

Problem Set 5 (revised 4/29/05)

Due **in Lecture** on Wednesday, May 4th. "Box-in" your answers to the algebraic questions.

1. Using real data to evaluate (relative) PPP and UIP. Consider the tables drawn from the *Economist*, April 23rd edition, on the attached pages. Answer these questions using equations.

1.1 Using the 3 month interest rates, and assuming UIP holds, calculate the expected change in the dollar/euro exchange rate over the next three months. Be sure to state what the rate will be, in annualized terms, and what will be the actual percentage change in the US dollar/euro exchange rate.

1.2 Given the empirical evidence on the relationship between exchange rate changes and interest differentials provided in the table in the handout on CIP and UIP, what do you expect to happen to the dollar/euro rate? Explain.

1.3 Using 10 year bonds, calculate what the implied change in the dollar/euro exchange rate is, over the next ten years.

1.4 Given the inflation rates over the past year, what should have been the rate of change in the US dollar/euro exchange rate if relative purchasing power parity (in growth rates) held?

1.5 Interpret the *Economist* poll of expected inflation rate for 2005 as the expected change from December 2004 to December 2005. What is the expected change in the US dollar/euro over this period?

1.6 Calculate the euro/pound exchange rate on April 20th (expressed as the number of euros required to purchase a single pound).

1.7 Find the implied exchange rate for the euro/pound 3 months from April 20th.

2. Using Big Mac data to calculate PPP exchange rates. Consider the data in the (revised) Figure below.

2.1 ~~Calculate~~ **Indicate** the exchange rate that would be consistent for absolute PPP (for BigMacs), for the dollar/euro rate.

2.2 Assuming that prices of Big Macs had not changed from ~~Dec. 13~~ May, 2004 to April 20, 2005, can you say whether the euro is overvalued relative to the dollar?

2.3 Repeat 2.1 using the Chinese price of the Big Mac. Making the same assumptions as in 2.2, can you say whether the Chinese currency (the “Renminbi”) is undervalued or overvalued according to this criterion? (The exchange rate is 8.28 RMB/USD).

3. The exchange risk premium. Consider a world in which there are only two types of government bonds: US Treasury bills, and all other developed country (e.g., Germany, France, the UK) government debt.

3.1 What would you expect to happen as US government debt becomes an ever larger proportion of the total stock of debt outstanding?

3.2 What happens if US debt increases by 3% but foreign debt also increases by 3%?

3.3 Suppose that US debt and foreign debt stayed constant, but “global investors” (firms, individual savers) suddenly became more risk averse. What would be the impact (assuming a risk premium was originally being paid on US debt)?

