

Introduction to Macroeconomics · M5 · 2013-14

Problem set 5

1. Nominal exchange rate. Consider tables T1 and T2 below, taken from <http://www.x-rates.com/>. In T1, for instance, €1 can purchase \$1.35357.

T1	USD	GBP	CAD	EUR	AUD
USD	1	0.63804	0.99588	0.73879	0.96732
GBP	1.56729	1	1.56082	1.15789	1.51607
CAD	1.00414	0.64069	1	0.74185	0.97133
EUR	1.35357	0.86364	1.34799	1	1.30933
AUD	1.03378	0.65960	1.02952	0.76375	1

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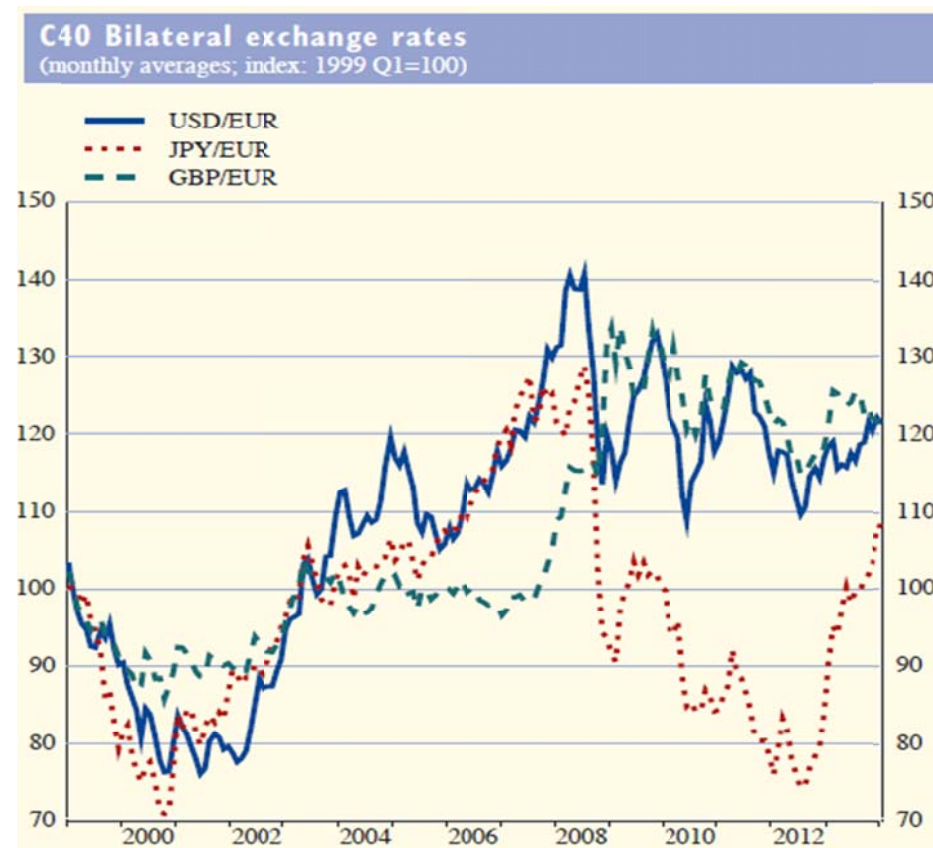
T2	USD	GBP	CAD	EUR	AUD
USD	1	0.59794	1.10587	0.72790	1.11365
GBP	1.67240	1	1.84945	1.21734	1.86247
CAD	0.90427	0.54070	1	0.65822	1.00704
EUR	1.37382	0.82146	1.51926	1	1.52995
AUD	0.89795	0.53692	0.99301	0.65362	1

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(i) Is the euro appreciating or depreciating with respect to the dollar from T1 to T2? (ii) Is there any currency with respect to which both the euro and the dollar appreciate from T1 to T2? (iii) Identify a currency that, in passing from T1 to T2, appreciated with respect to the dollar but depreciated with respect to the euro or vice versa.

2. Appreciation. Let the dollar-euro exchange rate be $e = 2$ \$/€. (i) Calculate the level of the exchange rate that makes the dollar appreciate a 50% with respect to the euro. (ii) Compute the level of the exchange rate needed to induce a 20% appreciation of the euro with respect to the dollar.

3. Appreciation/depreciation. In the chart next, for each foreign currency, indicate a period in which the euro: (i) appreciates with respect to the currency; (b) depreciates with respect to the currency.



