Net exports and equilibrium GDP

Assume that net exports are independent of the level of GDP and can be either positive, negative, or zero. In this case, equilibrium GDP can be written as $Y_e = C + I_g + X_n = a + bY_e + I_g + X_n$. Solving for Y_e we obtain: $Y_e = \left(\frac{1}{1-b}\right) \cdot (a + I_g + X_n)$. We note that investment and net exports enter the solution in a like fashion. As with investment, positive net exports increase equilibrium GDP while negative net exports decrease it. Likewise, we see from inspection that $\frac{\Delta Y_e}{\Delta X_n} = \left(\frac{1}{1-b}\right)$, which was previously identified as the "multiplier."

More generally, X_n is a function of prosperity abroad, or foreign incomes (Y_f), foreign tariffs on U.S. exports (t), and the international exchange value of the dollar ($P_\$$), $X_n = X_n(Y_f, t, P_\$)$. Increased prosperity abroad, lower foreign tariffs,[1] and a lower international value of the dollar all increase net exports. That is, $\frac{\partial X_n}{\partial Y_f} > 0$, $\frac{\partial X_n}{\partial t} < 0$, and $\frac{\partial X_n}{\partial P_\$} < 0$.

Substituting $X_n = X_n(Y_f, t, P_\$)$ into the relationship for Y_e we obtain a more complete picture of equilibrium GDP. $Y_e = \left(\frac{1}{1-b}\right) \cdot (a + I_g + X_n(Y_f, t, P_\$))$. Using the function of a function rule, we can differentiate Y_e with respect to foreign incomes, tariffs, and the exchange rate to obtain the following results:

$$\frac{\partial Y_e}{\partial Y_f} = \left(\frac{1}{1-b}\right) \cdot \frac{\partial X_n}{\partial Y_f} > 0$$

$$\frac{\partial Y_e}{\partial t} = \left(\frac{1}{1-b}\right) \cdot \frac{\partial X_n}{\partial t} < 0$$

$$\frac{\partial Y_e}{\partial P_\$} = \left(\frac{1}{1-b}\right) \cdot \frac{\partial X_n}{\partial P_\$} < 0$$

That is, to find how any of these determinants of net exports affect GDP, first determine the impact on net exports of changes in foreign income, tariffs, or the exchange rate. Then multiply that change in net exports by the multiplier to calculate the effect on equilibrium GDP. The signs on these derivatives indicate that higher foreign incomes, lower taxes, or a lower international value of the dollar (dollar depreciation) will raise equilibrium GDP, all else equal.

[1] This assumes that the U.S. does not impose retaliatory tariffs on its imported goods. If it does, the impact of foreign tariffs on net exports is ambiguous.