% change on year ago

	The Economist poll											
	Consumer prices			consumer prices forecast		Producer prices			Wages/earnings			
	latest	year ago		2005	2006	latest	year ago		latest	year ago		
Australia	+ 2.6	Q4	+ 2.4	+ 2.6	+ 2.7	+ 8.2	Q4	- 1.1	+ 3.0	Q4	+ 6.0	
Austria	+ 2.9	Mar	+ 1.5	+ 2.0	+ 1.6	+ 4.0	Mar	+ 3.0	+ 2.2	Mar	+ 2.1	
Belgium	+ 3.1	Mar	+ 1.1	+ 1.9	+ 1.7	- 1.1	Feb	+ 2.4	+ 2.3	Jan	+ 1.9	
Britain	+ 1.9	Mar*	+ 1.1	+ 1.8	+ 1.8	+ 2.8	Mar	+ 1.4	+ 4.7	Feb†	+ 4.9	
Canada	+ 2.1	Feb	+ 0.7	+ 1.9	+ 2.1	+ 2.3	Feb	- 1.9	+ 1.8	Jan	+ 4.3	
Denmark	+ 1.4	Mar	+ 0.7	+ 1.5	+ 1.8	+ 4.2	Mar	+ 0.3	+ 2.8	Q4	+ 3.5	
France	+ 1.9	Mar	+ 1.7	+ 1.6	+ 1.6	+ 3.1	Feb	nil	+ 3.0	Q4	+ 2.7	
Germany	+ 1.8	Mar	+ 1.1	+ 1.3	+ 1.1	+ 3.3	Mar	+ 1.0	+ 1.2	Jan	+ 1.9	
Italy	+ 1.9	Mar	+ 2.3	+ 1.9	+ 1.9	+ 4.7	Feb	+ 0.1	+ 3.4	Feb	+ 2.8	
Japan	- 0.3	Feb	nil	nil	+ 0.3	+ 1.4	Mar	+ 0.2	+ 0.1	Feb	+ 2.0	
Netherlands	+ 1.8	Mar	+ 1.1	+ 1.3	+ 1.4	+ 5.5	Feb	- 1.6	+ 0.9	Mar	+ 1.7	
Spain	+ 3.4	Mar	+ 2.1	+ 2.8	+ 2.6	+ 4.9	Feb	+ 0.7	+ 2.6	Q4	+ 3.3	
Sweden	+ 0.1	Mar	- 0.1	+ 0.7	+ 1.5	+ 2.8	Feb	- 2.3	+ 2.0	Dec	+ 2.8	
Switzerland	+ 1.4	Mar	- 0.1	+ 1.1	+ 1.2	+ 1.4	Mar	- 0.1	+ 1.4	2003	+ 1.8	
United States	+ 3.1	Mar	+ 1.7	+ 2.6	+ 2.5	+ 4.9	Mar	+ 1.5	+ 2.6	Mar	+ 1.8	
Euro area	+ 2.1	Mar	+ 1.7	+ 1.8	+ 1.6	+ 4.2	Feb	nil	+ 2.2	Q4	+ 2.1	
MORE COUNTRIES	Data for the countries below are not provided in printed editions of <i>The Economist</i>											
Finland	+ 1.0	Mar	- 0.6	na	na	+ 2.4	Mar	- 0.6	+ 3.0	Q4	+ 4.2	
Greece	+ 2.9	Mar	+ 2.7	na	na	+ 3.3	Jan	+ 1.5	na	na	na	
Iceland	+ 4.3	Apr	+ 2.2	na	na	+ 6.6	Apr	+ 2.7	+ 6.7	Feb	+ 3.3	
Ireland	+ 2.1	Mar	+ 1.3	na	na	- 0.4	Feb	- 6.6	+ 5.1	Q4	+ 4.5	
Luxembourg	+ 2.4	Mar	+ 1.8	na	na	+16.3	Feb	- 0.6	nil	Jan	+ 2.6	
New Zealand	+ 2.8	Q1	+ 1.5	na	na	+ 3.4	Q4	- 0.1	+ 2.5	Q4	+ 2.3	
Norway	+ 1.0	Mar	- 0.6	na	na	+17.5	Mar	+ 3.3	+ 3.9	Q4	+ 3.9	
Portugal	+ 2.2	Mar	+ 2.3	na	na	+ 4.0	Feb	- 0.5	- 0.9	Feb	+ 0.8	

*RPI inflation rate 3.2% in Mar. †Dec-Feb.

	Money supply*			Interest rates % a year (Apr 20th 2005)					
	% change on year ago			3-mth money market		2-year gov't bonds	10-year gov't bonds		corporate bonds
	narrow	broad		latest	year ago		latest	year ago	
Australia	+ 2.0	+ 8.9	Feb	5.72	5.54	5.25	5.34	5.93	6.35
Britain	+ 5.2	+10.4	Mar	4.88	4.34	4.59	4.58	4.97	5.22
Canada	+13.7	+11.1	Feb	2.44	1.96	2.97	4.19	4.65	5.61
Denmark	+13.8	+10.3	Feb	2.18	2.15	2.28	3.49	4.28	5.01
Japan	+ 4.5	+ 2.1	Mar	0.02	0.02	0.08	1.25	1.56	1.34
Sweden	+ 2.5	+ 4.3	Feb	1.97	2.01	2.39	3.51	4.55	3.28 [‡]
Switzerland	- 5.6	+ 2.0	Mar	0.76	0.28	0.94	2.06	2.67	1.99
United States	+ 3.3	+ 4.9	Mar	3.05	1.08	3.51	4.21	4.42	5.23
Euro area[†]	+ 9.9	+ 6.4	Feb	2.14	2.07	2.31	3.42	4.11	3.89

*Narrow: M1 except Britain and Sweden M0, broad: M2 or M3 except Britain M4. [†]Germany for bonds. [‡]New series. Benchmarks: US 30-year 4.57%, Japan No. 269 1.25%. Central bank rates: US fed funds 2.75%, ECB refinancing 2.00%, BOJ overnight call 0.001%, BOE repo 4.75%. Sources: Bank of Canada, Commerzbank, Danske Bank, J.P. Morgan Chase, Stockholmsbörsen, UBS, Global Insight, Westpac, Thomson Datastream. Rates cannot be construed as banks' offers.

