Fiscal Policy, the Trade Balance and the Real Exchange Rate: Implications for International Risk-Sharing

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What is the effect of a rise in government spending on the (real) exchange rate?
1. IS-LM-Mundell-Fleming

- ↑ aggregate demand

- ↑ interest rate (IS effect)

- nominal + real appreciation
2. Obstfeld and Rogoff (NOEM)

$\uparrow G \rightarrow \downarrow \text{consumption (wealth effect on L supply)}$

$\downarrow \text{money demand}$

$\text{need rise in P level (since M supply given)}$

(nominal) **depreciation** (via PPP)

$$ (\uparrow)p = (\uparrow)e + \bar{p}^* $$
• IS-LM and OR have opposite implications on exchange rate

• Also: IS-LM $\rightarrow$ consumption rises

\[ \text{OR} \rightarrow \text{consumption falls} \]
• This paper

OR are right, but for the "wrong" reason
• Related issue: what is the effect on the trade balance?

• Recently: "twin deficits" vs "savings glut" as alternative theories of US current account deficit
• At business cycle frequency: primary budget balance and trade balance negatively correlated
Correlation = -0.23
• What about real exchange rate and fiscal balance?
Literature

- Froot-Rogoff (1991)

- Baseline results (US, UK, Australia, Canada)

- Positive **G shock** →

1. Real exchange rate **depreciates**

2. "**Twin deficits**" (with varying intensity)

3. Consumption **rises**
Methodology

Suppose model with $Y$ (output), $G$ (govt. spending) and $T$ (taxes)

$$X_t = A(L)X_{t-1} + U_t$$

$$U_t \equiv [u^g_t \ u^t_t \ u^y_t]'$$ vector of reduced form residuals
\[ u_t^g = \alpha_{gy} u_t^y + \beta_{gt} e_t^g + e_t^g \]

\( u_t^g \) and \( u_t^t \) capture **three effects**.

1. *automatic response* of \( T \) and \( G \) to innovations in \( Y \)

2. *systematic discretionary* response of policy to \( Y \)

3. *structural* shocks
- Net-out effect (1) by resorting to external estimates on tax and spending elasticities to GDP

- Net-out effect (2) by employing quarterly data

- Assume orthogonalization to disentangle $e_{t}^{g}$ and $e_{t}^{t}$
• Our **SVAR** model

\[
\begin{bmatrix}
\log G_t \\
\log T_{net} \\
\log Y_t \\
\log C_t \\
\log CPI_t \\
\log RER_t \\
\log R_t \\
\end{bmatrix}
\]

• Sample 1975:1 - 2005:2

• Countries: UK, US, Canada, Australia: non-interpolated data
Results from **SVAR** (whole sample): shock to G (1% of GDP)

1. GDP and Consumption **rise**
2. Real exchange rate depreciation (G shock = 1% GDP)
3. Trade balance **deteriorates** (twin deficit) ⇔ (G shock = 1% GDP)

→ But effect in the US is small
• Does identification/ordering matter? YES

• Convention: measure of fiscal deficit should be "cyclically adjusted"

• In practice: put GDP first in ordering
Suppose reduced-form model is

\[ u_d = \beta u_y + \varepsilon_d \]  \hspace{1cm} (1)
\[ u_y = \gamma u_d + \varepsilon_y \]  \hspace{1cm} (2)

\( \varepsilon_d = "true" \) deficit/GDP shock; \( \varepsilon_y = "true" \) GDP shock

\( \beta < 0 \) for two effects: (i) \( \uparrow Y \rightarrow \downarrow \frac{D}{Y} \) (D given); (ii) \( \uparrow Y \rightarrow \downarrow D \) (automatic effect on taxes/spending programs)

\( \gamma > 0 \) (standard theory)
• Note: \( u_y \) correlated with \( \varepsilon_d \)

\[
u_y = \frac{\gamma}{1 - \beta \gamma} \varepsilon_d + \frac{1}{1 - \beta \gamma} \varepsilon_y
\]
• Suppose estimate with Choleski ordering (Y first):

\[ u_d = \tilde{\beta} u_y + \tilde{\varepsilon}_d \]  \hspace{1cm} (3)

\[ u_y = \tilde{\varepsilon}_y \]  \hspace{1cm} (4)

→ Impose \( u_y \) uncorrelated with \( \tilde{\varepsilon}_d \) (→ upward bias in \( \tilde{\beta} \))

• But in fact..

\[ \tilde{\varepsilon}_d = \varepsilon_d - \left( \tilde{\beta} - \beta \right) u_y \]

\[ > 0 \]

→ Estimated deficit shock \textbf{negatively} correlated with true GDP shock

\[ \uparrow \text{deficit} \rightarrow \downarrow Y \]
In summary: $\uparrow$ deficit $\rightarrow$ $\downarrow$ $Y$ $\rightarrow$ $\uparrow \frac{D}{Y}$ via 2 channels

1. denominator increases

2. automatic effect on taxes/spending

$\rightarrow$ **Spurious negative correlation** between deficit innovation and GDP innovation

- In addition: $\downarrow$ $Y$ $\rightarrow$ $\uparrow \frac{TB}{Y}$ $\rightarrow$ spurious negative correlation between deficit shock and **trade balance** shock (**twin divergence**)
Recursive approach with \textit{Y first} \\

