Global Economy
Final Exam: SOLUTIONS

Part I:

1. If we excluded foreign produced goods and services from consumption expenditures by domestic households, investment expenditures by domestic firms, and expenditures by domestic governments, then the sum of these net expenditures would equal gross domestic product.

   The basic national income accounting identity states that GDP is the sum of consumption, investment, government spending and net exports:

   $$Y = C + I + G + X - M$$

   If we net out imports from total expenditures by households, firms and governments the sum would be equal to C + I + G - M. Therefore the accounting identity says that this will not be equal to GDP, but rather it must be equal to GDP plus total exports, Y + X.

2. The Cobb-Douglas production function implies that if both the capital-labor ratio and TFP are constant over time, then per capita GDP will also be constant.

   Per capita GDP is equal to GDP per worker times the fraction of the population that participates in the labor force: Y/Pop = (Y/L)(L/Pop). If output derives from a Cobb-Douglas production function, then Y/L will indeed be constant when both TFP and the ratio of capital to labor are constant over time, since it implies $Y/L = A (K/L)^{1/3}$. Nonetheless, this does not guarantee that L/Pop will be constant over time, hence per capital GDP could still change as a result.

3. Since capital and labor are substitutes in production, an increase in the capital stock, other things equal, will reduce the demand for labor.

   Since profit maximizing firms will hire labor up to the point where the real wage is equal to the marginal productivity of labor, we can think of the marginal productivity of labor as the demand for labor. Diminishing marginal productivity implies that holding TFP and the capital stock fixed, the demand for labor is a decreasing function of the real wage. On the other hand, holding labor fixed, any change that increases the marginal product of labor will appear as an increase in the demand for labor. Both TFP and the capital stock have this feature: when either TFP or the size of the capital stock increases, the marginal productivity of labor increases. Therefore, an increase in the capital stock will increase the demand for labor.

4. Movements in financial market prices tend to lag behind the business cycle as investors slowly respond to changes in the current economic environment.

Since financial assets are claims to future cash flows, their current market prices are driven by expectations about the future. Since future business cycles are an important factor in determining these future cash flows, the current market prices of financial assets respond to expectations of future business cycles. In other words, financial market prices lead the business cycle, the do not lag the business cycle.

5. To maintain stable prices, the Fed should respond to a temporary decrease in TFP by temporarily increasing the money supply.

   The quantity theory with a constant velocity would imply that a decrease in TFP would lower output, hence, would lead to higher prices if the money supply remained constant. To maintain stable prices, the Fed would have to lower the money supply to accommodate the decrease in TFP. The AS-AD model predicts exactly the same thing. A temporary decrease in TFP would shift the AS curve to the left, but leave the AD curve unchanged, hence, would lead to higher prices (and lower output). If the Fed accommodated this shock by lowering the money supply, it would shift the AD curve to the left which would maintain stable prices.

6. A sovereign government that has difficulty borrowing can always costlessly create more money to finance its spending.

   A government that finances it's spending through money creation effectively de-couples the supply of money in its economy from the need for money to facility trade. The consequence of this is inflation or even hyperinflation. Therefore, since inflation is costly, eg, it makes routine business transactions very difficult to execute, this form of government finance may be feasible, but it is not costless.

7. The Taylor rule creates stable inflation by allowing the monetary authority substantial discretion over future monetary policy.

   The value of the Taylor rule for creating stable inflation is precisely because it is a rule that will be followed without discretion in the future. The Taylor rule requires the Fed to set a short-term nominal interest rate that depends on the current inflation rate, whereas private bond traders will be concerned with the expected future inflation rate. Therefore, the Taylor rule makes the current inflation rate a function of the expected future inflation rate. By committing to the rule in the future as well as the present, bond traders know how future inflation rates will be determined, which creates stable inflation.

8. If capital and labor income are taxed at a comparable rate, lowering labor income taxes and replacing the lost revenue by raising capital income taxes will improve economic efficiency.

