Emigration and Growth: A Model for Small Developing Economies

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I. Introduction

Emigration is a common phenomenon in developing countries. Responding to the expected differences in standard of living, international and interregional migratory flows have been mainly from less developed economies to relatively more advanced ones.[1] Such population movements bring repercussions to both the sending and receiving economies, which in turn affect the growth trajectories of these economies. While these effects may be only marginal for large economies, they can be rather significant for small ones.

The problems arising from international and interregional migratory flows have been widely discussed, but the implications of these movements on economic growth have not been fully examined. In this theoretical note we focus on emigration alone, and examine its effects on the growth and development of the place of origin, which is taken to be a small developing economy. Here a

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1. While recognizing the significance of emigration due to socio-political causes, we restrict ourselves to the analysis of emigration due to economic reasons in this article.

small economy refers to one which is geographically small, and whose production is sufficiently small so that it exerts no significant influence in the world market. The economy of our interest may be a relatively backward area within a larger economic entity, or a developing country which, due to historical or other reasons, maintains close economic and cultural ties with some particular economically more advanced country or countries. In such an economy, emigration typically follows certain established pattern and via some more or less set routes to the host economies.

A small developing economy is likely to be particularly sensitive to the effects of emigration. Emigration tends to be self-breeding as migrants are joined by their dependents, relatives and friends, and it is conceivable that the growing outflow of emigrants may constitute a significant drain of its labour force and capital. However, it is also conceivable that emigration helps to ease the problem of unemployment and underemployment. Indeed Friendlander (1965) even argues that heavy emigration of Puerto Ricans to the United States during the fifties contributed significantly to the rapid growth and modernization of the country in that period. Remittances from migrants may also represent an important source of capital inflow, although empirical studies by Baucic (1972) and Abadan-Unat (1975) indicate that only a small portion of the remittances has been successfully channelled into productive investment, while the greater share has been spent on consumer goods and housing, which may have helped to fuel inflationary pressures and increase import demand (Ecevit and Zachariah (1978)).

In this paper it is argued that the net effects of emigration have to be assessed in the light of its impacts on the growth performance of the economy. Emphasis is placed on the effects of emigration on the intersectoral labour transfer process in the course of economic growth. Given the dualistic structure of most developing economies, the impacts of migratory flows on the relative growth performance between the traditional and the modern sectors are especially relevant. To analyze the relationship between emigration and sectoral growth, a two-sector model for a stylized small economy is presented here. Described by the model specifications is an economic system that features a relatively large traditional sector and a small but well-protected modern sector. Migration functions are introduced to determine the emigratory flows from the two sectors of this small economy to some "destination". The problems of remittances and capital flows are not considered in the present paper.

II. Model Features

There are some features of this model that are worth notice at the beginning. First, although some standard neoclassical assumptions are used, the model does not fall properly within the realm of neoclassical dualistic development models. In the Jorgenson (1961) and the Kelley-Williamson-Cheetham (1972) models, for example, labour is assumed to adjust to wage differentials between the traditional and modern sectors. In this model, intersectoral labour transfer is governed by the rate of employment creation in the modern sector which in turn depends on the rate of capital accumulation. The traditional sector acts as a reservoir of underemployed labour. But unlike the Lewis-Ranis-Fei model where some subsistence wage is assumed for the traditional sector, the wage rate for a traditional worker in this model is his average product. In the modern sector, employment varies such that the institutionally fixed wage rate corresponds to the marginal productivity of labour. The asymmetry in sectoral wage-setting mechanism is meant to reflect the common phenomenon of segregated labour market being witnessed in LDC's.

Secondly, the traditional-modern dichotomy of the model economy may not necessarily coincide with the conventional agriculture-industry dichotomy. In other words, the sector characterized as traditional in the model may not be agricultural, and that as modern may not be industrial. If the economy of our interest is a city, for example, then the modern sector may include civil services whereas the traditional sector may embody as constituents "the overtly unemployed, the underemployed or sporadically employed, and those who grind out a meagre existence in petty retail trades and services" (Todaro (1969), p. 139). Thus although it is assumed that all workers who cannot find jobs in the modern sector are "employed" in the traditional sector, the model should not interpreted as a full-employment model in the sense of Jorgenson and Kelley-Williamson-Cheetham.

