Concepts of Equilibrium Exchange Rates

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What do we mean by Equilibrium?

• Existence, uniqueness, optimality, determination, evolution……

• Can equilibrium be separated from the models?

• Importance of significance to question in hand
Choosing how to measure equilibrium

- What time frame?
- What definition of the exchange rate?
- Modelling option
- Choosing between models
What time frame are we interested in?

• Short run
  • Market equilibrium
  • Current equilibrium

• Medium run

• Long run
Dynamic path for exchange rate:

\[ e_t = \beta' Z_t + \theta' T_t + \varepsilon_t \]

- Random disturbance
- Transitory factors
- Fundamentals
What definition of the exchange rate?

- Real vs Nominal?
- Bilateral vs Effective?
- Choice of price index?
Terms of trade (price of exports compared to imports)

Price of tradable goods or output prices

Whole economy measures defined using
  • Consumer price indices
  • Unit labour costs

Internal real exchange rate (tradables to non-tradables)
Implementing an approach

- Modelling option
  - Model based
  - Estimation

- Choosing between models
  - Predictability
  - Co-movements
  - Long run
Arbitrage based approaches

- Uncovered Interest Parity (UIP)
- Purchasing Power Parity (PPP)
- Balassa-Samuelson

Empirical Justification?
Using forward substitution you get:

\[
e_t = E_t e_{t+1} + r_t - r_t^* + \sigma_t
\]

\[
e_{t+k} - E_t e_{t+k} = \sum_{j=k}^{n-1} (E_{t+k} \delta_{t+j} - E_t \delta_{t+j}) + \sum_{j=k}^{n-1} (E_{t+k} \sigma_{t+j} - E_t \sigma_{t+j}) + (E_{t+k} e_{t+n} - E_t e_{t+n})
\]

Empirical justification?
Do equilibrium exchange rates vary?

• Surely arbitrage should equalise prices?

  i.e. purchasing power parity (PPP) and the law of one price (LOOP) should hold

Not necessarily:
Suppose LOOP holds. PPP may fail because
- Different consumer preferences
- Not all goods are traded
- Produce different goods

LOOP may also fail because
- Transportation costs
- Market structure (pricing to market)

Empirical justification?
Balassa-Samuelson

- PPP for traded goods
- Labour mobile across sectors
- Productivity differentials between traded and non-traded sectors

\[ e_t = (s_t + p_t^T - p_t^{T*}) - \alpha (p_t^T - p_t^{NT}) + \alpha^* (p_t^{T*} - p_t^{NT*}) \]

Empirical justification?
Short run models

- Monetary models
- Capital Enhanced Equilibrium Exchange Rates (CHEERs)
- Intermediate-term model-based EERs (ITMEERs)
- Behavioural Equilibrium Exchange Rates (BEERs)

Empirical justification?
Underlying Balance Models: The Medium Run

Internal and external balance

• Fundamental Equilibrium Exchange Rates (FEERs)
• Desired Equilibrium Exchange Rates (DEERs)

Empirical justification?
Fig 1: Stylised Model of the Underlying Balance model

- Real Exchange Rate
- External Balance
- Trend Current Account ($Y=Y^*$ and $Y^W=Y^W^*$)
- $Y>Y^*$
- $Y<Y^*$

Diagram showing relationships between Real Exchange Rate and External Balance, with trends for current accounts at different levels of $Y$.
A simple economy:

Output supplied:

\[ y_t^S = \bar{y}(A, K, \bar{L})_t \]

Output demanded:

\[ y_t^D = DD_t + NT_t \]

Balance of Payments Identity:

\[ CA_t = NT_t + BIPD_t = \Delta NFA_t = (S - I)_t \]
Permanent Equilibrium Exchange Rates (PEERs)

Atheoretical Permanent Eers (APEERs)

Natural Real Exchange Rate (Natrex)

Empirical justification?
Understanding the role of shocks

- Structural Vector Autoregressions (SVARs)
- Dynamic Stochastic General Equilibrium Models (DGSE)

Empirical justification?
### Table 1: Summary of Empirical Approaches to Estimating Equilibrium Exchange Rates