	Trade balance*, \$bn latest 12 months	Current-account balance				Exchange rate		Currency units				Budget balance % of GDP [‡] 2004 [†]
		\$bn latest 12 mths	The Economist poll % of GDP, forecast		trade-weighted [†] 2000=100		per \$	per £	per euro	per ¥100		
			2005	2006	Apr 20th	year ago						
Australia	- 18.1 Feb	- 39.4 Q4	- 5.7	- 5.1	115.3	114.7	1.29	1.36	2.48	1.69	1.21	+ 0.7
Austria	+ 0.1 Jan	- 0.9 Feb	- 0.6	- 0.8	105.8 [§]	105.5	0.77	0.84	1.47	-	0.72	- 1.5
Belgium	+ 17.6 Feb	+ 12.0 Dec	+ 3.3	+ 3.3	107.7 [§]	107.2	0.77	0.84	1.47	-	0.72	- 0.1
Britain	-107.3 Feb	- 49.0 Q4	- 2.7	- 2.7	101.6 ^{**}	100.5	0.52	0.56	-	0.68	0.49	- 3.2
Canada	+ 50.9 Feb	+ 23.4 Q4	+ 1.7	+ 1.5	115.3	106.7	1.24	1.36	2.38	1.62	1.16	+ 1.1
Denmark	+ 9.4 Feb	+ 7.2 Feb	+ 2.2	+ 2.1	106.5	105.5	5.70	6.27	10.9	7.45	5.33	+ 0.9
France	- 15.2 Feb	- 9.6 Feb	- 0.2	- 0.1	108.6 [§]	108.0	0.77	0.84	1.47	-	0.72	- 3.7
Germany	+198.3 Feb	+107.5 Feb	+ 3.1	+ 3.0	110.2 [§]	109.6	0.77	0.84	1.47	-	0.72	- 3.9
Italy	- 2.3 Feb	- 16.8 Feb	- 1.0	- 1.0	108.1 [§]	107.6	0.77	0.84	1.47	-	0.72	- 2.9
Japan	+126.6 Feb	+169.5 Feb	+ 3.5	+ 3.6	86.9	88.8	107	109	205	140	-	- 6.5
Netherlands	+ 37.6 Feb	+ 24.1 Q4	+ 3.3	+ 3.3	108.5 [§]	108.0	0.77	0.84	1.47	-	0.72	- 2.9
Spain	- 78.0 Jan	- 53.8 Jan	- 4.5	- 4.5	106.0 [§]	105.6	0.77	0.84	1.47	-	0.72	- 1.1
Sweden	+ 22.8 Feb	+ 28.0 Q4	+ 6.8	+ 6.3	98.9	97.5	7.03	7.72	13.5	9.19	6.58	+ 0.5
Switzerland	+ 7.0 Mar	+ 40.8 Q4	+11.5	+11.5	108.0	105.0	1.18	1.32	2.26	1.54	1.10	- 1.6
United States	-693.1 Feb	-665.9 Q4	- 6.1	- 5.9	82.6	88.6	-	-	1.92	1.31	0.94	- 4.4
Euro area	+ 82.0 Feb	+ 46.1 Jan	+ 0.5	+ 0.5	118.6	113.9	0.77	0.84	1.47	-	0.72	- 2.9
MORE COUNTRIES Data for the countries below are not provided in printed editions of <i>The Economist</i>												
Finland	+ 13.0 Feb	+ 8.5 Feb	na	na	109.2 [§]	108.9	0.77	0.84	1.47	-	0.72	+ 2.3
Greece	- 32.1 Jan	- 10.5 Feb	na	na	104.9 [§]	104.6	0.77	0.84	1.47	-	0.72	- 5.3
Iceland	- 0.6 Feb	- 1.0 Q4	na	na	98.1 ^{††}	90.2	62.5	73.6	120	81.7	58.5	+ 0.1
Ireland	+ 41.4 Feb	- 0.8 Q4	na	na	114.2 [§]	113.1	0.77	0.84	1.47	-	0.72	+ 0.2
Luxembourg	- 4.6 Jan	+ 2.9 Q4	na	na	107.7 [§]	107.2	0.77	0.84	1.47	-	0.72	- 0.4
New Zealand	- 2.8 Feb	- 6.2 Q4	na	na	137.5	123.8	1.38	1.60	2.64	1.80	1.29	+ 2.9
Norway	+ 36.5 Mar	+ 34.4 Dec	na	na	107.3	104.3	6.25	6.96	12.0	8.17	5.85	+ 8.2
Portugal	- 19.2 Jan	- 13.6 Jan	na	na	105.8 ^{††}	105.1	0.77	0.84	1.47	-	0.72	- 2.9