Thirdly, there are two processes of labour transfer in the model: intersectoral labour transfer internal to the economy, and emigration of workers from both the traditional and modern sectors to some "destination" outside of the economy. As pointed out earlier, the intersectoral labour transfer process is governed by the rate of employment creation in the modern sector. The emigration process, on the other hand, is determined by the expected income differentials between the model economy which is the place of origin and the destination. This relationship between emigration

and expected income differentials is represented by the migration functions in the model. However, in contrast to the Harris-Todaro (1970) formulation and its variations (e.g., Blomqvist (1978) where some objective probabilities of finding jobs are endogenously determined, *subjective probabilities* of securing jobs at the destination are introduced in this model. As expounded elsewhere (Fan (1973)) it is argued that as far as migration decisions are concerned, the potential migrant's subjective evaluation of the job situations at the prospective destination is far more relevant than the objective reality. Migration decisions are often made based on scanty and imperfect information, illusions that grass is greener on the other side of the fence, and on the expectation that help can be sought from relatives, friends and acquintances.

III. The Model

Let there be two sectors in our hypothetical small economy, the traditional and the modern, each producing a single (composite) output. Invoking the small country assumption, prices of the outputs (P_1, P_2) are exogenously determined in the world market. In the traditional sector (Section 1) subsistence economic activities prevail. Output is assumed to be linearly related to labour alone, and labour productivity though positive, is very low. The production function can be written as

$$(1) \qquad Y_1 = f_1(L_1) = \alpha L_1$$

where Y_1 = output of Sector 1,

L_1 = labour engaged in the production of Y_1,

α = technological coefficient, a constant.

Let the wage rate for L_1 be the value of its average product. Then from (1) we have

$$(2) \qquad W_1 = \alpha P_1$$

where W_1 is the traditional wage rate which varies with P_1.[2]

In the modern sector (Sector 2), output is produced using both capital and labour. The production function, assumed to be of the Cobb-Douglas form and homogenous of degree one for simplicity, can be written as

$$(3) \qquad Y_2 = f_2(K, L_2) = K^{\beta} L_2^{(1-\beta)}$$

2. Both the production function and the wage-fixing mechanism are so specified to reflect subsistence economic activities which characterize the traditional sector.

where Y_2 = output of Sector 2,
K = capital,
L_2 = labour employed in Sector 2,
β = a constant and $0 < \beta < 1$.

Let $r = \frac{\partial Y_2}{\partial K}$ be the real rate of return on capital stock and all return be re-invested into Sector 2. Then

$$\dot{K} = rK, \tag{4}$$

where $\dot{K} = \frac{dK}{dt}$.

Assume that the wage rate in Sector 2 is held fixed institutionally at $W_2 = \overline{W}_2$, but the workers are paid the value of their marginal product. This in effect says that employment in Sector 2 is extended to the level such that the marginal product of labour is equal to the fixed wage rate.[3] With our specification of the production function for Sector 2, employment in the modern sector is a linear function of the output level of the sector, because

$$W_2 = P_2 \frac{\partial Y_2}{\partial L_2} = \frac{P_2 (1-\beta) Y_2}{L_2} = \overline{W}_2$$

therefore

$$L_2 = \left(\frac{P_2 (1-\beta)}{\overline{W}_2}\right) Y_2 \tag{5}$$

with L_2 inversely related to $\overline{W}_2$. Furthermore, substituting (5) back into the production function we have

$$Y_2 = K \left(\frac{P_2 (1-\beta)}{\overline{W}_2}\right)^{\frac{1-\beta}{\beta}} \tag{6}$$

$$= \phi(K).$$

Thus employment is a linear function of the capital stock. As the capital stock grows larger through capital accumulation, Y_2 expands, resulting in more labour being absorbed into the modern sector. From this it follows that the rate of employment creation in Section 2, denoted by λ, depends on the rate of capital accumu-

