

### Problem Set 1

Due *in lecture* on ~~Monday, 28 September~~ Wednesday, 30 September.

**1. Balance of payments identities.** Recalling the balance of payments identity,  $CA + FA + ORT \equiv 0$ , answer the following questions.

1.1 If  $CA > 0$  and the central bank is neither accumulating nor decumulating foreign exchange reserves, what must be true about private capital inflows?

1.2 If a country maintains a pegged exchange rate and runs a balance of payments surplus, then what must be true about  $ORT$ ? Explain what this means in words.

1.3 From the Chinese perspective, if the Chinese central bank is purchasing U.S. securities (T-bills, corporate bonds and stocks) and the U.S. central bank is purchasing no Chinese securities, then what is the value of  $KA$  (Ignore direct investment for purposes of this question)? What is the value of  $ORT$ ?

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1.4 Calculate  $FA$  for 2014, using the data in Economic Indicators, "U.S. International Transactions".

1.5 Identify  $ORT$  for 2014.

**2. The foreign exchange market.** Using a supply and demand diagram, and defining the US as the home country and either the Philippines or Japan as the foreign, show what happens in the following situations (assuming a flexible exchange rate regime).

2.1 US demand for Japanese autos increases.

2.2 Japanese demand for American real estate decreases.

2.3 Remittances from Filipino citizens in the U.S. back to the Philippines increases (use a graph of the USD/Philippine Peso market)

Using the Table reproduced from the *Economist* (September 19<sup>th</sup> edition, <http://www.economist.com/news/economic-and-financial-indicators/21664945-trade-exchange-rates-budget-balances-and-interest-rates>), answer the following questions. **Show your work, and "box in" your answers.**

2.4 Has the US dollar (USD) appreciated or depreciated against the euro over the past year? By what amount has the USD appreciated/depreciated, in percentage terms? Specify whether you are using the exact formula or a log approximation.

2.5 How many US dollars does it take to buy a single Canadian dollar (CAD) now? How many did it take a year ago? Has the US dollar appreciated or depreciated?

2.6 What is the exchange rate of UK pounds (GBP) for Canadian dollars (CAD) (i.e., how many British pounds does it take to purchase a single Canadian dollar)?