ECB Monthly Bulletin, February 2014

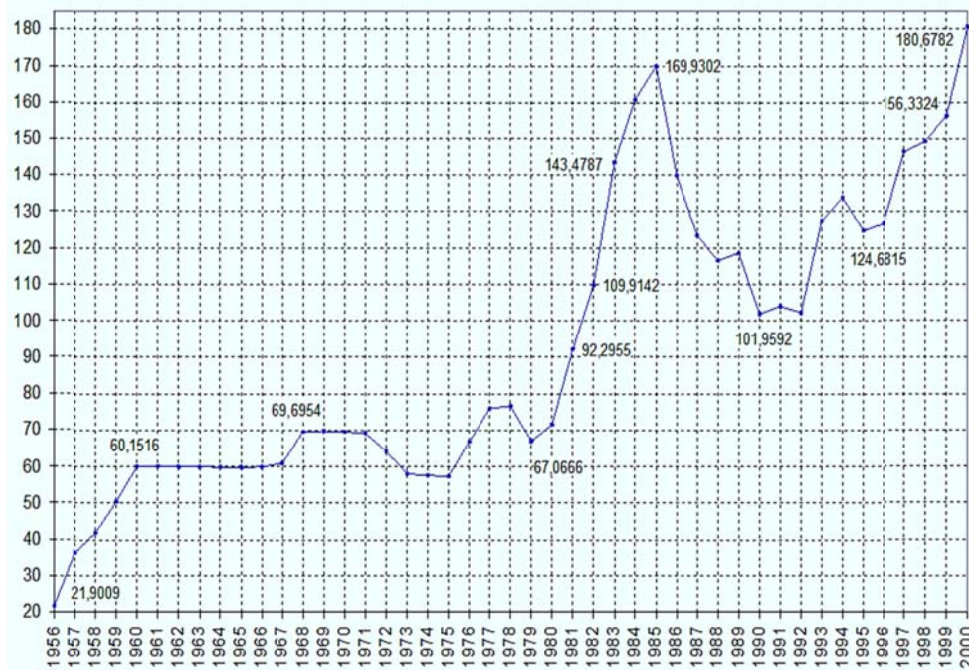
www.ecb.europa.eu/pub/pdf/mobu/mb201402en.pdf (S73)

4. PPP. Find the purchasing power parity exchange rate (when the euro is the home currency and indirect quotation is adopted) if the nominal exchange rate is 2 €/\$, the eurozone CPI is 200, and the US CPI is 600 (assuming that both CPIs are based on the same basket of goods).

5. Currency arbitrage. Explain how triangular arbitrage would alter the exchange rates 1 \$/€, 1 \$/¥, and 2 €/¥.

6. Three currencies. (i) Is it possible for the yen to depreciate with respect to the euro and, simultaneously, to appreciate with respect to the dollar? (ii) If so, would the euro appreciate or depreciate with respect to the dollar?

7. Peseta-dollar exchange rate. The chart below shows the peseta-dollar exchange rate (1956 to 2000): how many pesetas could be purchased with one dollar (<http://www.economicswbinstitute.org/data/world/exchangerates.zip>). (i) Select an interval during which the peseta depreciated with respect to the dollar. (ii) Pick two years between which the peseta appreciated with respect to the dollar. (iii) Conjecture how the graph showing the dollar-peseta exchange rate should look like.



8. Central banks. (i) Explain, and represent graphically, what kind of currency market intervention by the Federal Reserve would cause an appreciation of the euro against the dollar. (ii) Would that intervention also cause an appreciation of the euro if it were carried out by the European Central Bank?

9. Currency market. (i) Explain if the euro appreciates or depreciates with respect to the dollar if the US real GDP increases. Illustrate your explanation by means of a graphical representation of the currency market. (ii) Address the same two questions (explain and illustrate) if the European Central Bank conducts an expansionary open market operation. (iii) Address the same two questions if the events in (i) and (ii) occur simultaneously.

10. PPP. (i) Suppose a currency is overvalued according to its PPP value. What can be said about the associated real exchange rate? [Hint: is greater, smaller, or equal to 1?] (ii) Assume that P^* is twice P . What is the value of the nominal exchange rate implied by PPP?

