

Homework 3: Solutions
Principles of Macroeconomics: ECO 212

Question 1.

- a. • We have:

$$e = \frac{3.15 \frac{\$}{\text{US MAC}} \cdot 3.08 \frac{\text{Pesos}}{\$1}}{4.77 \frac{\text{Pesos}}{\text{Argentinian MAC}}} = 2.03 \frac{\text{Argentinian MACs}}{\text{US MAC}} \quad (1)$$

Apparently, one US Big Mac buys about two Big Macs in Argentina. We instead might expect that a US Big Mac is equivalent to an Argentinian Big Mac since Big Macs are the same across countries ($e = 1$). For $e = 1$, we must have $E \downarrow$. That is, the US dollar is overvalued. One Big Mac is exchanged for \$3.15, but \$3.15 buys too many Pesos and thus too many Argentinian Macs.

- For Brazil $e = \frac{\$3.15 \cdot 2.16}{5.92} = 1.15$ Brazilian Big Macs per US Mac. So the US dollar is slightly overvalued relative to the Real.
 - For Europe $e = 0.90$ so the dollar is undervalued.
 - For Denmark, $e = 0.70$, so the dollar is undervalued relative to the Kroner.
 - For South Korea, $e = 1.23$, so the dollar is over valued.
 - For China, $e = 2.42$, so the dollar is by far the most over valued in China.
 - For the US $= e = 1$, so the dollar is neither under nor over valued versus the dollar.
- b. • The trick is to keep track of the units. We want to end up with dollars per foreign Big Mac so for Argentina:

$$\frac{P^f}{E} = \frac{4.77 \frac{\text{Pesos}}{\text{Argentinian MAC}}}{3.08 \frac{\text{Pesos}}{\$1}} = 1.55 \frac{\$}{\text{Argentinian MAC}} \quad (2)$$

So a Big Mac in Argentina costs \$1.55, less than half the price in the US.

- Similarly, a big Mac in Brazil costs \$2.74.
 - A big Mac in Europe costs \$3.51.
 - A big Mac is most expensive in Denmark, the cost being \$4.49.
 - A big Mac in South Korea costs \$2.56.
 - A big Mac in China costs only \$1.30. Therefore, China is the cheapest place to visit.
 - A big Mac in the US costs \$2.80.
- c. As seen in Part (a), the dollar is over valued relative to the currencies of Argentina, Brazil, South Korea, and China. The dollar is under valued relative to the Euro and Kroner. The dollar is neither over valued or under valued relative to the dollar.

- d. • If PPP holds, then $e = 1$, and we are looking for P^f the local price. Thus:

$$e = 1 = \frac{3.15 \frac{\$}{\text{MAC}} \cdot 3.08 \frac{\text{Pesos}}{\$1}}{P^f \frac{\text{Pesos}}{\text{MAC}}} \quad (3)$$

$$P^f = 3.15 \frac{\$}{\text{MAC}} \cdot 3.08 \frac{\text{Pesos}}{\$1} = 9.70 \frac{\text{Pesos}}{\text{MAC}} \quad (4)$$

If $e = 1$, then a Big Mac in Argentina would cost 9.70 Pesos. Note the unit change: since Big Macs are identical under PPP, an Argentinian Big Mac and a US Big Mac are the same Mac.

- For Brazil $P^f = 3.15 \cdot 2.16 = 6.80$ Real for a Big Mac.
 - For Europe $P^f = 3.15 \cdot 0.84 = 2.65$ Euro per Big Mac.
 - For Denmark $P^f = 3.15 \cdot 6.26 = 19.72$ Kroner per Big Mac.
 - For South Korea, $P^f = 3.15 \cdot 993.3 = 3,128.90$ Won per Big Mac.
 - For China, $P^f = 3.15 \cdot 8.05 = 25.36$ Yuan per Big Mac.
 - For the US $P^f = 3.15$ Dollars per Big Mac.
- e. From part (b), the dollar is most over valued against the Yuan. Hence the Yuan is very under valued versus the dollar. This makes US imports from China very cheap (tourism in China is a US import, for example) and exports to China are very expensive. This supports the claim made by the politicians. However, it is not clear if the dollar is over valued due to manipulations by China or by other factors. For example, it may be that China finds the US an attractive place to invest, especially the safe US tbills and other government debt issued by the US. Demand for US dollars by China may be increasing the value of the dollar. The cause of the over valued dollar would then be the US issuing too much debt.