Taxes drive a wedge between the price buyers pay and the price that sellers receive. Some of this wedge is the tax that is collected, but some of it is simply a loss in efficiency (ie, lower consumer and producer surplus). Since this efficiency loss grows faster than the tax rate, placing a high tax on a few good is more inefficient that placing a low tax on a large number of goods. Therefore, taxing capital more heavily than labor will increase the inefficiency in capital markets at a faster rate than the efficiency gain from a lower tax rate in labor markets, hence, it will lead to an increase in economic inefficiency.

9. The ratio of government debt to nominal GDP will remain constant provided the government doesn't run a deficit.

   The current ratio of debt to GDP will depend on last period's ratio of debt to GDP and the ratio of the current deficit to GDP. However, the effect of last periods debt to GDP ratio will depend on both the nominal interest paid on the debt and the rate of growth of nominal GDP. Even if the deficit is zero, a nominal interest rate greater than the growth rate of nominal GDP will cause the debt to GDP ratio to grow (and vice versa).

10. When nominal interest rates in a foreign country are substantially larger than domestic nominal interest rates, uncovered interest-rate parity predicts that the domestic currency will lose value relative to the foreign currency.

    Uncovered interest rate parity says that a nominal interest rate in one country that is bigger than a nominal interest rate in another country is a reflection of investors expectation that the high-interest rate currency will depreciate in value relative to the low-interest rate currency so that the expected profit from borrowing at the low interest rate and lending at the high interest rate would be zero. In other words, the theory predicts that the domestic currency in this example will gain value relative to the foreign currency.

Part II:

1. Between 1963 and 2008, Israel and Turkey had very similar growth experiences: average annual growth in per capita GDP was 2.47% in Israel and 2.35% in Turkey (all growth rates are continuously compounded). Both countries had substantial growth in productivity: average annual growth in TFP was 1.35% in Israel and 1.58% in Turkey. However there was a substantial cross-country difference in the growth in labor force participation: the labor force as a fraction of the population had an average growth of 0.52% in Israel, but fell in Turkey at an average rate of 0.79% per year.

a. If output in both countries conforms to a Cobb-Douglas production function, and the income share of capital in each country is 1/3, how can you account for similar output growth experiences with such different labor participation experiences? Use the Cobb-Douglas production function to quantify this difference. (20 points)

Standard growth accounting based on the Cobb-Douglas production function:

Growth in GDP = (Growth in TFP) + (Growth in L/Pop)+ (1/3)(Growth in K/L)

For Israel, the numbers imply

2.47% = 1.35% + 0.52% + 0.60%

For Turkey, the numbers imply

2.35% = 1.58% - 0.79% + 1.55%

Growth in TFP across the two countries was similar, however, the decline in labor participation was offset by a faster growth rate of K/L than in Israel (ie, 1.55% compared to 0.60%).

b. If TFP in Turkey was not really changing, but rather the measured growth in TFP was a reflection of increases in average human capital, at what rate must average human capital have increased over this period? If actual TFP in Turkey was growing at the same average rate as it was in Israel, what would the average growth in human capital in have been? (10 points)

Human capital scales the labor input in the production function resulting in the following growth accounting relationship:

Growth in GDP = (Growth in TFP) + (Growth in L/Pop)+ (1/3)(Growth in K/L)
+(2/3)(Growth in Human Capital)

If the growth rate of TFP was actually zero, then the contribution of human capital must have been 1.58%, so that the growth in human capital was (3/2)(1.58) = 2.37% per year on average.