(1) GDP falls
- Recursive approach

(2) Trade Balance Improves $\rightarrow$ Twin divergence
Some theory

→ Use standard **NOEM model** with nominal rigidities (w/ or w/o investment) and **complete** markets

1. RER appreciates

2. Consumption falls (standard wealth effect)

3. Trade balance deteriorates (although it depends on openness and elasticity of substitution)
→ Notice: (1) and (2) strongly linked via **international risk-sharing**

\[
\frac{C_t}{C^*} = \kappa q_t^\sigma
\]
## Facts vs Theory: 3 puzzles

<table>
<thead>
<tr>
<th></th>
<th>Facts</th>
<th>Standard Theory</th>
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</thead>
<tbody>
<tr>
<td>RER</td>
<td>Depreciation</td>
<td>Appreciation</td>
</tr>
<tr>
<td>Corr(RER, Consumption)</td>
<td>Both rise</td>
<td>Both fall</td>
</tr>
<tr>
<td>Corr (RER, NX)</td>
<td>Negative</td>
<td>Positive (?)</td>
</tr>
</tbody>
</table>
RER puzzle

1. IS-LM Mundell-Fleming: appreciation

2. Obstfeld-Rogoff: depreciation but for "wrong" reason, i.e., need consumption to fall
Consumption-RER puzzle

1. All models with complete markets predict positive correlation btw. C and RER but in wrong direction

2. Similar prediction in "only-bond" economies

→Necessary condition: need to generate positive consumption response

→Yet this is not sufficient!
• **Three** classes of candidate models: what works / what doesn’t
1. Imperfect Asset Markets

- Savers vs. spenders, Mankiw (2000), Galì et al. (2006), rule-of-thumb (ROT) consumers

- If share or ROTer’s large enough → positive response of consumption
2. Non-separability Utility

(i) KPR 1988: consumption and leisure are **complements**

\[
\frac{1}{1 - \sigma} C_t^{1-\sigma} V(1 - N_t) \quad \sigma > 1
\]

(ii) GHH 1988: MRS btw. C and leisure does not depend on C → **no wealth effect on L supply**

\[
\frac{1}{1 - \sigma} \left(C_t - \psi N_t^c\right)^{1-\sigma}
\]
3. **Equilibrium Variable Markups**

Idea: $\uparrow G \rightarrow \downarrow \text{markup} \rightarrow L^D$ schedule shifts out sufficiently to generate rise in real wage and substitution of leisure into consumption

(i) NCES preferences (Gust et al. 07) $\rightarrow$ Markup depends on relative price of imports ("Dornbusch effect")

(ii) Deep habits (Ravn et al. 07)

(iii) Increasing returns $+$ entry-exit of firms (Devereux et al. 1996)
<table>
<thead>
<tr>
<th>Feature</th>
<th>Rise in Consumption</th>
<th>RER depreciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imperf. Asset Market</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Non-separable Utility</td>
<td></td>
<td></td>
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<tr>
<td>GHH preferences</td>
<td>YES if sticky P</td>
<td>NO for reasonable calibr.</td>
</tr>
<tr>
<td>KPR preferences</td>
<td>YES</td>
<td>YES if elast L. supply high</td>
</tr>
<tr>
<td>Variable markup</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCES</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Deep habits</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>IRS - entry/exit</td>
<td>YES</td>
<td>?</td>
</tr>
</tbody>
</table>
• **Example**: consumption-leisure **non-separable** (King, Plosser and Rebelo 1988)

\[ U(C_t, L_t) = \frac{1}{1 - \sigma} C_t^{1-\sigma} V(L_t) \quad \sigma > 1 \]

→Consumption and leisure are **complements**
• Marginal utility of wealth:

\[ \lambda_t = \frac{N_t^{1+\varphi}}{C_t^\sigma} \]

→ Higher employment raises the marginal utility of consumption

\[ \uparrow G \rightarrow \uparrow L \text{ supply} \rightarrow \uparrow MU_c \rightarrow \uparrow C \rightarrow RER \text{ depreciates (via risk-sharing)} \]

• Effect depends on \( \sigma \) and \( \varphi \) (\( \uparrow \sigma \rightarrow \uparrow \varphi \rightarrow \downarrow L^s \text{ elasticity} \))
→ Need sufficiently low $\sigma$ (i.e., sufficiently high $L^s$ elasticity)
Extension (Monacelli-Perotti 2008)

Decompose RER movements (Engel 1999):

\[
RER_{CPI} = \left( \frac{EP^*_T}{P_T} \right) \left( \frac{(P_T/P_N)^{1-\omega}}{(P^*_T/P^*_N)^{1-\omega^*}} \right) = RER_T^{\text{external}} \times RER_N^{\text{internal}}
\]
1. Measure **traded** goods using **export** and **import** prices (see e.g., Burstein et al. 2006)

2. What drives RER depreciation? **Both** components, but especially "**external**" real exchange rate
Y, T/PY, C/PY, RERIMPEXP_RER-RERIMPEXP, QT, S5 FROM 1971b
Theory

Very difficult to obtain depreciation of both components of RER in standard two-sector model

\[ \text{rer}_t = \text{rer}^T_t + \text{rer}^N_t = (1 - \alpha)s_t + (1 - \omega)q_t \]

\( \text{ToT} \) rel. price T goods