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

Modelling Exchange Rates

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?

Exchange rate measure (cont.)

- 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?

UIP (in real terms)

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

Using forward substitution you get:

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

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:

Continued........

- 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)
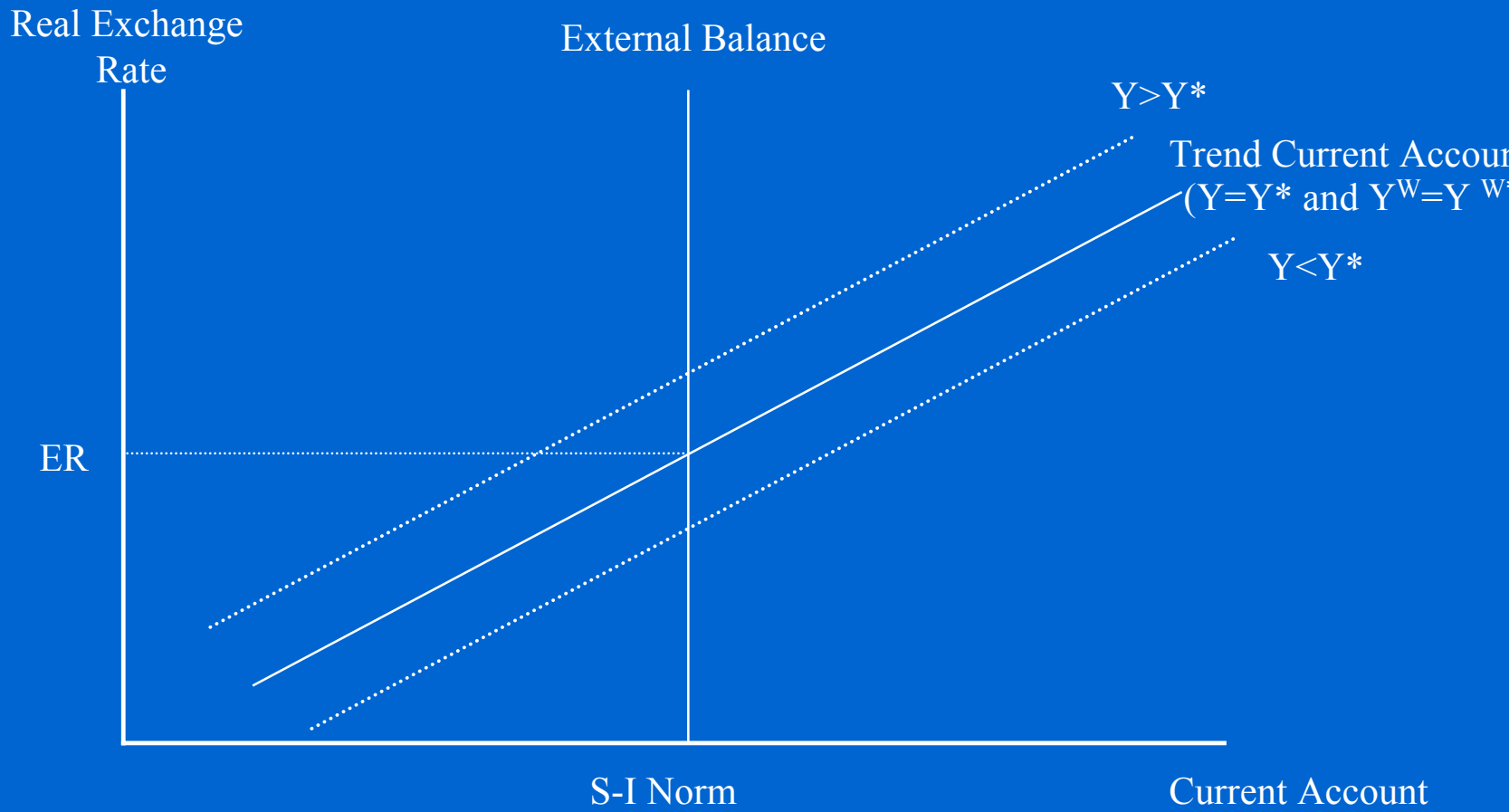
Empirical justification?