3. Implicit are the assumptions that competitive conditions prevail in the commodity markets in Sector 2, and that labour is always available to the sector at the institutional wage rate. See D. W. Jorgenson (1967).

tion. Hence

(7) $\lambda = \lambda(r)$

and we expect

$$\frac{d\lambda}{dr} = 0.$$

The growth of labour is governed by the relation:

(8) $\dot{L} = nL + M - E$

where $\dot{L} = \frac{dL}{dt}$,

n = rate of natural increase,

M = immigrants,

E = emigrants.[4]

For our purpose, assume that the flow of immigration is exogenous to the system.

The expansion of employment in the modern sector is limited to the rate of employment creation λ. Thus, if $\dot{L}_2$ represents the rate of growth of modern employment, we have

(9) $\dot{L}_2 = \lambda L_2$

The traditional sector, on the other hand, harbours all the workers who fail to find employment in the modern sector.[5] Thus

$$L_1 = L - L_2.$$

It follow, therefore, that the rate of growth of traditional labour is

$$\dot{L}_1 = \dot{L} - \dot{L}_2$$

and from (8) and (9)

(10) $\dot{L}_1 = nL_1 + (n - \lambda)L_2 + M - E.$

It is hypothesized that people will leave their homeland and emigrate to a new place when the subjectively evaluated expected income they can get in the new place exceeds their earnings in the homeland. The greater the expected income differentials, the larger is the number of emigrants. To simplify our analysis, let us assume that emigration from each sector at any point in time is an

4. Here, as in most economic growth models, we make no distinction between the population and the labour force. The formulation also implies that labour is homogeneous, and there is no sectoral differences in the rate of natural increase. This is a reasonable assumption for small economies.

5. This follows from the implicit assumption that labour is always available to the modern sector at the institutional wage rate (see footnote 3) and the subsistence nature of traditional production conditions.

increasing function of the difference between the expected wages obtainable in the new place and the realized wages one can earn by staying in the sector.[6] Therefore, the emigration functions can be written as:

$$E = E_1 + E_2 \tag{11}$$

$$E_1 = \mu(\rho_1 \hat{W}_u - W_1),\ \mu'(.) > 0 \tag{12}$$

$$E_2 = v(\rho_2 \hat{W}_s),\ v'(.) > 0 \tag{13}$$

where E_1 = emigrants from Sector 1,

E_2 = emigrants from Sector 2,

ρ_1 = subjective probability of getting on unskilled job in the new place,

ρ_2 = subjective probability of getting a skilled job in the new place,

$\hat{W}_u$ = wage rate for unskilled workers in the new place,

$\hat{W}_s$ = wage rate for skilled workers in the new place.

Emigration from each sector continues until the local wages are equal to the respective expected wages of the new place. As discussed in the last section, subjective probabilities of getting jobs are used here instead of objective probabilities *a la* Todaro (1969).

IV. Emigration and Economic Growth

In this section we shall examine how the growth performance of our hypothetical small economy with unrestricted emigration is affected when changes occur in the parameters and exogenous variables. Special emphasis will be given to the role of emigration in affecting the relative sectoral growth of the economy.

Economic growth is described by the growth equations for the two sectors derivable from the model specifications. For the traditional sector:

$$\dot{Y}_1 = \alpha \dot{L}_1 = \alpha \{nL_1 + (n-\lambda)L_2 + M - E\}.$$

6. A more rigorous formulation would be in terms of the difference between the discounted present value of the expected income stream over a worker's planning horizon and the discounted present value of his realizable income stream over the same period. Implicit in this simplified specification is the assumption of a one-period planning horizon for the decision-makers. See M. P. Todaro (1969). The migration functions being used here, while offering mathematical convenience, are quite adequate for this level of abstraction. Indeed, if we were ready to trade mathematical convenience for realism, then we should incorporate non-economic variables as well as economic ones into the migration functions: see Y. K. Fan (1974, 1978).