<table>
<thead>
<tr>
<th>Name</th>
<th>Theoretical Assumptions</th>
<th>Relevant Time Horizon</th>
<th>Statistical Assumptions</th>
<th>Dependent Variable</th>
<th>Estimation Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>UIP</td>
<td>Uncovered Interest Parity</td>
<td>Short run</td>
<td>Stationarity (of change)</td>
<td>Expected change in the real or nominal</td>
<td>Direct</td>
</tr>
<tr>
<td>PPP</td>
<td>Purchasing Power Parity</td>
<td>Long run</td>
<td>Stationary</td>
<td>Real or nominal</td>
<td>Test for stationarity</td>
</tr>
<tr>
<td>Balassa-Samuelson</td>
<td>Monetary and Portfolio balance models</td>
<td>Short run (forecast)</td>
<td>Non-stationary, with emphasis on speed of convergence</td>
<td>Real Nominal</td>
<td>Direct</td>
</tr>
<tr>
<td>Monetary Models</td>
<td>Intermediate Term Model Based Equilibrium Exchange Rates</td>
<td>Short run (forecast)</td>
<td>Stationary, with emphasis on speed of convergence</td>
<td>Nominal</td>
<td>Direct</td>
</tr>
<tr>
<td>CHEERs</td>
<td>Behavioural Equilibrium Exchange Rates</td>
<td>Medium run</td>
<td>Non-stationary</td>
<td>Future change in the Nominal</td>
<td>Direct</td>
</tr>
<tr>
<td>ITMEERs</td>
<td>Fundamental Equilibrium Exchange Rates</td>
<td>Medium / Long run</td>
<td>Non-stationary (extract permanent component)</td>
<td>Real</td>
<td>Direct</td>
</tr>
<tr>
<td>BEERs</td>
<td>Real exchange rate compatible with both internal and external balance. Flow not full stock equilibrium</td>
<td>Medium / Long run</td>
<td>Non-stationary (extract permanent component)</td>
<td>Real Effective</td>
<td>Underlying Balance</td>
</tr>
<tr>
<td>FEERs</td>
<td>As with FEERs, but the definition of external balance based on optimal policy</td>
<td>Long run</td>
<td>Non-stationary</td>
<td>Real</td>
<td>Underlying Balance</td>
</tr>
<tr>
<td>DEERs</td>
<td>None</td>
<td>Long run</td>
<td>Non-stationary</td>
<td>Real</td>
<td>Direct</td>
</tr>
<tr>
<td>AFEERs</td>
<td>As with FEERs, but with the assumption of portfolio balance (so domestic real interest rate is equal to the world rate).</td>
<td>Short (and long) run</td>
<td>As with theoretical</td>
<td>Real Effective</td>
<td>Direct</td>
</tr>
<tr>
<td>PEERs</td>
<td>As with FEERs, but with theoretical</td>
<td>Short and long run</td>
<td>As with theoretical</td>
<td>Real</td>
<td>Direct</td>
</tr>
<tr>
<td>NATREX</td>
<td>Permanent Equilibrium Exchange Rates</td>
<td>Structural Vector Auto Regression</td>
<td>None</td>
<td>Change in the Real</td>
<td>Direct</td>
</tr>
<tr>
<td>SVARs</td>
<td>Natural Real Exchange Rates</td>
<td>Dynamic Stochastic General Equilibrium models</td>
<td>None</td>
<td>Change relative to long run steady state</td>
<td>Direct</td>
</tr>
<tr>
<td>DSGE</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
Modelling Accession countries

What features do we want?

• Traded vs nontraded goods?
• Pricing to market?
  – In which direction?
• Risk premium?

Will depend on the question
Choosing an entry rate for EMU

- Actual exchange rate = short run equilibrium = medium run equilibrium = long run equilibrium
- Life is simple!!!!
  - With a small caveat about bilateral v effective exchange rates
- Sadly life is rarely simple!
Exchange rates when shocks occur

• The exchange rate as a shock absorber vs. source of noise

• Good reasons why short, medium and long run equilibria differ

• Important to understand why
Different time horizons

- Short Run
- Medium Run
- Long Run
Entry rates when shocks occur

- Entry rate = medium run ≠ short run rate
  - Inflationary consequences

- Costs determined by:
  - reason why actual ≠ medium run equilibrium
  - speed of adjustment to FEER outside EMU

- Choice of entry date important

http://www.hm-treasury.gov.uk/documents/the_euro/assessment/studies/euro_assess03_studwiltshire.cfm
Conclusions

- Remember the question of interest
- Models may have equal analytical status
- What will be important is their significance for task