Currency Pegs and Unemployment

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The Achilles’ Heel of Currency Pegs

• Emerging countries are prone to negative aggregate demand shocks stemming from the external sector.

• Expenditure switch requires a fall in the relative price of non-tradables (or real depreciation).

• The currency peg rules out devaluation, so deflation ensues.

• With nominal downward rigidity, deflation leads to unemployment.
Objectives of the paper:

• Build a model of the Achilles’ Heel of currency pegs.

• Derive a model-based measure of the welfare costs of currency pegs.

• Characterize optimal exchange rate policy.

• Analyze the welfare costs of currency pegs under alternative asset market structures.
A Dynamic Stochastic Disequilibrium (DSDE) Model

- downwardly rigid nominal wages
- perfectly competitive factor markets
- small open economy with traded and nontraded goods
- supply shocks in the traded sector
Summary of Main Findings:

- The costs of currency pegs can be large, both in terms of welfare and unemployment.

- The optimal rate of inflation is high and volatile.

- The asset market structure can be an important determinant of the costs of currency pegs.
Households

\[
\max_{\{c_t^T, c_t^N\}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t U(c_t)
\]

subject to

\[
h_t \leq \bar{h}
\]

\[
c_t = A(c_t^T, c_t^N)
\]

\[
c_t^T + p_t c_t^N = y_t^T + w_t h_t + \phi_t + \tau_t,
\]

First-order condition:

\[
\frac{A_2(c_t^T, c_t^N)}{A_1(c_t^T, c_t^N)} = p_t
\]
Firms in the nontraded sector

\[
\max_{h_t} p_t F(h_t) - w_t h_t
\]

First-order conditions — The labor demand schedule:

\[
p_t F'(h_t) = w_t
\]
Downwardly Rigid Nominal Wages

\[ w_t \geq \gamma \frac{w_{t-1}}{\epsilon_t} \]

\[ h_t \leq \bar{h} \]

\[ (\bar{h} - h_t) \left( w_t - \gamma \frac{w_{t-1}}{\epsilon_t} \right) = 0 \]
The Effect of Transfers on the Private Sector
The Effect of Devaluations on the Private Sector

- **Hours, \( h_t \)**
  - Devaluation Rate, \( \epsilon_t \)
  - Price of Nontradables, \( p_t \)
  - Aggregate Consumption, \( c_t \)

- **Real Wages, \( w_t \)**
  - Devaluation Rate, \( \epsilon_t \)

Mathematical relationship:

\[
\gamma \frac{w_t - w_{t-1}}{\epsilon_t} \rightarrow \gamma \frac{w_t - w_{t-1}}{\epsilon_t}
\]
The benevolent government

\[
\max_{\{d_{t+1}, \tau_t, \epsilon_t, w_t\}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t U(c_t)
\]

subject to

\[
c_t = C\left(y_t^T + \tau_t, \gamma \frac{w_t-1}{\epsilon_t}\right)
\]

\[
w_t = \max \left(w_f(y_t^T + \tau_t), \gamma \frac{w_t-1}{\epsilon_t}\right)
\]

\[
\tau_t = \begin{cases} 
0 & \text{financially closed economy} \\
\mathbb{E}_t q_{t,t+1}^* d_{t+1} - d_t & \text{complete asset markets}
\end{cases}
\]
Complete Asset Markets

\[ U'(c_t)A_1(c_t^T, F(\bar{h})) = \lambda \]

\[ \Rightarrow h_t = \bar{h}, \ c_t^N = F(\bar{h}), \text{ and } c_t^T = c^T \]

\[ \Rightarrow \text{Currency peg implements the optimal allocation} \]
Financially closed economy: $\tau_t = 0$

- Full employment exchange rate policy:
  
  $$\epsilon_t = \max \left\{ 1, \gamma \frac{w_{t-1}^f}{w_t^f} \right\}$$

  $$h_t = \bar{h}$$

- Currency peg:

  $$\epsilon_t = 1$$

  $$h_t = \min(\bar{h}, H(y_t^T, w_{t-1}))$$
# Inflation, Unemployment, and Welfare

<table>
<thead>
<tr>
<th>Wage Stickiness $\gamma$</th>
<th>Mean Inflation</th>
<th>Mean Unemployment</th>
<th>Welfare Cost of Peg</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Optimal Policy</td>
<td>Currency Peg</td>
<td>Optimal Policy</td>
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<tr>
<td>A. Complete asset markets</td>
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<tr>
<td>all</td>
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<tr>
<td>B. Financially closed economy</td>
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<tr>
<td>0.99</td>
<td>12.0</td>
<td>0.0</td>
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<tr>
<td>0.95</td>
<td>5.6</td>
<td>0.0</td>
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Conclusions:

This paper presents a dynamic stochastic disequilibrium (DSDE) model of a small open economy. The model implies that:

• The costs of currency pegs can be large, both in terms of welfare and unemployment.

• The optimal rate of inflation is high and volatile.

• The asset market structure can be an important determinant of the costs of currency pegs.
EXTRAS
Calibration and Functional Forms

\[ U(c) = \frac{c^{1-\sigma} - 1}{1 - \sigma} \]

\[ A(c^T, c^N) = \left[ a(c^T)^{1-\frac{1}{\xi}} + (1 - a)(c^N)^{1-\frac{1}{\xi}} \right]^{\frac{\xi}{\xi-1}} \]

\[ F(h) = h^\alpha \]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
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</thead>
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<tr>
<td>(\sigma)</td>
<td>5</td>
<td>Inverse of intertemporal elasticity of consumption</td>
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<tr>
<td>(a)</td>
<td>0.26</td>
<td>Share of tradables</td>
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<tr>
<td>(\xi)</td>
<td>0.44</td>
<td>Elasticity of substitution between tradables and nontradables</td>
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<tr>
<td>(\alpha)</td>
<td>0.75</td>
<td>Labor share in nontraded sector</td>
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<td>(\bar{h})</td>
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<td>Labor endowment</td>
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<tr>
<td>(y^T)</td>
<td>1</td>
<td>Steady-state tradable output</td>
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<tr>
<td>(\rho)</td>
<td>0.90</td>
<td>Serial correlation of log tradable output</td>
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<tr>
<td>(\sigma_T)</td>
<td>0.0355</td>
<td>Standard deviation of innovation to log of tradable output</td>
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<tr>
<td>(\beta)</td>
<td>0.953</td>
<td>Quarterly subjective discount factor</td>
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<tr>
<td>(r^*)</td>
<td>0.02</td>
<td>Quarterly world interest rate</td>
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<tr>
<td>(\eta)</td>
<td>0.0002</td>
<td>Debt sensitivity of country premium</td>
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<tr>
<td>(\gamma)</td>
<td>0.99, 0.95, 0.9</td>
<td>Degree of downward nominal wage rigidity</td>
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