PC7 - Corrected

Exercise #1

1) Dollar-denominated assets: $$X_t = \alpha W_t + (1-\alpha^*)\frac{W_t^*}{E_t} \qquad \text{(XX)}$$

Foreign-currency denominated assets: $$\frac{X_t^*}{E_t} = (1-\alpha)W_t + \alpha^* \frac{W_t^*}{E_t} \qquad \text{(XX)*}$$

(XX) can also be written: $$(1-\alpha)X_t = (1-\alpha-\alpha^*)F_t + (1-\alpha^*)\frac{X_t^*}{E_t}$$

(XX)* can also be written: $$(1-\alpha^*)\frac{X_t^*}{E_t} = (\alpha+\alpha^*-1)F_t + (1-\alpha)X_t$$

The two equations are identical, which confirms Walras law: in a two-asset world, clearing of one market implies clearing of the other market.

Solving for E_t and W_t yield: $$E_t = \frac{(1-\alpha^*)X_t^*}{(1-\alpha)X_t + (\alpha+\alpha^*-1)F_t}$$

Implications:
- A higher external debt F drags the dollar downward because it makes dollar assets-biased US residents poorer;
- A larger supply of dollar assets X also drags the dollar downward because absent portfolio reallocation, US demand is no longer enough to match supply;
- A larger supply of foreign-denominated assets has an opposite effect.

2) We have seen in (1) that $F_t = X_t - W_t$. Substitute X_t by its value derived from (XX) :

$$F_t = (\alpha-1)W_t + (1-\alpha^*)\frac{W_t^*}{E_t}$$

External debt is the difference between non-US held dollar assets and US-held forex assets:

$$F_{t-1} = (\alpha-1)W_{t-1} + (1-\alpha^*)\frac{W_{t-1}^*}{E_{t-1}} \qquad (3)$$

Debt at the end of period *t* results from the current-account deficit and from the evolution of previously existing debt stocks:

$$F_t = (1-\alpha^*)\frac{W_{t-1}^*}{E_{t-1}}(1+r) - (1-\alpha)W_{t-1}\frac{E_{t-1}}{E_t}(1+r^*) + D_t \qquad (4)$$

The term in E_{t-1}/E_t result from the fact that $(1-\alpha)W_{t-1}$ is denominated in foreign currency. Substituting $(1-\alpha^*)\frac{W_{t-1}^*}{E_{t-1}}$ with the value implied by (3) and substituting W_{t-1} with $X_{t-1} - F_{t-1}$ yields:

$$F_t = (1+r)F_{t-1} + D_t + (1-\alpha)\left((1+r) - (1+r^*)\frac{E_{t-1}}{E_t}\right)(X_{t-1} - F_{t-1}) \qquad \text{(BB)}$$

External debt dynamics has three components:
- Interest paid on external debt;
- Fresh debt resulting from the trade deficit;

- Revaluation of foreign-denominated assets compared to domestic ones. If foreign-denominated assets are better remunerated than dollar assets, then net external debt goes down.

  A depreciating exchange rate ($E_t < E_{t-1}$) lowers net external debt by raising the dollar value of US external assets. This effect stems from the fact that the US is indebted in its own currency. Its magnitude depends on the share $(1 - \alpha)$ of US wealth X – F invested in foreign currency.

  For foreign-currency indebted countries, the valuation effect goes the opposite way. Note that exchange rate depreciation also impacts on D_t (Marshall-Lerner condition, see Lesson #8).

3) In the steady state, equation (XX) writes: $$X = \alpha(X - F) + (1-\alpha^*)\left(\frac{X^*}{E} + F\right)$$

Or else: $$E = \frac{(1-\alpha^*)X^*}{(1-\alpha)X + (\alpha + \alpha^* - 1)F} \qquad \text{(XX)}$$