Question 2

- a. Recall:

$$NFI = \text{Net Exports} = S - I = \$750 - \$800 = -\$50 \text{ Billion} \quad (5)$$

Next capital outflows are given as \$25 Billion. Therefore:

$$NFI = \text{outflows} - \text{inflows} \quad (6)$$

$$-\$50 = \$25 - \text{inflows} \Rightarrow \text{inflows} = \$75 \text{ Billion} \quad (7)$$

- b. Since net exports equals NFI , net exports are $-\$50$ Billion. The problem gives imports as $\$75$ Billion. Therefore:

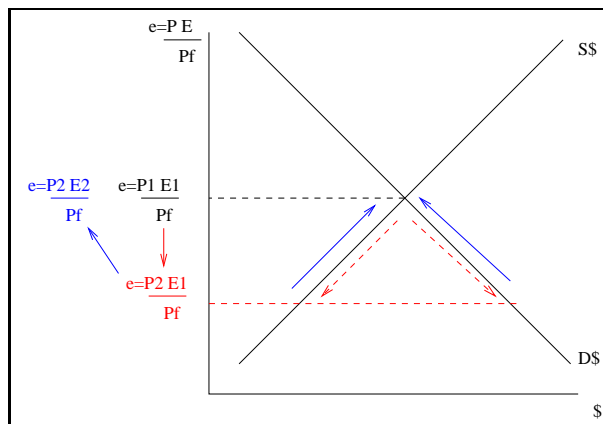
$$\text{Net Exports} = X - M \tag{8}$$

$$-\$50 = X - \$75 \Rightarrow M = \$75 \text{ Billion} \tag{9}$$

- c. Net exports are negative, which is a trade deficit. Apparently, $\$50$ Billion in US assets are being exchanged for $\$50$ Billion of US imports.

Question 3.

US deflation means P is falling. Since US goods are becoming less expensive, both to foreign and US consumers, e falls. A US good buys less foreign goods. To restore $e = 1$, or purchasing power parity, E must rise, which increases the value of the dollar, as shown on the graph below.



Question 4.

The Catch-up hypothesis states that poor countries grow faster than rich countries. Since poor countries have a relative abundance of labor and little capital, wages are low since so many idle workers are available. Therefore, capital and FDI have an incentive to locate in poor countries, where the labor is cheap. Thus poor countries tend to grow relatively fast. Catch-up seems to hold in countries that are similar except for the size of the capital stock, for example US states after the Civil War (the South grew faster) and Japan after WWII grew faster than the US.

Question 5.

The average rate of technical change in the 1980's was:

$$2 = \frac{1}{3}2 + \Delta T \Rightarrow \Delta T = 1.33\% \tag{10}$$

In the 1990's technical change was:

$$4 = \frac{1}{3}3 + \Delta T \Rightarrow \Delta T = 3\% \quad (11)$$

The contribution of technology was for the 1990s:

$$\text{contribution} = \frac{3\%}{4\%} = 75\% \quad (12)$$

Although both capital per worker and technology increased by 3%, technology has a much higher weight as a source of economic growth (1 versus 1/3). Thus technological change explains most of the growth in the 1990s.

Further, almost all of the increase in the growth rate of GDP from the 1980s to the 1990s is due to technological change. We experienced a 2% increase in productivity, a 1% increase in capital per worker, and a $\frac{5}{3}\%$ increase in technology. Thus $\frac{5}{3}$ of the total $\frac{6}{3}$ productivity growth, or $\frac{5}{6}$ of the increase is due to the increase in technical change.