NYU STERN

The Global Economy
Backus & Cooley

Practice Problems D: Exchange Rates & Crises

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This will not be collected or graded, but it's a good way to make sure you're up to speed. We recommend you do it before the next class.

1. Purchasing power parity for Big Macs. The Economist reports the following data for local prices of Big Macs and US dollars in July 2012:

	Big Mac Price (Local Currency)	Exchange Rate (LCUs per Dollar)
Argentina	19.0	4.16
Brazil	10.1	0.97
India	89.0	56.2
United States	4.33	1.00

   (a) What is the dollar price of a Big Mac in each of these locations?

   (b) What exchange rates for the first three currencies would equate the dollar prices of Big Macs to the US price.

   (c) How much are the first three currencies over- or under-valued relative to the US dollar?

Solution: The calculations are summarized in

	Big Mac (LCU) (A)	Exch Rate (LCU/USD) (B)	Big Mac (USD) (C)	Big Mac Parity (D)	Overvaluation (percent) (E)
Argentina	19.0	4.16	4.57	4.39	5.5
Brazil	10.1	0.97	10.41	2.33	140
India	89.0	56.2	1.58	20.55	−63
United States	4.33	1.00	4.33	1.00	0.0

See the spreadsheet for a complete description.

   (a) Dollar prices of Big Macs are reported above as column (C), computed as (A)/(B).

(b) The calculation is reported in column (D). The idea is to pick the exchange rate that makes the dollar price of a Big Mac the same in both countries.

A more elaborate rationale. The relative price of Big Macs is like a real exchange rate. The real exchange rate is the ratio of prices converted to a common currency:

$$\text{RER} \;=\; eP^*/P.$$

Usually we use prices indexes for P and P^*, here we use prices of Big Macs.

Mathematically, we set RER equal to one and solve for $e = P/P^*$. In the table, we computed this as the ratio of entries on column (A) to the US entry in the same column. The results are reported in (D). They give us a "Big Mac Parity" benchmark for what the exchange rate should be.

(c) If we compare our calculation of the PPP exchange rate in (b) to the actual, we can see how far off we are. In the table, we compute "overvaluation" as the percentage difference between column (D) and true exchange rates (B): `100*[(D)/(B)-1]`. We see that the Brazilian real is overvalued (Big Macs are expensive there) and the Indian rupee is undervalued (Big Macs are cheap there). Argentina is about even, at least at the official exchange rate.

2. Foreign exchange reserves. Countries often buy and sell foreign currency as part of their day-to-day central bank operations.

   (a) Describe the central bank's balance sheet. Where do foreign exchange reserves appear?

   (b) If private citizens choose to buy foreign currency from the central bank, what happens to its balance sheet? What limits how much of this the central bank can accommodate?

Solution:

(a) Foreign exchange reserves are an asset of the central bank.

(b) The balance sheets look something like this:

Central Bank

Assets		Liabilities	
Bonds	10	Money	20
FX reserves	10		

Households & firms (everyone else)

Assets		Liabilities	
Money	10		
FX	50		
Bonds	180		

(c) Suppose private citizens buy 5 worth of "FX" (foreign currency) from the central banks, paying in local currency (money). Balance sheets change like this:

Central Bank

Assets		Liabilities	
Bonds	10	Money	15
FX reserves	5		

Households & firms (everyone else)

Assets		Liabilities	
Money	5		
FX	55		
Bonds	180		

The central bank is limited by the quantity of reserves it holds. Once it runs out, it either finds a way to get more or stops trading currencies.

3. The trilemma in action. In 1992, the Bank of England found that its commitment to maintain a quasi-fixed parity of the pound against the Deutschemark forced it to raise short-term interest rates during a recession. What were its choices? How does this illustrate the trilemma?

Solution: The trilemma says you can have at most two of these three things: (i) independent monetary policy, (ii) fixed exchange rate, and (iii) free capital mobility.

In the UK, they took (iii) as given, but (i) and (ii) were in conflict. The economy was in a recession, so the central bank wanted to lower interest rates. But that conflicted with their agreement to maintain a quasi-fixed exchange rate with European currencies, including the Deutschemark. In the end, they kept (i) and abandoned (ii).

4. Crisis triggers. Economic crises have been with us throughout recorded history. Although they often come as a surprise, their forms are familiar from past experience.
   (a) What are the classic crisis triggers?
   (b) What indicators would you use to assess each source of crisis risk?
   (c) What are the standard responses to each one?
   (d) What would you do now if you were the benevolent dictator of the European Union?

Solution:

(a) Classic triggers: government debt, finance/banking, and fixed exchange rates.

(b) Common indicators:

- Government debt: lots of debt, continuing deficits, and (most important) the political situation.
- Banking: not part of this course, but people would look at capital ratios, nonperforming loans, and asset problems in the economy (real estate is a standard source of problems dating back to Roman times).
- Fixed exchange rate: overvaluation either from PPP or compared to the recent past, reserves.

(c) Common responses:

- Government debt: fiscal discipline, perhaps an IMF program to indicate commitment and finance a transition period.
- Banking: if the issue is illiquidity, the central bank supplies liquidity to the financial system; if the issue is insolvency, it's important to recapitalize the system and get it working again.

- Fixed exchange rate: give it up, let the currency float.

(d) Where do we start?