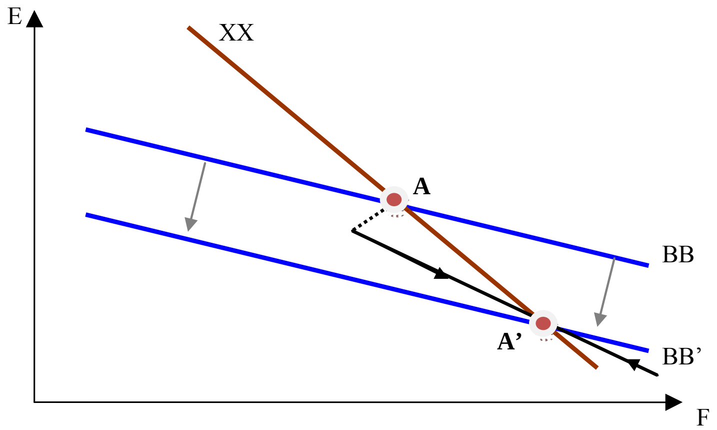
A larger US external debt implies requires the dollar to depreciate since it amounts to a transfer of wealth from the US to the rest of the world, implying a lower world demand for dollar-denominated assets (*home bias*).

With $r = r^*$, (BB) simplifies as: $$rF + D(E, z) = 0 \qquad \text{(BB)}$$

This equation simply expresses current account balance. It also implies a negative relationship between F and E. The story is the following: **a larger debt entails a higher interest cost, which widens the current-account deficit. For external debt not to rise, the trade deficit has to diminish, which requires a lower dollar.**

Here, we assume that (XX) is steeper than (BB). One explanation can be a low interest rate: a higher F does not increase the interest cost very much and therefore does not requires the trade balance to adjust a lot.

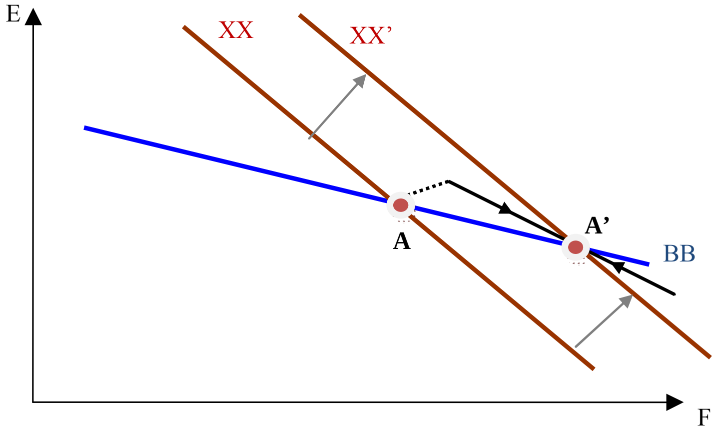
a) A stronger preference for foreign goods and services ($dz>0$) moves (BB) downwards. Equilibrium moves from A to A': the exchange rate is lower and external debt is larger. In the short run, F diminishes as a result of the value effect of the dollar depreciation, then increases along the saddle path.



<u>The trade view</u>

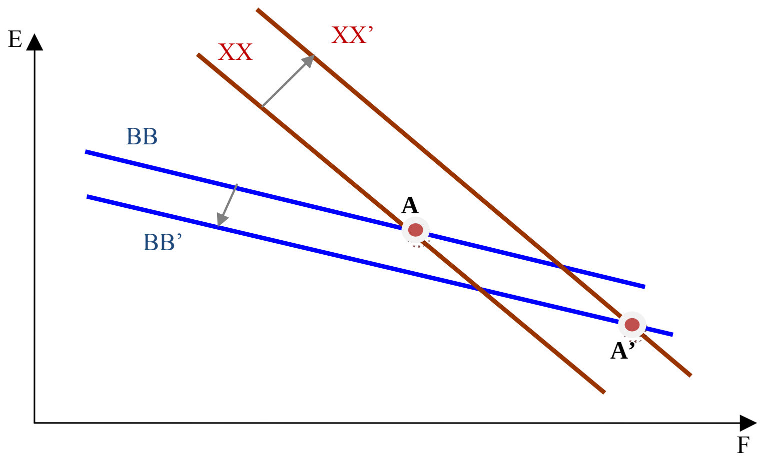
Note that we supposed here that $\partial D/\partial E$ is unambiguously positive as a result of the Marshall-Lerner condition; but this is in fact a long-run effect and in the short-run, D might depend negatively on E due to the value effect on imports. The dollar depreciation would then *revalue* imports and thus increase the trade deficit; in turn this would *increase* F through equation (BB); the net short-term effect on F would be ambiguous.

b) A stronger preference for US assets moves (EP) to the right. The outcome is also a lower exchange rate and a larger external debt. In the short run, the dollar appreciates, which increases external debt (US foreign assets are revalued). Then the dollar goes down as the interest cost increases.