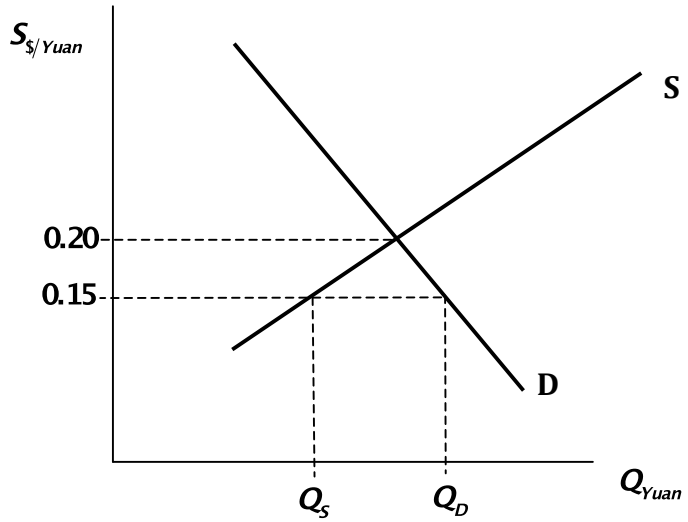
If the growth rate of TFP in Turkey had been the same as Israel, ie, 1.35%, then the contribution of human capital in Turkey would have made this look like 1.58%. In other words, human capital growth at a rate equal to (3/2)(1.58-1.35) = 0.345%.

2. Currently, the Chinese Yuan price of a US dollar is around 6.36. Suppose that the equilibrium price that would prevail if the Yuan were allowed to float is 5 Yuan per US dollar.

a. Sketch supply and demand curves for the Yuan on the axis below. The vertical axis is the US dollar price of a Yuan, $S_{\$/Yuan}$, and the horizontal axis is the quantity of Yuan, Q_{Yuan}. Label the floating price of the Yuan and fixed price

of the Yuan on the graph. Further, label the amount of Yuan supplied and the amount of Yuan demanded at the fixed exchange rate. (5 points)

The fixed price of 6.50 yuan per dollar is equivalent to a price of 0.15 dollars per yuan (which is what is being graphed). Likewise, the floating price of 5.00 yuan per dollar is equivalent to a price of 0.20 dollars per yuan. Since the fixed price is below the equilibrium price, the quantity of yuan demanded must be greater than the quantity supplied.



b. How can the People's Bank of China keep the exchange rate fixed at this rate? What will happen to the level of foreign reserves held by the bank? (10 points)

To prevent market forces from driving up the dollar price of yuan, the People's Bank of China must buy dollars and sell Yuan to make up the excess demand for yuan at the fixed exchange rate. In so doing, they will be increasing the supply of yuan and adding to US dollar reserves, therefore, increasing foreign reserves held by the Bank.

c. What would you expect to happen to the price level in China? Why might we not be seeing this currently? (5 points)

The quantity theory predicts that if velocity and output are constant, increasing the money supply will lead to increases in the price level. There are two reasons why we might not be seeing this now. Firstly, output is not constant in China. The Chinese economy continues to grow rapidly, so that new money is needed to facility transactions without increasing prices. Secondly, the People's Bank of China is increasing reserve requirements on Chinese banks, and engages in open market purchases of securities, which prevents a lot of the new money from circulating and effectively lowering the money supply. In addition, many prices in China are still fixed by government

planners and do not quickly adjust to market conditions, so rather than average prices increasing, the prices of goods that are allowed to fluctuate increase a lot, eg, real estate.

d. What would you expect to happen to interest rates in China if the People's Bank of China stopped intervening to keep the Yuan below its equilibrium level? Why? What would happen to the exchange rate if at the same time China stopped it's foreign exchange intervention, it also eliminated its strict capital controls? (10 points)

Unless the People's Bank of China purchased other assets, reduced dollar purchases would slow the increase in the supply of Yuan and thereby increase interest rates in China. The effect would be to dampen inflation. On the other hand, if capital controls were lifted at the same time, then private investors would likely increase their levels of foreign asset purchases, which would increase the supply of Yuan and the demand for dollars, perhaps even enough to replicate the earlier intervention, leaving the value of the Yuan and domestic interest rates relatively constant.