Substituting (11), (12) and (13) for E, we have

$$\dot{Y}_1 = \alpha \{ nL_1 + (n-\lambda)L_2 + M - \mu(\rho_1 \hat{W}_u - W_1) - \upsilon(\rho_2 \hat{W}_s - \overline{W}_2) \}. \quad (14)$$

Similarly, for the modern sector:

$$\dot{Y}_2 = L_2^{1-\beta} \beta K^{\beta-1} \dot{K} + K^{\beta}(1-\beta)L_2^{-\beta}\dot{L}_2$$
$$= r\beta Y_2 + \lambda(r)(1-\beta)Y_2$$

and from (6)

$$\dot{Y}_2 = [r\beta + \lambda(r)(1-\beta)] \left(\frac{P_2(1-\beta)}{\overline{W}_2}\right)^{\frac{1}{\beta}-1} K. \quad (15)$$

Equations (14) and (15) describe the growth paths of outputs of the two sectors. It is interesting to note that while Y_1depends mainly on changes in the size and composition of the labour force, Y_2 is basically a function of capital accmulation.

Now let us proceed to examine how the growth performance of each sector is affected when the emigration parameters are changed. First, suppose that there is a change in $\hat{W}_u$, the wage rate for unskilled workers in the economy which accepts migrants. The growth of traditional output will be induced to move in the opposite direction if all other things remain unchanged:

$$\frac{\partial \dot{Y}_1}{\partial \hat{W}_u} = -\alpha\mu'(\cdot)\rho_1 < 0.$$

The causal relationship can be traced as follows. An increase in $\hat{W}_u$, for intance, will increase the flow of emigration of traditional workers, E_1. This in turn has the effect of lowering L_1, leading to a shrinkage of the traditional sector.

Similar results will be obtained if there are changes in $\hat{W}_s$, the wage rate for skilled workers. An increase in $\hat{W}_s$ will encourage more emigration from the modern sector, creating more vacancies to be filled by traditional workers, hence lowering L_1.

Changes in the subjective probabilities ρ_1 and ρ_2 also affect $\dot{L}_1$ and hence $\dot{Y}_1$. Many factors influence the subjective probabiities of getting jobs in the receiving country. These include, for example, the personal ambitions, aspiration and educational level of the potential emigrants, general economic conditions, unemployment rates, legislation restricting employment of aliens, and the number of relatives, friends and acquaintances that the potential migrants have at the destination, which in turn relates to the volume of immigration from the sending country in previous periods. Liberalization of work restrictions for aliens, for instance, will induce more emigration from our hypothetical economy through

changes in ρ_1 and ρ_2, lowering $\dot{L}_1$ and $\dot{Y}_1$ as is evident from (14).

It is noteworthy that $\dot{Y}_2$, the growth rate of the modern sector, is not affected by any changes in emigration flows, including those from the modern sector itself.

Proposition 1: Given the model, emigration from either or both sectors, *ceteris paribus,* reduces the growth rate of the traditional sector only. The growth of the modern sector is unaffected.

The implication of this proposition is that emigration can bring about structural changes in the economy. It reduces the share of traditional output in the GNP relative to modern output which expands at a rate governed by the rate of capital accumulation. Since L_1 is lowered due to the emigration of traditional workers as well as to their transference to the modern sector to replace the emigrants there, the average skill of the entire labour force is improved. It can also release the population pressure of the economy, raising per capita income in the process.

If emigration can reduce the growth rate of the traditional sector, then immigration can enhance it. This is indeed the case, as as indicated by $\frac{\partial \dot{Y}_1}{\partial M} > 0$. Again, $\dot{Y}_2$ is insulated from the effects of changes of immigration flows.

