1.533	-2.945	0.014	76:01-08:01
	(0.002)	(0.860)			
Euro	0.005	-4.334	-3.223	0.048	98:12-08:01
	(0.002)	(1.655)			

Notes: OLS regression estimates of (11.6) as reported by Burnside, Eichenbaum, Kleshchelski, and Rebelo (2006). Estimates are computed from monthly data over the sample periods listed in the right hand column. Heteroskedastic robust standard errors are shown in parethesis. T-statistics for the null that $a = 1$ are reported in the column headed t-stat.

11.1 FX Returns and Interest Rates

The Carry Trade

Table 2: Annualized Carry Trade Payoffs

	No Transactions Costs			With Transactions Costs		
	Mean	Standard Deviation	Sharpe Ratio	Mean	Standard Deviation	Sharpe Ratio
Canada	0.024	0.071	0.339	0.015	0.060	0.242
France	0.068	0.093	0.727	0.064	0.093	0.686
Germany	0.071	0.093	0.762	0.067	0.093	0.715
Italy	-0.108	0.086	-1.249	-0.066	0.083	-0.797
Japan	0.026	0.112	0.235	0.021	0.112	0.187
Switzerland	0.002	0.095	0.017	0.015	0.088	0.169
UK	0.022	0.074	0.297	0.014	0.066	0.214
Euro	0.079	0.087	0.900	0.062	0.082	0.758
Portfolio	0.048	0.045	1.061	0.044	0.051	0.867
US Stocks	0.068	0.148	0.461			

Notes: Source Burnside et al. (2006) The payoffs are measured in USD per dollar bet on an annualized basis. The portfolio payoff is computed as the equally-weighted average of up to 20 individual currency carry trades against the USD. The payoff at time t on the US stock market is the value-weighted excess return on all US stocks reported in Kenneth French's database, divided by the US gross interest rate, R_{t-1}.

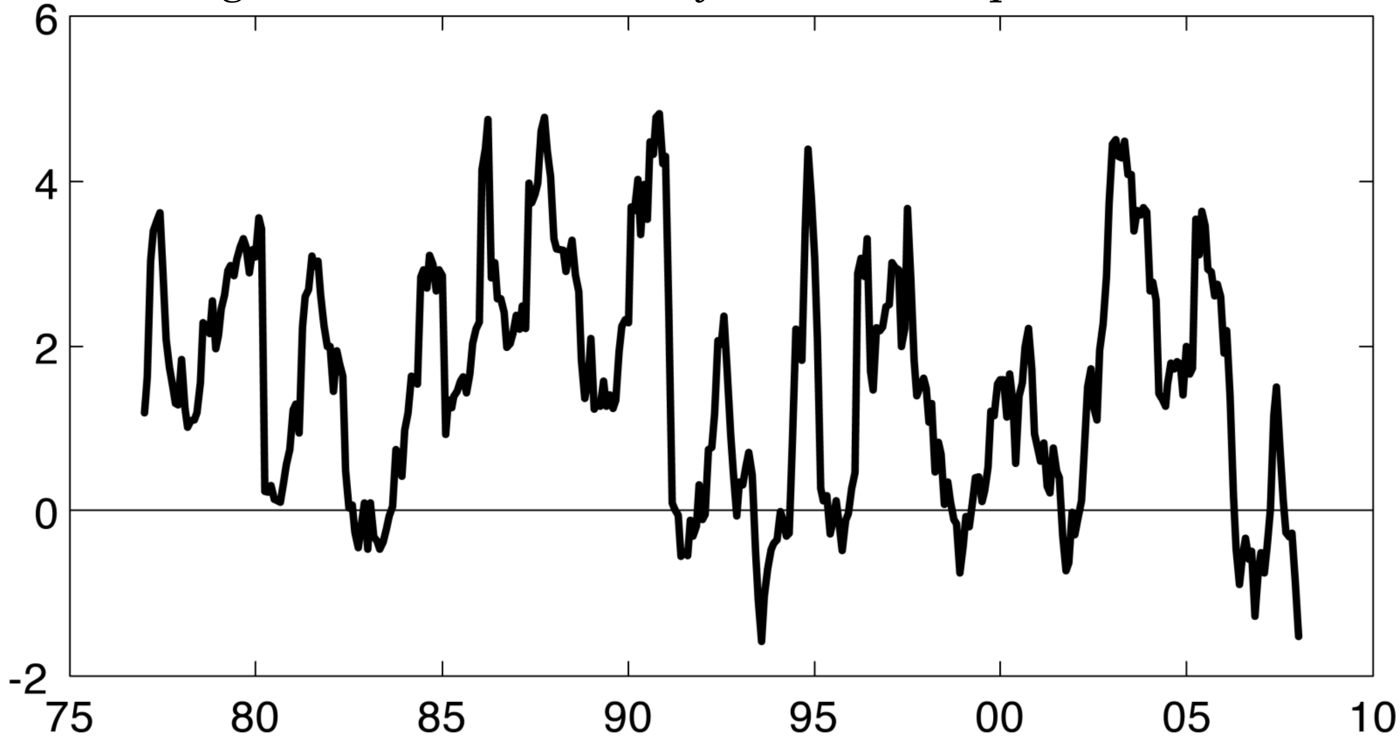
Note:

