Exchange rates and international finance puzzles: where do we stand?

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1. Equilibrium exchange rates: level and changes

2. Excess returns: from Fama 1984 to Engel 2016
   - Time-varying excess returns are key to reconcile evidence and conventional wisdom
   - Engel 2016

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Equilibrium exchange rate

In the notes so far, we have derived two important equations characterizing the exchange rate.

Its equilibrium level:

\[ e_t = -(D\mathcal{R}_t) - \Lambda_t + \bar{q} + (p_t - p^*_t) \]  \hspace{1cm} (1)

and its dynamics (the UIP condition)

\[ E_t q_{t+1} - q_t = [r_t - r^*_t] + E_t \lambda_{t+1} \]  \hspace{1cm} (2)

We will now show that time-varying excess returns are key to reconcile evidence and conventional wisdom.
Excess returns: Fama 1984

Time-varying excess returns are key to reconcile evidence and conventional wisdom

The evidence from UIP studies is that, outside crises, the Fama coefficient is negative. Fama 84 shows that for this empirical result to be explained by the risk premium, this must be negatively correlated with the interest differential. The same applies to the excess returns.

Let’s assume that the excess return coincides with the risk premium, i.e., $E_t \lambda_{t+1} = rp$. For simplicity, suppose that both are linear in interest differentials:

$$rp_t = E_t \lambda_{t+1} = -\gamma [r_t - r_t^*] + \varepsilon_t,$$

where $\varepsilon$ is noise (i.i.d. with zero mean).

Substituting it in the real exchange rate expression:

$$E_t q_{t+1} - q_t = r_t - r_t^* + \lambda_{t+1}$$

$$E_t q_{t+1} - q_t = (1 - \gamma) [r_t - r_t^*] + \varepsilon_t$$

If $\gamma > 1$, the coefficient in front of the real rate differential is negative.
Here is a problem. If we solve the above equation forward assuming that $\gamma$ remains constant over time:

$$q_t = (\gamma - 1) R_t - \varepsilon_t + \bar{q}$$

According to this expression, if $\gamma > 1$ (as required to satisfy Fama 84), when the domestic central bank raises interest rates ($R_t \uparrow$), the domestic currency should always depreciate!

This is against conventional wisdom—and against the evidence on the effects of monetary contractions, generally causing a temporary exchange rate temporary appreciation.
For the evidence and conventional wisdom to be reconciled, it must be the case that:

\[
\text{Cov}_t (E_t \lambda_{t+1}, r_t - r_t^*) < 0 \\
\text{Cov}_t (\Lambda_t, r_t - r_t^*) \geq 0
\]

implying that the sequence of \(E_t \lambda_{t+s}\) must be expected to switch sign over time. Note that the switch is somewhat implied by the results from Fama regressions, suggesting that UIP fails over short horizons (1,3,12 months) but holds at long ones.

3. Taking stock

From theory, we know that, over a generic horizon of $h$ period, the following holds:

$$F_{t,t+h} = E_t(E_{t+h}) + \frac{\text{Cov}_t \left[ D_{t,t+h} \frac{P_t}{P_{t+h}}, E_{t+h} \right]}{E_t \left[ D_{t,t+h} \frac{P_t}{P_{t+h}} \right]}$$  \hspace{1cm} (5)$$

where note that $D_{t,t+h}$ is the discount between $t$ and $t + h$.

From the UIP notes we can conclude:

- evidence that the textbook UIP approximately holds in the long run suggests that, for $h$ equal to 5 years and up, the covariance term above should be very small.

- over business cycle horizon, in non-crisis time, the evidence that $F_{t,t+h} > E_tE_{t+h}$ suggests that the covariance should be positive.

- in crisis times, the evidence that $F_{t,t+h} \ll E_tE_{t+h}$ suggests that the covariance is negative and high in absolute value.
Taking stock

Let’s rewrite the above in real terms. Rearranging the above, you should get:

\[
\mathcal{F}_{t,t+h} E_t \left[ \frac{P_t}{P_{t+1}} \right] = E_t q_{t+h} + \frac{\text{Cov}_t[D_{t,t+h}, q_{t+h}]}{E_t D_{t,t+h}} - \frac{\mathcal{F}_{t,t+h} \text{Cov}_t \left[ D_{t,t+h}, \frac{P_t}{P_{t+1}} \right]}{E_t D_{t,t+h}}
\]

Note that, if PPP holds exactly in the long run and \( \lim_{t \to \infty} q_t = 1 \), the above implies equalization of long-run rates in real terms—a condition that could be tested in the data.