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 mod

Real Exchange Rate

External Balance

$Y>Y^*$

Trend Current Accour
$(Y=Y^*$ and $Y^W=Y^{W}$

$Y<Y^*$

ER

S-I Norm

Current Account

A simple economy:

Output supplied:

$$y_t^S = \overline{y}(A, K, \overline{L})_t$$

Output demanded:

$$y_t^D = DD_t + NT_t$$

Balance of Payments Identity:

$$CA_t = NT_t + BIPD_t = \Delta NFA_t = (S - I)_t$$

Longer run measures

- 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

	UIP	PPP	Balassa-Samuelson	Monetary Models	CHEERs	ITMEERs	BEERs	FEERs	DEERs	APEERs	PEERs	NATREX	SVARs	DSGE
Name	Uncovered Interest Parity	Purchasing Power Parity	Balassa-Samuelson	Monetary and Portfolio balance models	Capital Enhanced Equilibrium Exchange Rates	**Intermediate Term Model Based Equilibrium Exchange Rates**	Behavioural Equilibrium Exchange Rates	Fundamental Equilibrium Exchange Rates	Desired Equilibrium Exchange Rates	Atheoretical Permanent Equilibrium Exchange Rates	Permanent Equilibrium Exchange Rates	Natural Real Exchange Rates	Structural Vector Auto Regression	Dynamic Stochastic General Equilibrium models
Theoretical Assumptions	The expected change in the exchange rate determined by interest differentials	Constant Equilibrium Exchange Rate	PPP for tradable goods. Productivity differentials between traded and nontraded goods	PPP in long run (or short run) plus demand for money.	PPP plus nominal UIP without risk premia	Nominal UIP including a risk premia plus expected future movements in real exchange rates determined by fundamentals	Real UIP with a risk premia and/or expected future movements in real exchange rates determined by fundamentals	Real exchange rate compatible with both internal and external balance. Flow not full stock equilibrium	As with FEERs, but the definition of external balance based on *optimal* policy	None	As BEERs	As with FEERs, but with the assumption of portfolio balance (so domestic real interest rate is equal to the world rate).	Real exchange rate affected by supply and demand (but not nominal) shocks in the long run	Models designed to explore movements in real and/or nominal exchange rates in response to shocks.
Relevant Time Horizon	Short run	Long run	Long run	Short run	Short run (forecast)	Short run (forecast)	Short run	Medium run	Medium Run	Medium / Long run	Medium / Long run	Long run	Short (and long) run	Short and long run
Statistical Assumptions	Stationarity (of change)	Stationary	Non-stationary	Non-stationary	Stationary, with emphasis on speed of convergence	None	Non-stationary	Non-stationary	Non-stationary	Non-stationary (extract permanent component)	Non-stationary (extract permanent component)	Non-stationary	As with theoretical	As with theoretical
Dependent Variable	Expected change in the real or nominal	Real or nominal	Real	Nominal	Nominal	Future change in the Nominal	Real	Real Effective	Real Effective	Real	Real	Real	Change in the Real	Change relative to long run steady state
Estimation Method	Direct	Test for stationarity	Direct	Direct	Direct	Direct	Direct	Underlying Balance	Underlying Balance	Direct	Direct	Direct	Direct	Simulation

Modelling Accession countries

What features do we want?

