

CHAPTER III

THEORETICAL FRAMEWORK

3.1 Introduction

In the literature on trade, aid and development, trade and aid are viewed as important factors that affects the rate of domestic growth. A great number of alternative hypothesis explaining the beneficial effects of these relation have been put forward, yet, empirical analysis has concentrated mainly on demonstrating the existence of a positive relationship rather than ascertaining the links in the chain of causation.

In the present study, the focus is on the relationship between exports, foreign capital inflow and the rate of domestic growth. This analysis is adopting a simplified version of the two-gap model developed by Voivodas (1973).

3.2 Exports and Economic Development

In this section, two aggregative models, that is, open-economy Harrod-Domar model and two-gap model of Chenery and associates, will be discussed. Since both models are structurally similar, relationship between trade and growth in either model will be analyzed and subsequently built up individually.

Capacity output and the change in capital stock are related as follows:

$$dQ_t = \frac{1}{g} I_t, \quad (3.1)$$

Where Q_t is capacity output in period t , $I_t = dK_t$ is the change in capital stock (the time dimension of all derivatives is omitted for simplicity) and g is the incremental capital-output ratio. The underlying relationship is the production function $Q_t = (1/g) K_t$ in which it is assumed that capital and labor are employed in fixed proportion. There is always sufficient amount of labor to ensure it is not a significant constraint on output.

Savings are related to output and income under the saving function

$$S_t = sQ_t, \quad (3.2)$$

Where S is the amount of total savings and s is the average and marginal propensity to save. Equation (3.2) also ignores the effects of differences in the distribution of income between different groups in the economy, for example, government versus private.

Imports are related to output and income under a similarly simplified import function

$$M_t = mQ_t, \quad (3.3)$$

Where M is the total amount of imports of the economy and m is the average and marginal propensity to import. The same remarks of (3.2) are relevant here.

Exports are treated as exogenous variable and their growth rate is assumed to depend on the growth rate of foreign output. The foreign elasticity demand is as follows:

$$X_t = X_0 (1 + e)^t, \quad (3.4)$$

Where X is the amount of total exports and e is the given rate of growth.

The two-gap model analysis focuses on the investment function where both domestic and foreign capital goods enter in fixed proportions as follows:

$$I_t = \min (aI_t^d, bM_t^k), \quad (3.5)$$

Where I_t^d stands for domestic investment resources and M_t^k for imports of capital goods. This formulation is employed to distinguish open economy Harrod-Domar and two-gap model.

To complete the model, equilibrium conditions and identities are required. Specifically, from the national accounting relationship $Y = C + I + X - M$ (where $C = Y$

– S is the total amount of consumption while government expenditures are not treated separately), we derive the equality

$$I - S = M - X \quad (3.6)$$

The complete open economy of Harrod-Domar model could be summarized as follows:

$$dQ_t = \frac{1}{g} I_t \quad (3.1)$$

$$S_t = sQ_t \quad (3.2)$$

$$M_t = mQ_t \quad (3.3)$$

$$X_t = X_0 (1 + e)^t \quad (3.4)$$

$$I_t - S_t = M_t - X_t \quad (3.6)$$

Relationships (3.6), (3.2) and (3.3) give

$$I_t = sQ_t + mQ_t - X_t \quad (3.7)$$

Substituting (3.7) into (3.1) and divide both sides by Q_t yields

$$\frac{dQ_t}{Q_t} = \frac{1}{g} \left(s + m - \frac{X_t}{Q_t} \right) \quad (3.8)$$

Equation (3.8) states that there is a negative relationship between the growth rate of domestic output and the proportion of exports to total product. This is because, given that capital formation is the only source of growth, there is no distinction between domestic and foreign capital. Imports are also solely for consumption purposes. Hence,

exports and investment are variables competing for limited domestic resources. As a result, the growth rate of domestic product and exports are negatively related.

We now turn to the two-gap model simplified to its bare essentials:

$$dQ_t = \frac{1}{g} I_t \quad (3.1)$$

$$S_t = sQ_t \quad (3.2)$$

$$M_t = mQ_t \quad (3.3)$$

$$X_t = X_0 (1 + e)^t \quad (3.4)$$

$$I_t = \min (aI_t^d, bM_t^k) \quad (3.5)$$

$$I_t - S_t = M_t - X_t \quad (3.6)$$

$$F_t = M_t - X_t \quad (3.9)$$

$$M_t = M_t^k + M_t^c \quad (3.10)$$

$$I_t = I_t^d + M_t^k \quad (3.11)$$

Where M_t^c is the total amount of consumer goods imports in period t .