1. Transaction costs reduce the payoffs on the carry trade, but they are too small to reduce the payoffs to zero.
2. There are large gains to diversification from adopting a multi-currency strategy.
3. The Sharpe ratio for the multi-currency carry-trade return is substantially larger than that for the US stock market because the returns on stocks are considerably more volatile than the carry-trade payoffs.

11.1 FX Returns and Interest Rates

The Carry Trade

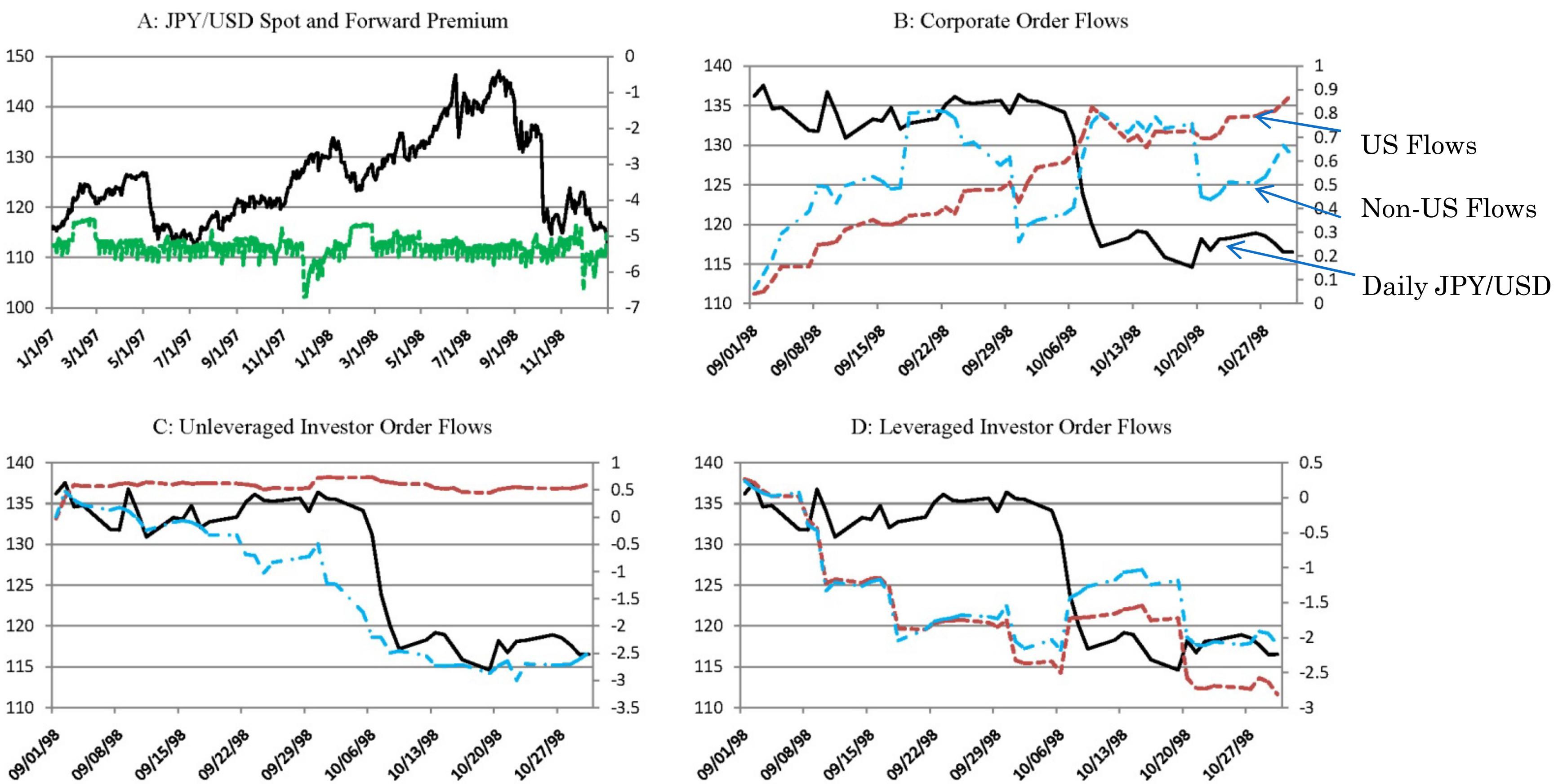
Figure 1: Realized Carry-Trade Sharpe Ratios