## Trade, exchange rates, budget balances and interest rates

	Trade balance		Current-account balance		Currency units, per \$		Budget balance		Interest rates	
	latest 12 months, \$bn	latest 12 months, \$bn	% of GDP 2015 <sup>1</sup>	Sep 16th	year ago	% of GDP 2015 <sup>1</sup>	3-month latest	10-year gov't bonds, latest		
United States	-750.8 Jul	-406.4 Q1	-2.6	-	-	-2.6	0.33	2.23		
China	+546.6 Aug	+291.4 Q2	+3.0	6.37	6.15	-2.7	3.13	3.18 <sup>5*</sup>		
Japan	-31.2 Jul	+107.8 Jul	+2.7	121	107	-6.8	0.08	0.38		
Britain	-187.5 Jul	-180.5 Q1	-4.8	0.65	0.61	-4.4	0.57	1.88		
Canada	-12.9 Jul	-48.5 Q2	-2.9	1.32	1.10	-1.8	0.73	1.60		
Euro area	+283.8 Jul	+317.6 Jun	+2.6	0.89	0.77	-2.1	-0.04	0.78		
Austria	-1.2 Jun	+6.5 Q1	+1.4	0.89	0.77	-2.1	-0.04	1.03		
Belgium	+20.6 Jul	+12.1 Mar	+1.7	0.89	0.77	-2.6	-0.04	1.14		
France	-55.0 Jul <sup>†</sup>	-6.0 Jul <sup>†</sup>	-0.7	0.89	0.77	-4.1	-0.04	1.14		
Germany	+285.8 Jul	+280.5 Jul	+7.6	0.89	0.77	+0.7	-0.04	0.78		
Greece	-19.1 Jun	+2.1 Jun	+2.6	0.89	0.77	-3.8	-0.04	8.75		
Italy	+53.5 Jun	+45.6 Jun	+2.0	0.89	0.77	-2.9	-0.04	1.92		
Netherlands	+62.7 Jul	+91.4 Q1	+9.2	0.89	0.77	-1.8	-0.04	0.92		
Spain	-29.1 Jun	+15.8 Jun	+0.8	0.89	0.77	-4.4	-0.04	2.13		
Czech Republic	+19.0 Jul	+2.4 Q2	-0.1	24.0	21.2	-1.8	0.31	0.85		
Denmark	+10.3 Jul	+21.1 Jul	+6.8	6.61	5.75	-2.9	nil	1.06		
Hungary	+8.8 Jul	+6.0 Q1	+4.6	276	242	-2.6	1.36	3.58		
Norway	+35.9 Aug	+37.8 Q2	+9.3	8.15	6.40	+6.0	1.18	1.61		
Poland	-0.8 Jul	-1.8 Jul	-1.4	3.72	3.23	-1.5	1.52	3.06		
Russia	+169.8 Jul	+68.7 Q2	+4.9	65.5	38.4	-2.8	12.8	11.2		
Sweden	+2.4 Jul	+35.1 Q2	+6.5	8.26	7.12	-1.2	-0.29	0.77		
Switzerland	+35.2 Jul	+53.6 Q1	+7.2	0.97	0.93	+0.2	-0.73	0.01		
Turkey	-75.3 Aug	-45.0 Jul	-4.7	3.00	2.20	-1.6	12.0	10.7		
Australia	-3.0 Jul	-47.4 Q2	-3.2	1.39	1.10	-2.4	2.36	2.80		
Hong Kong	-66.5 Jul	+5.9 Q1	+2.8	7.75	7.75	nil	0.40	1.77		
India	-137.4 Aug	-25.9 Q2	-1.2	66.2	61.0	-4.1	7.48	7.76		
Indonesia	+5.7 Aug	-21.6 Q2	-2.4	14,396	11,995	-2.0	7.76	8.89		
Malaysia	+22.5 Jul	+8.8 Q2	+3.4	4.25	3.23	-4.1	3.73	4.18		
Pakistan	-21.9 Aug	-2.2 Q2	-0.6	104	103	-5.1	6.56	9.00 <sup>11††</sup>		
Singapore	+53.2 Aug	+69.5 Q2	+21.3	1.40	1.26	-0.7	na	2.85		
South Korea	+79.0 Aug	+104.3 Jul	+7.8	1,170	1,037	+0.4	1.55	2.27		
Taiwan	+15.5 Aug	+72.8 Q2	+12.8	32.4	30.2	-1.1	0.94	1.25		
Thailand	+5.1 Jul	+20.8 Q2	+2.4	35.9	32.2	-2.0	1.55	2.98		
Argentina	+3.9 Jul	-6.0 Q1	-1.4	9.38	8.40	-3.3	23.1	na		
Brazil	+3.0 Aug	-89.4 Jul	-4.1	3.83	2.33	-5.8	14.3	15.2		
Chile	+7.6 Aug	-0.3 Q2	-1.3	677	592	-2.0	0.44	4.67		
Colombia	-14.6 Jun	-20.7 Q1	-6.6	2,967	1,974	-2.1	4.40	7.88		
Mexico	-7.9 Jul	-25.3 Q2	-2.5	16.6	13.2	-3.4	3.35	6.13		
Venezuela	-36.2 Oct	+10.3 Q3	-1.8	6.30	6.35	-16.5	16.0	10.5		
Egypt	-43.8 Jun	-12.2 Q2	-1.4	7.83	7.15	-11.0	11.6	na		
Israel	-9.8 Aug	+11.7 Q1	+4.8	3.86	3.64	-2.9	0.09	2.43		
Saudi Arabia	+168.4 2014	+39.7 Q1	-2.4	3.75	3.75	-12.1	0.89	na		
South Africa	-5.8 Jul	-15.6 Q2	-5.1	13.3	10.9	-3.8	6.31	8.46		
Estonia	-1.7 Jul	+0.6 Jul	-0.5	0.89	0.77	-0.1	-0.04	na		
Finland	+0.2 Jul	+1.2 Jul	-0.6	0.89	0.77	-2.4	-0.04	1.03		
Iceland	nil Aug	+0.8 Q2	+2.0	na	na	+0.2	6.40	na		
Ireland	+47.9 Jul	+12.0 Q2	+6.8	0.89	0.77	-2.6	-0.04	1.38		
Latvia	-2.8 Jul	-0.4 Jul	-2.7	0.89	0.77	-1.2	-0.04	na		
Lithuania	-2.6 Jul	nil Q1	-1.6	0.89	0.77	-1.8	-0.04	1.65		
Luxembourg	-8.0 Jun	+3.8 Q1	+4.2	0.89	0.77	-0.4	-0.04	na		
New Zealand	-2.1 Jul	-6.8 Q2	-4.8	1.57	1.22	+0.1	2.83	3.35		
Peru	-2.4 Jul	-7.1 Q2	-4.6	3.20	2.86	-0.4	1.20	na		
Philippines	-3.8 Jun	+14.5 Mar	+4.1	46.5	44.2	-1.9	1.38	3.77		
Portugal	-12.4 Jul	+1.6 Jun	+0.8	0.89	0.77	-3.0	-0.04	2.75		
Slovakia	+4.9 Jul	-0.7 Jun	nil	0.89	0.77	-2.6	-0.04	0.46		
Slovenia	nil Jun	+3.2 Jul	+4.1	0.89	0.77	-3.5	-0.04	na		
Ukraine	+0.2 Jul	-2.8 Q2	-2.3	na	na	-3.1	27.0	na		
Vietnam	-4.8 Aug	+8.9 2014	+2.7	na	na	-4.2	4.60	7.05		