- Traded v 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 v source of noise

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

- Important to understand why

Different time horizons

Exchange rate

Short Run

Medium Run

Long Ru

time
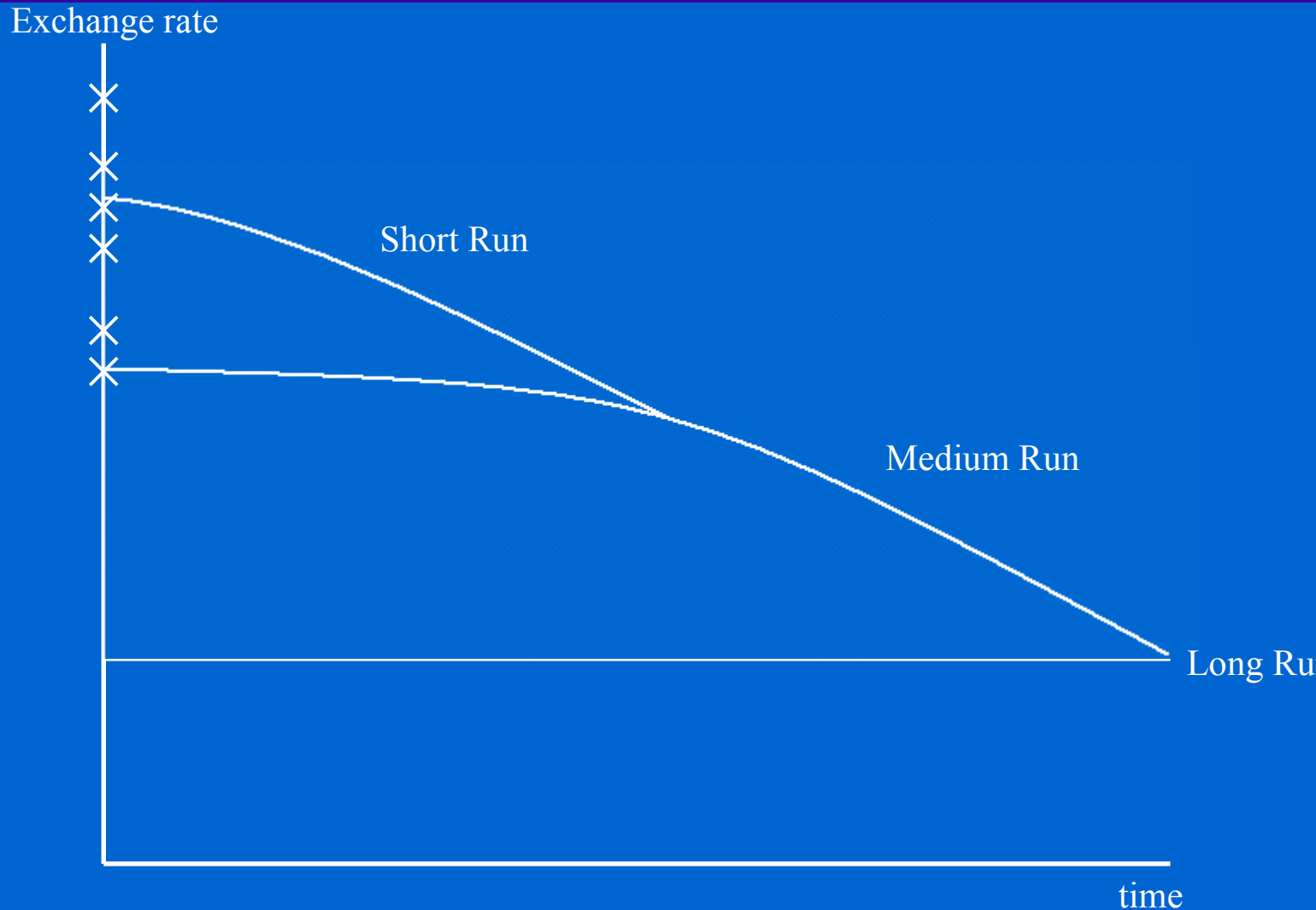
Entry rates when shocks occur

- 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

References

Westaway (2003) "Modelling the transition to EMU", HM Treasury.

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