12-month moving average of the realize Sharpe Ratio for the equally-weighted carry-trade portfolio. Source: Burnside et al (2006).

11.1 FX Returns and Interest Rates

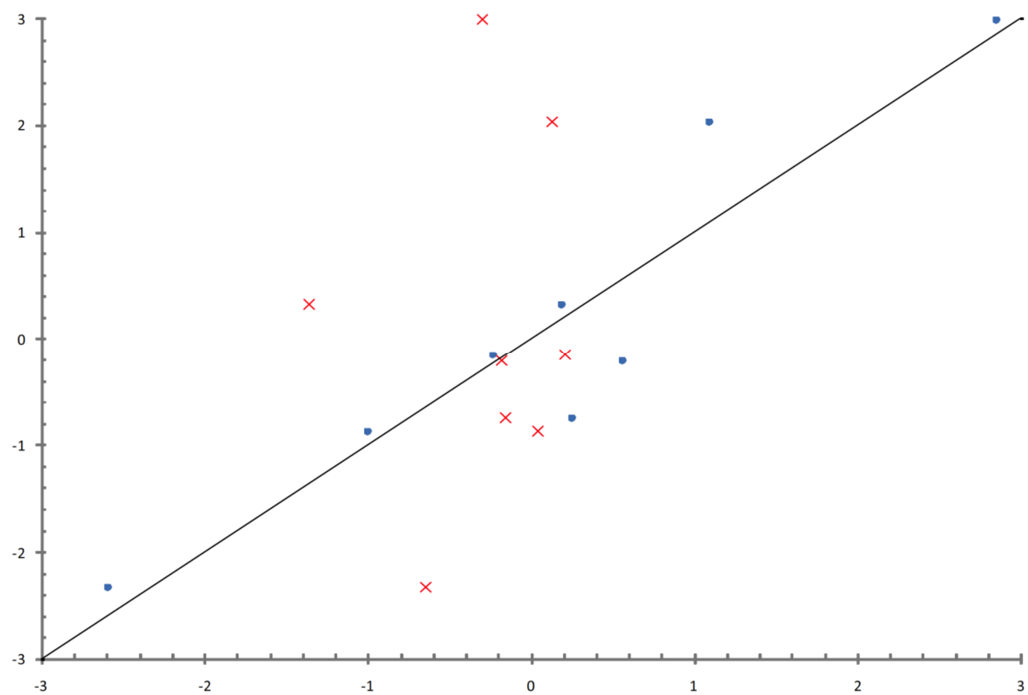
The Carry Trade: Risk from Currency Crashes



11.2 Macro Models

Euler Equation Models: Recent Research

Figure 3: Portfolio Excess Returns



Notes: The blue dots show the scatter plot of average excess returns, $\mathfrak{R}_i^e$ (vertical axis), versus predicted excess returns from estimates of (11.32) (horizontal axis). The red x's plot $\mathfrak{R}_i^e$ versus the predicted excess returns from estimates of (11.32) without the constant. All data used to produce these estimates is from Lustig and Verdelhan (2007).