The essence of the model is that, it assumes two limits to the amount of capital formation as specified by equation (3.5). The one limit $I_t = aI_t^d$ arises when there are sufficient capital goods imports but insufficient domestically produced capital goods. Investment and growth are constrained by the limited domestic resources. The alternative limit is sufficient amount of domestic resources but insufficient amount of capital goods imports, namely $I_t = bM_t^k$. Here, investment and growth are constrained by the limitation of foreign resources.

As a result, the reduced form of the model differs according to whether the domestic or foreign resource constraint is operative. Consider when domestic constraint is operative, equation (3.5) is replaced by $I_t = aI_t^d$ and the reduced form of the model becomes:

$$\frac{dQ_t}{Q_t} = \frac{1}{g} \left(s + m - \frac{X_t}{Q_t} \right) \quad (3.12)$$

which is identical to (3.8), the reduced form of the open economy Harrod-Domar model. The implication of (3.12) is again a negative relationship between the proportion of exports to total product and its growth rate.

Consider now when the foreign resource constraint is operative. Equation (3.5) is replaced by $I_t = bM_t^k$ and the reduced form of the model becomes:

$$\frac{dQ_t}{Q_t} = \frac{1}{g} \left(\frac{X_t}{Q_t} + \frac{F_t}{Q_t} - \frac{M_t^c}{Q_t} \right) \quad (3.13)$$

because

$$M_t^k = F_t + X_t - M_t^c \quad (3.14)$$

Equation (3.13) reveals a positive relationship between the proportion of exports to total product and its growth rate, implies a positive relationship between exports and capital goods imports.

In summary, the open-economy Harrod-Domar model, the two-gap model when the domestic constraint is operative and the two-gap model when the foreign constraint is operative are derived. The first two models imply a negative relationship between the proportion of exports to total product and its rate of growth, reveal a negative relationship between exports and domestic investment. The last model reveals a positive relationship between the proportion of exports to total product and its rate of growth, implies a positive relationship between exports and capital goods imports.

3.3 Foreign Capital Inflow and Domestic Growth

The relationship between foreign capital inflow and domestic growth has been traditionally examined in the light of the two-gap model. Specifically, we have the following relationships:

$$dQ_t = \frac{1}{g} I_t \quad (3.1)$$

$$I_t = \min (aI_t^d, bM_t^k) \quad (3.5)$$

$$I_t - S_t = M_t - X_t = F_t \quad (3.6)$$

$$M_t^k = M_t - M_t^c \quad (3.10)$$

$$I_t = I_t^d + M_t^k \quad (3.11)$$

When the domestic constraint is operative, then $I_t = aI_t^d$ and the reduced form of the model becomes:

$$\frac{dQ_t}{Q_t} = \frac{a}{g} \left(\frac{S_t}{Q_t} + \frac{F_t}{Q_t} - \frac{M_t^k}{Q_t} \right) \quad (3.15)$$

which specifies positive relationship between the proportion of foreign capital inflow to total output and its rate of growth.

When the foreign constraint is operative, then $I_t = bM_t^k$ and the reduced form of the model becomes:

$$\frac{dQ_t}{Q_t} = \frac{b}{g} \left(\frac{F_t}{Q_t} + \frac{X_t}{Q_t} - \frac{M_t^c}{Q_t} \right) \quad (3.16)$$

which also specifies a positive relationship between the variables of interest.

In summary, both models show positive relationship between foreign capital inflow and growth regardless of the constraint.

3.4 Conclusion

In section 3.2, we have examined the theoretical relationship between exports and domestic growth inherent in the open-economy Harrod-Domar and two-gap models. Meanwhile, section 3.3 studies the relationship between foreign capital inflow and growth inherent in the two-gap model. Using two-gap model, both studies suggest positive relationships between exports, foreign capital inflow and economic growth.^{3.1}

^{3.1} Conclusion drawn based on we assume foreign resource is operative for both models.