Austerity measures at home can bring about similar effects. Lowering the institutional wage rate of the modern sector, for example, will widen the gap between the expected income that can be earned by emigrating and the income which the workers are earning, hence inducing more emigration. The vacant positions thus created will be filled by traditional workers who are constantly seeking such opportunities. This can be shown in our model. From (5), (6), and (14), we can obtain

$$\frac{\partial Y_1}{\partial \overline{W}_2} = \frac{\alpha K}{\beta} [\lambda(r) - n] [P_2(1-\beta)]^{\frac{1}{\beta}} \left(\frac{1}{\overline{W}_2}\right)^{1+\frac{1}{\beta}} + \alpha v'(\cdot) > 0$$

for $(\lambda(r)-n) > 0$. That is, if the rate of employment creation in the modern sector exceeds the labour growth rate, then a reduction in $\overline{W}_2$ will lower the growth rate of the traditional sector.

Lowering $\overline{W}_2$ has the additional desirable effect of increasing employment in the modern sector. Recall that

$$L_2 = \left(\frac{P_2\ (1-\beta)}{W_2}\right)^{\frac{1}{\beta}} K,$$

hence a smaller $\overline{W_2}$ allows more labour to be absorbed into the modern sector. The growth of the modern sector is also enhanced:

$$\frac{\partial \hat{Y}_2}{\partial \overline{W}_2} = [r\beta + \lambda(r)\ (1-\beta)]\ P_2\ (1-\beta)^{\frac{1}{\beta}-1} K\left(1-\frac{1}{\beta}\right)\overline{W}_2^{-\frac{1}{\beta}} < 0.$$

Thus we have the following results:

Proposition 2: Given the model, an austerity measure of lowering the wage rate for modern workers, *ceteris paribus,* encourages emigration from the modern sector. This quickens the pace of labour transfer from the traditional sector to the modern sector, hence lowering the growth rate of the traditional sector. The austerity measure also increases employment in the modern sector, and enhances the growth of the modern sector.

V. Implications: A Viable Policy?

The simple model presented in this article helps to illustrate the growth-enhancing aspects of emigration for small developing economies. It also serves to summarize the arguments for encouraging emigration as a solution to unemployment and underemployment problems.

However, if the deductions from the model imply that encouraging emigration could be a viable policy for economic growth and development, then some implicit assumptions of the model suggest that there are also serious drawbacks of such a policy.

In this model, it is assumed that there exists no time lag or cost or training when traditional workers are transferred to the modern sector. Indeed, all social costs of emigration are excluded in the migrant's private calculations of expected gains.[7] Introducing a learning lag will not change the qualitative results of the analysis. However, with social costs coming into the picture, the validity of Proposition 1 becomes in doubt.

It is also implicity assumed that there are no psychological and sociological effects of emigration on the remaining population. But

7. See H. G. Johnson (1968).

as more and more emigration takes place, a general "outward looking" attitude may develop, diverting people's efforts from building up their own economy to finding means of escaping from their existing realities. Furthermore, when this happens, modern workers tend to emigrate at a rate much faster than that of traditional workers simply because they face less restrictions, enjoy more facilities, and command more resources. With the dynamics of "brain drain" in full motion, emigration will prove to have adverse effects on economic growth, especially in the long run.[8]

However, emigration may be a useful policy if our small economy is but a region of a larger economic entity under coordinated planning.[9] In this case, $\hat{W}_u$ and $\hat{W}_s$, ρ_1 and ρ_2 are endogenized, and may be treated as policy variables. For example, the economic planners can design $\hat{W}_u$ and $\hat{W}_s$ in areas where immigrants are needed, high enough to attract the desired amount of migration from the areas where more emigration proves helpful to economic growth. They can use various policies to manipulate the values of ρ_1 and ρ_2. They can also design various "incentive plans" such as subsidies for the explicit and implicit costs of emigration to induce people to migrate, which of course highly complicate our migration functions. To fully analyze the effects of interregional migratory flows on growth and development entails a model of higher dimensions and complexity.[10] Suffice it to say here that when our model is but a substructure of a larger structure, inducing emigration can become a viable strategy for the development of both the sending and receiving regions.

8. For studies on "brain drain" see G. Beyer (1972).

9. Of course, this refers to economic planning in a market economy or in an economic community of market economies.

10. See for example Fan and Day (1978) in which a model with two regions and six sectors is presented.

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