11.2 Macro Models

Peso Problem Models

Table 3: Peso Problems and the Forward Premium Puzzle

Currency Monthly Data	(i) $\tilde{\beta}_1$	(ii) $H_0 : \beta_1 = 1$	(iii) Bias	(iv) Ratio
GBP/USD	-2.266	<0.001	-0.726 (3.438)	1.222 (1.053)
DM/USD	-3.502	0.001	-1.068 (3.253)	1.237 (0.722)
JPY/USD	-2.022	<0.001	-0.107 (0.607)	1.035 (0.201)
Quarterly Data				
GBP/USD	-2.347	0.001	-0.724 (2.691)	1.216 (0.804)
DM/USD	3.448	0.004	-0.720 (2.720)	1.162 (0.615)
JPY/USD	-2.955	<0.001	-0.124 (0.700)	1.031 (0.177)

Source: Evans and Lewis (1995)

The estimates are computed in monthly and quarterly data for the DM/USD, GBP/USD and JPY/USD between 1975 and 1989.

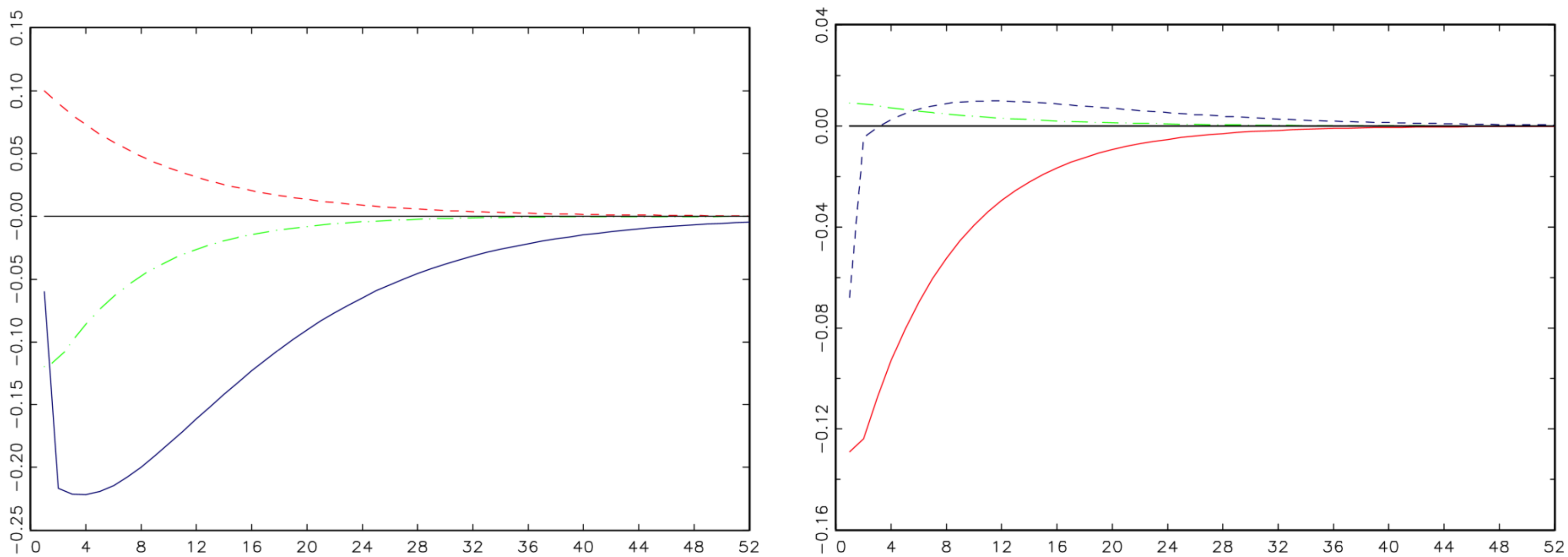
Column (iii) reports the mean value of $\hat{\delta}_1 - \delta_1$

Column (iv) reports the means and standard deviation of $\hat{\delta}_1 / \delta_1$

11.3 Micro-Based Models

Micro-Based Explanations for the Forward Premium Puzzle

Figure 4: Peso Problems in the Micro-Based Model



Panel A　　　　Panel B

Panel A shows the impulse responses of the log spot rate, s_t, (solid blue); interest differential, $r_t - \hat{r}_t$ (dashed red); and risk premium, δ_t (dot-dashed green); following a negative u_t shock. Panel B shows the Impulse responses for components of the risk premium: $E_t^{\mathrm{D}} s_{t+1}^{e}$ (solid red) and $-(\alpha_h/\alpha_s)E_t^{\mathrm{D}} h_t$ (dashed green). The dashed blue plot shows dealers' expectations for the depreciation rate, $E_t^{\mathrm{D}} \Delta s_{t+1}$.

