Trade Deficits and Budget Constraints

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Motivated by discussions of the large and longstanding U.S. trade deficit, this note investigates the sustainability of trade deficits in a standard macroeconomic model. Suppose that a country's economy can be modeled as an infinitely-lived representative agent maximizing lifetime utility of consumption subject to the usual budget constraint. In particular,

$$\max_{\{C_t\}} \sum_{t=0}^{\infty} \left(\frac{1}{1+\rho}\right)^t U(C_t) \quad s.t. \quad \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t C_t \leq \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t Y_t \tag{1}$$

where U is the instantaneous utility function, C_t is consumption in period t, Y_t is income in period t, ρ is the time preference rate, and r is the interest rate. Importantly, the budget constraint requires that the present value of consumption cannot exceed the present value of income (i.e., wealth). For illustration, I assume that income is exogenously endowed. (Specifying dynamics of income and capital accumulation would not impact the following results.) Re-arrange the budget constraint in terms of the economy's net exports $Y_t - C_t$.

$$\sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t C_t \leq \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t Y_t \iff \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t (Y_t - C_t) \geq 0 \tag{2}$$

In this form, the budget constraint clearly expresses a "no default" condition: a trade deficit today ($Y_0 - C_0 < 0$) must be repaid by future trade surpluses of sufficient present value. In particular, a "permanent" trade deficit ($Y_t - C_t < 0$ for all t) is not feasible.

To be emphatic, trade is good! In the model, trade is welfare enhancing by allowing the country to smooth its consumption despite variations to its income. In an enhanced model production and capital, trade is also welfare enhancing by raising economic growth. Generally, the country will borrow when current income is low but future income is high. Nevertheless, the budget constraint does impose a limit on the sustainability of borrowing.

In this framework, why be concerned about today's trade deficits? The representative agent is an approximation of successive generations. Suppose that the current generation only cares about its own consumption (not the consumption of future generations) but can borrow against future generations' income. As $\rho \to \infty$, the current generation squanders the country's wealth on its own consumption so long as $U(\cdot)$ is monotonically increasing.

$$\max_{\{C_t\}} U(C_0) \quad s.t. \quad \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t C_t \leq \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t Y_t \implies C_0 = \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t Y_t \tag{3}$$

Obviously, this result is not time consistent: future generations would choose default.

To address a few immediate objections... First, in this setting, there is no analytical difference between a "trade deficit" and a "current account deficit." Use whatever name you like, but changing the name does not change the math. Second, the result holds despite the fact that a "current account deficit" necessarily implies an "capital account surplus." Much like the fact that public-sector deficits imply private-sector savings, this accounting identity does not mean that any pattern of current account deficits is sustainable. Third, while the model is stylistic, the key result only follows from the budget constraint. Incorporating (e.g.) private investment I_t, capital K_t, and government spending G_t would not change the result.

$$\sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t (Y_t(K_t) - C_t - I_t - G_t) \geq 0 \tag{4}$$