11. Over/undervaluation. Fill out the following table, where P is the eurozone CPI, P^* is the US CPI, e_{PPP} is the exchange rate $\$/\text{€}$ ensuring purchasing power parity, e is the equilibrium exchange rate $\$/\text{€}$ in the currency market, and the last column is the one where it must be specified in which percentage the euro is overvalued or undervalued with respect to the dollar according to e_{PPP} .

P	P^*	e_{PPP}	e	Overvalued/undervalued (%)
100	200		1	
100	200		2	
100	200		$\frac{1}{2}$	
150	150		2	

12. PPP. Reus and Tarragona are independent countries with their own currency, the reuro and the tarragollar, respectively. The exchange rate between reuro and tarragollar is 2 reuros per tarragollar. The price of French bread is 3 reuros a piece in Reus and 1 tarragollar a piece in Tarragona. (i) Is the reuro overvalued or undervalued with respect to its PPP value? If so, by how much? (ii) Assuming that there is no significant transportation cost, what changes would cause the commercial arbitrage of French bread in the exchange rate and the prices in Reus and Tarragona?

13. Currency market. (i) Identify five events shifting the market supply function of euros to the right. (ii) Identify five events shifting the market demand function for euros to the right.

14. Real exchange rate. What is to be expected to happen to the real exchange rate between the dollar and the euro if the euro depreciates with respect to the dollar and the inflation rate in the US is higher than the inflation rate in the eurozone?

15. Currency market. Determine the effect on the equilibrium exchange rate of the following events.

- (1) The arrival of a significant number of immigrants from the US
- (2) The Federal Reserve buys government bonds
- (3) Both the Federal Reserve and the European Central Bank purchase government bonds
- (4) The Federal Reserve buys government bonds and the European Central Bank sells them
- (5) The reduction of the number of tourists coming from the US
- (6) An increase in the US GDP
- (7) An increase in the US GDP combined with a reduction in the eurozone GDP
- (8) An increase in the eurozone CPI
- (9) An increase in both the eurozone CPI and US CPI
- (10) Germany or Catalonia leave the eurozone
- (11) The US declares war on the eurozone

16. Real exchange rate. (i) Compute the real exchange rate and the purchasing power parity exchange rate if the nominal exchange rate in the currency market is $e = 1/4$ €/\$, the US CPI is $P^* = 800$, and the eurozone CPI is $P = 400$ (specify the units of the two rates computed). (ii) If the purchasing power parity exchange rate differs from the nominal exchange rate in the currency market, explain if the euro is overvalued or undervalued with respect to the dollar and calculate the over/undervaluation percentage.

17. Three currencies. (i) If the dollar-euro exchange rate is 20 \$/€ and the yen-euro exchange rate is 10 ¥/€, what should presumably be the yen-dollar exchange rate? (ii) Let the dollar appreciate versus the euro and the yen depreciate versus the euro. Must the dollar appreciate or depreciate versus the yen?

18. Big Mac Index (<http://www.economist.com/content/big-mac-index>). Consider the table below. (i) Choose a country and explain whether its currency is overvalued or undervalued with respect to the dollar according to purchasing power parity. Explain also what the numbers in each column mean and how they are obtained. (ii) As regards Japan, $e_{PPP} = 67.04$ yen per dollar and e in the currency market is 104.25 yen per dollar. The deviation of e from e_{PPP} is $(104.25 - 67.04)/67.04 = 0.555 = 55.5\%$, but the table contends that the yen is undervalued a 35.69%. Explain the discrepancy.

Country	BM price in local currency	Actual exchange rate (Jan 2014)	Local price in \$ BM price in \$	PPP exchange rate	Over/undervaluation against \$ (%)
Argentina	21	6.92	3.03	4.54	-34.39
Egypt	16.93	6.96	2.43	3.66	-47.40
France	3.8	0.74	5.15	0.82	11.47
Greece	3.05	0.74	4.14	0.66	-10.53
Indonesia	27939	12140.00	2.30	6041.95	-50.23
Italy	3.85	0.74	5.22	0.83	12.94
Japan	310	104.25	2.97	67.04	-35.69
Mexico	37	13.33	2.78	8.00	-39.99
Norway	48	6.16	7.80	10.38	68.58
Poland	9.2	3.07	3.00	1.99	-35.16
Spain	3.65	0.74	4.95	0.79	7.07
Switzerland	6.5	0.91	7.14	1.41	54.46
Ukraine	19	8.38	2.27	4.11	-50.96
United States	4.62	1.00	4.62	1.00	0.00