*Merchandise. Australia, Britain, France, Canada, Japan and United States imports fob, exports fob. All others cif/fob. [†]Bank of England except [§]IMF, February average. [‡]OECD estimate. ^{**}New series. ^{††}IMF, December average.

Revised figure for Problem 2

The hamburger standard

	Big Mac price in dollars*	Implied PPP† of the dollar	Under (-)/over (+) valuation against the dollar, %
United States†	2.90	–	–
Argentina	1.48	1.50	-49
Australia	2.27	1.12	-22
Brazil	1.70	1.86	-41
Britain	3.37	1.54‡	+16
Canada	2.33	1.10	-20
Chile	2.18	483	-25
China	1.26	3.59	-57
Czech Rep.	2.13	19.5	-27
Denmark	4.46	9.57	+54
Egypt	1.62	3.45	-44
Euro area	3.28**	1.06††	+13
Hong Kong	1.54	4.14	-47
Hungary	2.52	183	-13
Indonesia	1.77	5,552	-39
Japan	2.33	90.3	-20
Malaysia	1.33	1.74	-54
Mexico	2.08	8.28	-28
New Zealand	2.65	1.50	-8
Peru	2.57	3.10	-11
Philippines	1.23	23.8	-57
Poland	1.63	2.17	-44
Russia	1.45	14.5	-50
Singapore	1.92	1.14	-34
South Africa	1.86	4.28	-36
South Korea	2.72	1,103	-6
Sweden	3.94	10.3	+36
Switzerland	4.90	2.17	+69
Taiwan	2.24	25.9	-23
Thailand	1.45	20.3	-50
Turkey	2.58	1,362,069	-11
Venezuela	1.48	1,517	-49

MORE COUNTRIES Data for the countries below are not provided in printed editions of *The Economist*

	Big Mac price in dollars*	Implied PPP† of the dollar	Under (-)/over (+) valuation against the dollar, %
Aruba	2.29	1.41	-21
Belarus	1.37	1021	-53
Bulgaria	1.85	1.03	-36
Colombia	2.35	2241	-19
Costa Rica	2.61	390	-10
Croatia	2.42	5.14	-17
Dom. Rep.	1.32	20.7	-54
Estonia	2.27	10.2	-22
Fiji	2.35	1.47	-19
Georgia	1.90	1.26	-34
Guatemala	2.01	5.52	-31
Honduras	1.98	12.4	-32
Iceland	6.01	151	107
Jamaica	1.88	39.0	-35
Jordan	3.65	0.89	26
Kuwait	7.33	0.74	153
Latvia	2.00	0.38	-31
Lebanon	2.84	1483	-2
Lithuania	2.26	2.24	-22
Macau	1.40	3.86	-52
Macedonia	1.84	32.8	-36
Moldova	1.93	7.93	-33
Morocco	0.26	0.82	-91
Nicaragua	2.19	11.9	-25
Norway	5.18	12.2	79
Pakistan	1.90	37.9	-34
Qatar	0.68	0.85	-77
Saudi Arabia	0.64	0.83	-78
Slovakia	1.98	22.8	-32
Slovenia	2.42	166	-17
Sri Lanka	1.41	48.3	-51
Ukraine	1.36	2.50	-53
UAE	0.67	0.84	-77
Uruguay	1.00	10.3	-65

*At current exchange rates †Purchasing-power parity ‡Average of New York, Chicago, San Francisco and Atlanta
§Dollars per pound **Weighted average of member countries ††Dollars per euro

Sources: McDonald's; *The Economist*