Notes on the Two Gap Model

The two gap model is an open economy Harrod-Domar model designed to show how a shortage of foreign exchange can reduce economic growth by constraining both imports and savings. It assumes but does not explain how that shortage arises but does suggest foreign aid or capital inflows can have a multiplier effect on growth and investment. Beginning with the national income identity,

\[ Y = C + I + G + X - M \]

define capital inflows as foreign savings \( F = M - X \). At times it will be convenient to write \( F \) as a share of GNP, where \( f = F/Y \) (lower case generally refers that variable as a share of \( Y \)). Since \( Y - C = S + T \) where \( S \) and \( T \) are total domestic savings and taxes respectively, we can rewrite (1) as

\[ S + (T-G) + F = I \]

which simply states that investment \( I \) must be financed by domestic private savings \( S \), public savings \( T-G \) or foreign savings (capital inflows) \( F \). Introducing the usual Keynesian savings and tax rate parameters \( S = sY, T = tY \) and using lower case for \( g \) for \( G/Y \), \( f \) for \( F/Y \) etc.

\[ ID = (s + t)Y - G + F \quad \text{or} \quad ID/Y = s + t - g + f \]

Taking capital inflows, \( F \), as exogenous, it is clear that investment \( ID \) increases dollar for dollar with \( F \). This yields the domestic savings-investment line \( ID \) shown in Figure 1 with an intercept \( (s+t)Y \) and a slope of one. Now add the crucial equation of the two gap literature, an import demand function:

\[ M = \lambda I + \alpha Y \]

where \( \lambda \) is the share of investment goods and services imported and \( \alpha \) is the share of imported intermediate inputs (e.g., oil and other raw materials) required to produce \( Y \). Using the definition \( F = M - X \) to replace \( M \) so that \( F = \lambda I + \alpha Y - X \) we can obtain the "foreign exchange constrained" investment function

\[ IF = \frac{1}{\lambda} [ F + X ] - (\alpha/\lambda)Y \quad \text{or} \quad IF/Y = \frac{1}{\lambda} [ f + x - \alpha ] \]

Clearly the slope of \( IF \) exceeds \( ID \) as long as \( \lambda < 1 \). The question of whether the intercept for \( ID \), \( (s + t)Y - G \), lies above that of \( IF : [1/\lambda] (X-\alpha Y) \). Dividing both intercepts and I as shares of \( Y \) so that the intercept of \( ID \) is \( (s + t - g) \) where \( g = G/Y \) and that of \( IF \) is \( (x-\alpha)/\lambda \). Note that the watershed value of \( x^* = \lambda (s + t - g) + \alpha \) says that exports have to cover all imports as a share of GDP. To see this more clearly set \( t = g \) so that \( x^* = \lambda s + \alpha \). If the exports share of GDP is low (ie., \( x < x^* \)), however, the economy can be foreign exchange constrained. If the export share is high (\( x > x^* \)) the investment is limited only by domestic savings. For any \( x < x^* \) there is a foreign exchange inflow \( f^* \) that effectively removes the foreign exchange constraint on investment,

\[ f^* = \frac{1}{1-(1-\lambda)} \left\{ \lambda (s + t - g) - (x - \alpha) \right\} \]

Or if the public savings is zero so that, \( t = g \), then \( f^* = \frac{1}{1-(1-\lambda)} \left\{ \lambda s + \alpha - x \right\} \).
Questions for Review:

1. The two gap model provides one explanation of how capital inflows affect economic growth. (a) use the above equations to label the intercepts in the diagram below. How does an increase in \( x \) affect \( f^* \)? (b) Suppose \( s = .25, \ g = .15, \ \lambda = .5, \ \alpha = .1, \ t = .10 \) and \( x = .15 \) what is the impact of additional dollar of foreign exchange on investment? Why does this happen? What is the "best" level of capital or aid inflows for this economy? (that is, what is \( f^* \))? Suppose no capital inflows are available (ie., \( f = 0 \)): what is the level of exports that effectively removes the foreign exchange constraint (i.e., what is \( x^* \))? (c) Ex post \( I_d = I_f \) always, so how does the foreign exchange constraint work? Use the McKinnon diagram (below) to illustrate your answer to this last question.
Additional Readings (see also GPRS pp. 132-34)


Edwards, S. and S. van Wijnbergen "Disequilibrium and Structural Adjustment"
Handbook of Development Economics Vol II (op. cit.)


Chenery H. and A. Strout (1966) "Foreign Assistance and Economic Development" America Economic Review, 56:4, 679-733. (is also Chapt. 10 of Chenery (1979)).