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

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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 variation in government spending on the (real) exchange rate?

• Two opposite views
1. IS-LM-Mundell-Fleming

↑ aggregate demand

↑ interest rate (IS curve effect)

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

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

\[ \downarrow \text{money demand} \]

\[ \rightarrow \text{need rise in } P \text{ level (since } M \text{ supply given)} \]

\[ \rightarrow \text{(nominal) depreciation (via PPP)} \]

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

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

        OR $\rightarrow$ consumption falls
• This paper in a nutshell

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 not much evidence of "twin deficits"

• **Unconditionally**, primary budget balance and trade balance **negatively** correlated
Correlation = -0.23
• What about the real exchange rate and the fiscal balance?
Literature

- Froot-Rogoff (1991)

- Countries: US, UK, Australia, Canada

- Positive **G shock** →

1. Real exchange rate **depreciates**

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

3. Consumption **rises**
• Results (continued)

Will argue that accounting simultaneously for results 1-3 is difficult in many models.
Methodology

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

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

$$U_t \equiv [u_t^g \ u_t^t \ u_t^y]' \text{ vector of reduced form residuals}$$
\[ u_t^g = \alpha_{gy} u_t^y + \beta_{gt} e_t^t + e_t^g \]

\( u_t^g \) captures three effects.

1. \textit{automatic response} of G to innovations in Y (automatic stabilizers)

2. \textit{systematic discretionary} response of fiscal policy to Y

3. \textit{structural} shocks
• Identification

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

Elasticity of $G \simeq 0 \rightarrow G$ ranked first in the VAR

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

3. Assume orthogonalization to disentangle $e_t^g$ and $e_t^t$
• Our **SVAR** model

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

• 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

\[ u_d = \beta u_y + \varepsilon_d \]  
\[ u_y = \gamma u_d + \varepsilon_y \]  

\( \varepsilon_d = \) "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):

\[ u_d = \tilde{\beta}u_y + \tilde{\varepsilon}_d \quad (3) \]
\[ u_y = \tilde{\varepsilon}_y \quad (4) \]

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

• But in fact..

\[ \tilde{\varepsilon}_d = \varepsilon_d - (\tilde{\beta} - \beta) u_y \]
\[ > 0 \]

→ 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 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)
Key point:

C and RER strongly linked via **international risk-sharing**

\[ \frac{C_t}{C_t^*} = \kappa (RER_t)^{1/\sigma} \]
- **Facts vs Theory: 2 puzzles**

<table>
<thead>
<tr>
<th></th>
<th>Facts</th>
<th>Standard Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>RER</td>
<td>Depreciation</td>
<td>Appreciation</td>
</tr>
<tr>
<td>(RER, Consumption)</td>
<td>Both rise</td>
<td>Both fall</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 comovement btw. C and RER but in wrong direction

2. Similar prediction in "only-bond" economies (see, e.g, Erceg et al. 2006)

→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), rule-of-thumb (ROT) consumers (Gali et al. 2006)

- If share or ROTer’s large enough → **positive** response of consumption to a rise in G
2. **Non-Separability in Utility**

(i) King-Plosser-Rebelo (1988): consumption and employment **complements**

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

- Virtually all models imply \( \uparrow G \rightarrow \uparrow N \)

- Hence KPR preferences \( \rightarrow \uparrow C \)
(ii) **Greenwood-Hercowitz-Huffmann** (1988)

\[
\frac{1}{1 - \sigma} \left( C_t - \psi N_t^\zeta \right)^{1 - \sigma}
\]

MRS cons./leisure does not depend on C $\rightarrow$ **no wealth effect on L supply**

\[
\frac{-U_{n,t}}{U_{c,t}} = \zeta \psi N_t^{\zeta - 1}
\]

- With **flex** prices: L supply schedule not affected by change in G $\rightarrow$ no effect on N and W/P $\rightarrow$ C must fall

- With **sticky** prices: L demand schedule shifts up $\rightarrow$ C, N, W/P all rise
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
Three variants of models with equilibrium variable markups

(i) **NCES preferences** (Kimball 95, Gust et al. 07) → Markup depends on relative price of imports ("Dornbusch effect": markup rises when terms of trade appreciate)

(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>
</tr>
<tr>
<td>KPR preferences</td>
<td>YES</td>
<td>YES if elastic L^S</td>
</tr>
<tr>
<td>GHH preferences</td>
<td>YES if sticky P+elastic L^S</td>
<td>NO for standard calibr.</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

↑ \( G \) → ↑ \( L \) supply → ↑ \( MU_c \) → ↑ \( C \) → \( RER \) depreciates (via risk-sharing)

• Effect depends on \( \sigma \) and \( \varphi \) (↑ \( \sigma \) → ↑ \( \varphi \) → ↓ \( L^s \) elasticity)
→Need sufficiently low $\sigma$ (i.e., sufficiently high $L^s$ elasticity)
• Extensions: traded and non-traded goods

Typical RER decomposition:

\[ RER_{CPI,t} = \frac{NER_t P^*_T,t}{P^*_T,t} \times \frac{\left(\frac{P^*_N,t}{P^*_T,t}\right)^{\omega^*_N}}{\left(\frac{P^*_N,t}{P^*_T,t}\right)^{\omega_N}} \]

1. Measure traded goods prices using export and import prices (see e.g., Burstein et al. 2006)

2. What drives RER depreciation? \( RER_N \) plays non-negligible role
From 1980