<u>The financial-account view</u>

4) The Blanchard, Giavazzi and Sa model sheds light on the exchange-rate dynamics in the US by contrasting two competing views: the "trade view" and the "financial-account view":
   - The rising US external indebtedness may stem from a higher demand for non-US goods and services, or from a higher demand for dollar assets;
   - In both cases, the dollar has to depreciate in the steady state. However, short-term dynamics are very different. In the first case, the dollar depreciates immediately. In the second case, it appreciates first, triggering a current-account deficit and a larger external debt;
   - Both phenomena can occur simultaneously (see figure below). The short-term dynamics of the exchange rate is then ambiguous.



<u>A mixed scenario</u>

Exercise #2

Question 1: $profit_i = \left(P_i - \frac{W}{\pi_i} \right) L_i$

With linear demand and production functions, perfect competition means zero profit: $P_i = \frac{W_i}{\pi_i^*}$ and $P_i^* = \frac{W_i^*}{\pi_i^*}$

Question 2: Law of one price:

$$P_T = SP_T^* \Rightarrow \frac{W_T}{\pi_T} = S\frac{W_T^*}{\pi_T^*} \Rightarrow \frac{W_T}{SW_T^*} = \frac{\pi_T}{\pi_T^*}$$

If $\pi_T < \pi_T^*$ then $W < SW^*$: wages are lower than in the rest of the world as a way to offset a lower productivity in the traded sector.

Question 3: We know that: $P_N = \frac{W_N}{\pi_N}$ and $P_N^* = \frac{W_N^*}{\pi_N^*}$, thus: $\frac{P_N}{EP_N^*} = \frac{\pi_N^*}{\pi_N}\frac{W}{SW^*} = \frac{\pi_N^*}{\pi_N} \times \frac{\pi_T}{\pi_T^*}$

Question 4: $P = (P_T)^{\alpha}(P_N)^{1-\alpha}$ and $P^* = (P_T^*)^{\alpha}(P_N^*)^{1-\alpha}$

Hence: $$Q = \frac{(P_T)^{\alpha}(P_N)^{1-\alpha}}{S(P_T^*)^{\alpha}(P_N^*)^{1-\alpha}} = \left(\frac{P_T}{SP_T^*}\right)^{\alpha}\left(\frac{P_N}{SP_N^*}\right)^{1-\alpha} = \left(\frac{\pi_N^*}{\pi_N}\frac{\pi_T}{\pi_T^*}\right)^{1-\alpha} \text{ since } \frac{P_T}{SP_T^*} = 1.$$

Question 5: $Q = \left(\frac{\pi_T}{\pi_T^*}\right)^{1-\alpha} \Rightarrow \ln Q = (1-\alpha)(\ln \pi_T - \ln \pi_T^*)$

A 10% lower productivity triggers a $(1-\alpha) \times 10\%$ lower real exchange rate as compared to PPP.

Question 6: $\frac{\pi_T}{\pi_T^*} = \frac{Y_T / L_T}{Y_T^* / L_T^*} = \frac{0.6Y / 0.4L}{0.6Y^* / 0.4L^*} = \frac{Y / L}{Y^* / L^*} = 0.5$, where Y denotes GDP and L employment.

Hence a 50%-productivity gap in the traded sector. $Q = \left(\frac{\pi_T}{\pi_T^*}\right)^{1-0.6} = 0.5^{0.4} = 0.76$: the Balassa-Samuelson real exchange rate is 24% lower than PPP.

Dynamically, $\frac{dQ}{Q} = 0.4 \times \left(\frac{d\pi_T}{\pi_T} - \frac{d\pi_T^*}{\pi_T^*}\right) = 0.4 * 7\% = 2.8\%$: the real exchange rate should appreciate by 2.8% per year.

If the nominal exchange rate is fixed, then inflation has to be 2.8% higher in Latvia than in the Eurozone … which contradicts another Maastricht criterion. Practically, inflation was 15.3% in Latvia and 3.3% in the Eurozone in 2008 even though the lat has been pegged since 2005 at 0.7 lat per euro.