11.3 Micro-Based Models

Excess Returns, Risk Premia and Order Flows

Table 4: Forecasting Return Regressions

Weeks	$r - \hat{r}$	Corporate		Hedge		Investors		R^2	χ^2
τ		US	Non-US	US	Non-US	US	Non-US		(p-value)
1	0.102	0.482	-0.033	0.089	-0.153	-0.346	0.142	0.027	8.056
	(0.409)	(0.317)	(0.136)	(0.102)	(0.198)	(0.238)	(0.141)		(0.234)
2	0.147	0.509***	-0.037	0.088	-0.09	-0.449***	0.163**	0.074	17.239
	(0.324)	(0.263)	(0.104)	(0.082)	(0.148)	(0.188)	(0.096)		(0.008)
3	0.176	0.615***	-0.034	0.095*	-0.084	-0.432***	0.145**	0.121	24.500
	(0.305)	(0.215)	(0.090)	(0.073)	(0.137)	(0.177)	(0.082)		(0.001)
4	0.202	0.544***	-0.042	0.094*	-0.097	-0.517***	0.137**	0.163	30.738
	(0.302)	(0.177)	(0.084)	(0.068)	(0.125)	(0.158)	(0.072)		(<0.001)

Source: Evans and Lyons (2004a) *, **, and *** denote significance at the 10%, 5% and 1% levels.

11.3 Micro-Based Models

Excess Returns, Risk Premia and Order Flows

Table 5: Forecast Comparisons

	Horizon in trading days				
	1	5	10	15	20
A: UIP					
MSE Ratio	1.005	1.011	1.022	1.035	1.054
b_s	0.000	0.003	0.002	0.003	0.010
p-value	(0.533)	(0.332)	(0.457)	(0.452)	(0.359)
B: Order Flows					
MSE Ratio	0.961	0.876	0.848	0.810	0.806
b_s	0.027	0.057	0.102	0.122	0.157
p-value	(0.005)	(0.018)	(0.005)	(0.007)	(0.002)

Source: Evans and Lyons (2005b)

By definition, $\mathbb{V}\left(\Delta^{\tau} s_{t+\tau}\right) = \mathbb{CV}(\Delta^{\tau} s_{t+\tau}, \widehat{\Delta^{\tau} s_{t+\tau|t}}) + \mathbb{CV}(\widehat{\varepsilon_{t+\tau|h}}, \Delta^{\tau} s_{t+\tau})$

so the values for b_s estimate the contribution of the model forecasts to the variance of spot rate changes over the forecasting period.

11.3 Micro-Based Models

Risk Premia, Order Flows and Macro Information

Table 6: Forecasting with Information Flows

Horizon	$r-\hat{r}$	$\Delta y-\Delta\hat{y}$	$\Delta p-\Delta\hat{p}$	$\Delta m-\Delta\hat{m}$	$\Delta m-\Delta y$	$\Delta\hat{m}-\Delta\hat{y}$	$(\Delta m-\Delta y)$ $-(\Delta\hat{m}-\Delta\hat{y})$	R^2	χ^2 (p-value)
$\tau=1$	-0.229	-0.229						<0.001	7.859
	(0.369)	(0.949)							(0.249)
	-0.194		-0.290					0.001	8.525
	(0.367)		(0.507)						(0.202)
	0.161			0.589**				0.023	1.115
	(0.387)			(0.218)					(0.981)
	0.04				0.436**	-0.700**		0.025	0.783
	(0.398)				(0.280)	(0.281)			(0.993)
	0.110						0.585**	0.023	1.158
	(0.381)						(0.219)		(0.979)
	0.136						0.639**	0.059	4.787
	(0.310)						(0.184)		(0.571)
$\tau=4$	-0.214	-0.094						<0.001	52.375
	(0.315)	(0.651)							(<0.001)
	-0.200		-0.106					<0.001	53.402
	(0.327)		(0.383)						(<0.001)
	0.248			0.709**				0.135	8.033
	(0.316)			(0.156)					(0.236)
	0.122				0.564**	-0.799**		0.138	9.129
	(0.302)				(0.193)	(0.186)			(0.166)
	0.186						0.697**	0.133	10.109
	(0.307)						(0.162)		(0.120)

Source: Evans and Lyons (2009) *, **, and *** denote significance at the 10%, 5% and 1% levels.