COMMENTS ON
On the Unstable Relationship between Exchange Rates and Macroeconomic Fundamentals

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Main Idea

Rational Confusion

Unobserved Fundamentals + Unobserved Time-Varying Parameters on Observed Fundamentals

⇒ Estimated coefficients on observed fundamentals can change even when there is no underlying change in the parameters

⇒ ‘Scapegoat Effects’
GENERAL COMMENTS

1. Nice idea.

2. Intuitively plausible.

3. Analysis seems like it could be simplified.
Simplification Strategies

1. Express model in State-Space form and apply recursive nonlinear filtering methods.
   - Zakai/Kushner Equations.
   - The extended Kalman filter.

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1. Express model in State-Space form and apply recursive nonlinear filtering methods.
   - Zakai/Kushner Equations.
   - The extended Kalman filter.

2. Are time-varying parameters and unobserved fundamentals even necessary to generate scapegoat effects?
   - Perceived vs. Actual TVP.
   - Learning Cycles. (Sargent & Williams (RED, 2005)).
**The Extended Kalman Filter**

**Model:** \[ E_{t} s_{t+1} = \mu s_t + f_t + b_t \quad \mu > 1 \]
\[ f_{t+1} = \beta_t f_t + \varepsilon_{1,t+1} \]
\[ \beta_{t+1} = \alpha \beta_t + \varepsilon_{3,t+1} \]

Let \( X_{t+1} = (f_{t+1}, E_t s_{t+1}, \beta_{t+1}, b_{t+1})' \) and \( Y_t = (f_t, s_t)' \).

Then model can be written as:

\[
X_{t+1} = F(X_t) + C\varepsilon_{t+1} \\
Y_{t+1} = GX_t + D\varepsilon_{t+1}
\]

**Key Idea:** Recursively linearize the system around current state estimate in order to update state estimates, but propagate the system forward using the original nonlinear system.
A SIMULATION

\[ \mu = 1.03 \quad \alpha = 0.95 \quad \gamma = 0.95 \quad \sigma_1 = 0.03 \quad \sigma_3 = 0.01 \]

![Graph showing Actual beta (blue) vs Estimated beta (red)]

\[ \sigma_\beta = 0.029 \]
\[ \sigma_\beta \text{ hat} = 0.044 \]
Learning Cycles

Model:

\[ s_t = \lambda E_t s_{t+1} + \beta_1 f_{1,t} + \beta_2 f_{2,t} \]

\[
\begin{pmatrix}
  f_{1,t} \\
  f_{2,t}
\end{pmatrix}
= \begin{pmatrix}
  a_{11} & a_{12} \\
  a_{21} & a_{22}
\end{pmatrix}
\begin{pmatrix}
  f_{1,t-1} \\
  f_{2,t-1}
\end{pmatrix}
+ \begin{pmatrix}
  \epsilon_{1,t} \\
  \epsilon_{2,t}
\end{pmatrix}
\]

Note: \( \beta_1 \) and \( \beta_2 \) are constant and \( f_t \) is observed

PLM:

\[
s_t = b_1 f_{1,t} + b_2 f_{2,t} + \epsilon_t
\]

\[
b_t = b_{t-1} + v_t \quad \text{var}(v_t) = V
\]

MeanODEs:

\[
\dot{b} = Pg(b)
\]

\[
\dot{P} = \sigma_\epsilon^{-2}V - PMP
\]
A SIMULATION

\[
\begin{align*}
\lambda &= .95 & \beta_1 &= .6 & \beta_2 &= .4 & a_{11} &= a_{22} = .9 & a_{21} &= -.35
\end{align*}
\]
Parameter Uncertainty vs. Model Uncertainty

- Markiewicz (2010), “Monetary Policy, Model Uncertainty and Exchange Rate Volatility”