Source: Haver Analytics. <sup>1</sup>The Economist poll or Economist Intelligence Unit estimate/forecast. <sup>†</sup>New series. <sup>5\*</sup>5-year yield. <sup>11††</sup>Dollar-denominated bonds.

### 3. Elasticities approach.

3.1 Suppose that each one percent depreciation in the US dollar induces a 0.70 increase in exports and a 0.25 decrease in imports. Starting from a position where exports equals imports, what will be the impact on the trade balance?

3.2 Suppose the US experiences the exchange rate depreciation while running a large trade surplus. What will happen to the trade balance?

3.3 Suppose that instead of the elasticities being constant, they are smaller in the short run, and larger in the long run. What is the time path of the trade balance over time (starting from initial balance)?

### 4. Equilibrium income and multipliers. Consider the following model of the economy:

<u>Eq.No.</u>	<u>Equation</u>	<u>Description</u>
(1)	$Y = AD$	Output equals aggregate demand, an equilibrium condition
(2)	$AD \equiv C + I + G + X - IM$	Definition of aggregate demand
(3)	$C = \bar{C} + c(Y - T + TR)$	Consumption function, $c$ is the MPC
(4)	$T = \bar{T} + tY$	Tax function; $\bar{T}$ is lump sum taxes, $t$ is tax rate
(5)	$TR = \bar{TR}$	Transfers function
(6)	$I = \bar{I}$	Investment function
(7)	$G = \bar{G}$	Government spending on goods and services
(9)	$X = \bar{X}$	Export spending
(10)	$IM = \bar{IM} + mY$	Import spending

There is no real exchange rate effect now because the real exchange rate is assumed constant (and so its effect is subsumed into the constant in (9) and (10)). **In your answers to the questions below, show your work, and “box in” your answers.**

4.1 Solve for  $Y$ , setting  $\bar{A} \equiv \bar{C} + \bar{I} + \bar{G} + c(\bar{TR} - \bar{T})$ .

4.2 Calculate the change in income for a given change in lump sum transfers.

4.3 Show what the multiplier is for a change in lump sum transfers.

4.4 Calculate the change in income for a given change in government spending.

4.5 Calculate the change in the trade balance for a given change in lump sum transfers. Hint:  $TB \equiv X - IM$ , so  $\Delta TB = \Delta X - \Delta IM - m\Delta Y$ .

4.6 Solve for a change in the budget surplus resulting from the change in lump sum transfers, recalling your answer to 4.3.

4.7 Suppose autonomous exports increase. Show what the implications for the trade balance and the budget balance. Do they move in the same or different directions?

## 5. Expenditure Switching/Expenditure Reduction

Suppose equations (9) and (10) in the above model were altered to:

$$(7) \quad X = \bar{X} + vq \quad \text{Export spending}$$

$$(8) \quad IM = \bar{IM} + mY - nq \quad \text{Import spending}$$

5.1 Solve for equilibrium income. What is the government spending multiplier in this model?

5.2 Solve for the multiplier for a given unit exchange rate devaluation.

5.3 (optional) In order to improve the trade balance by \$1 billion, what would have to happen to government spending on goods and services; alternatively, what would have to happen to the real exchange rate?