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FOREIGN INVESTMENT AND ECONOMIC GROWTH: THE CASE OF MR. NEWMAN.

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Foreign Investment and Economic Growth: The Case of Mr. Newman.

Newman's article seeks to illustrate the trade-offs which exist between domestic saving and foreign investment in the attainment of the targets for GNP in the Plans of the three East African countries. To do him justice, he never employs the term trade-off, but much of his discussion can be understood in no other way.[1]

Newman adopts virtually unaltered a model employed by Chenery and Bruno to analyse slightly different problems in the case of the Israeli economy.[2] Unfortunately, in modifying their approach, Newman leaves himself with insufficient degrees of freedom. We might add that the whole issue appears much more difficult than it is because of the confusing exposition of Newman in particular, but also to some extent of Chenery and Bruno.

C & B present a conventional model of simultaneous equations in a number of variables, which can be classified in a variety of ways. Apart from purely endogenous and exogenous variables, there are 'policy' variables which do not all possess the same status. Some are 'pure instrument variables' such as the exchange rate (r), and the net foreign capital inflow (Fn). Others are 'objective variables' such as the unemployment rate (u), and government recurrent expenditures (Gn). These are given fixed values and so become in a sense exogenous although u is allowed to vary as we shall see below. Some of these policy variables might in other models be estimated directly as parameters of the system (e.g. the marginal savings ratio -- s -- in this model is the marginal propensity to save of the private & the government sectors and so is amenable to influence within institutional limits -- although there is in fact no difficulty in crossing the lower limiting value of s).

The policy model is reduced to four equations, hypostasised[3] as indicated in the parentheses following each.

(13) $Vn = f_1(u, \ell)$ (This is the full employment equilibrium condition ℓ is the rate of increase of labor productivity)

(14) $Vn = f_2(Fn, s)$ (Savings = Investment Equilibrium)

(15) $Vn = f_3(Fn, Gn, En)$ (Balance of Payments Equilibrium)

(16) (C + G) (Total consumption)$= (1 - s)Vn + (s-s)Vo$

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1 Newman See p. 23, and p. 35 for particularly clear examples .
2 (Chenery and Bruno, 1962).
3 This word derives from the Greek υφιστημι .(huphistemi) - I drive out of (his, her, its) mind, which, readers should note takes the genitive.

There are only two strictly endogenous variables remaining, Cn and Vn. There remain six policy variables -- u, ℓ, Fn, s, Cn, En, (The case of En is somewhat anomalous. It is a function of export prices (exogenous) and the exchange rate, r. Since to each r there corresponds a level of exports, we can consider either r or E as policy determined. r also affects M (imports). In actually working the model, however, the authors leave r at a single value, and treat Exports as a policy variable, since exports depend "on other factors beside the exchange rate."[4]

As C & B point out,[5] Equations (13)and (14) are analogous to a Harrod-Domar fixed coefficient production function "If all the parameters are fixed, the maximum rate of growth will be determined by one of the two equations, and either labor or capital will be in excess supply." Such an equation could be simply expressed as

V = Min (αK, βN) (where K = capital stock, and N = labor supply).

They further suggest that the balance of payments equilibrium (15) expresses an analogous limitation on growth, so that we could write our equation as

V =Min(αK, βN, γM) (where level of imports = M).[6]

This idea is utilized, in a sense, later in the paper. But the authors' real concern is with the values for the policy variables which simultaneously satisfy equations (13 to (16).[7] That is, we can only make meaningful statements about situations where all equations of the model are satisfied.

There are four degrees of freedom in the system and six 'policy' variables. Clearly, if all six are exogenously set, the system will in general be over-determined. In general we would have three values of Vn. If we assume, using our production function outlined above, that the lowest of these obtains, there must be unemployed resources in the other two markets. Say that Vn is determined by N, then we must have unemployed savings and unemployed foreign exchange and we would find ourselves trying to explain what forms these take.

C & B follow an alternative approach. They lay down a plausible range for the values which each policy variable might take, either for institutional or other reasons. In particular, they fix Cn and u -- although the latter is

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4 C & B, p. 92
5 Ibid (p. 85)
6 (We are indebted to Dr. B. F. Massell, for pointing this out).
7. Ibid C & B, (p. 91).

allowed to vary from its desired level of 0.05 in "several trial solutions."[8] With Gn and u fixed, the degrees of freedom available are two. That is, we can fix values of any two of the remaining four policy variables, and the system will determine the values of the remaining two as well as of the endogenous variables. However, this is not what C & B seem to do.

To take one example of several. On p. 94, C & B pursue the implications of setting Fn=0 (initially, then at successively higher levels), En=1,150, ℓ=0.03 (although it is later allowed to rise to 0.04), and, implicitly, s<0.165. With Gn and u set, the system is apparently overdetermined. However, it is clear from Table II[9] that u and s in this case are allowed to vary in order to make (13) and (14) compatible with (15). What C & B in fact do is to set maximum values on En of 1,150 and on s of 0.165, and then find the largest Vn for increasing values of Fn. At first, En=1,150 provides the constraint and s<0.165. Later, (beyond Point 8), savings provide the constraint and En<1,150. The fulfillment of the labor market equilibrium (13) is treated somewhat differently. Below the Vn which corresponds to full employment when labor productivity increases at its lowest plausible rate, unemployment is assumed to occur. At levels of Vn above this level, it is assumed that labor productivity increases just sufficiently to ensure full employment and no labor shortage, until ℓ=0.04 is reached. Beyond that point, the employment equation provides the constraint for further increases in Fn, and s<0.165 and En<1,150.

Newman, in a simplified C & B model lacking the labor market equations, runs out of degrees of freedom. His policy model takes the form:

(14) $Vn = f_2 (Fn, s)$

(15R) $Vn = f_{3R} (Fn)$

He hopes to use the model to examinethe trade-offs between s and Fn in achieving the Plan target GNP, Vn^*. (By setting $Vn=Vn^*$, there is no need for the labor market equilibrium equation (13) in the C & B model. (15R) differs from the C & B (15) since Newman assumes that exports are exogenously determined.) Setting $Vn=Vn^*$ in (14) and (15R), and assuming some level of s,

> "We ..... have two estimates of the foreign capital inflow needed to attain the target, one provided by the savings constraint and one by the balance of payments limitation. It follows that, for any target Vn^*, it will be the higher of these two estimates of Fn which will actually be needed to reach full success."[10]

8 (C & B p. 93)
9 Ibid. (p. 94)
10 Newman (p. 30-1)

For example, if in the case of Kenya s=20.0, the Fn implied by (14) when $Vn=Vn^*$ is £38.1 million, whereas Fn implied by (15R) is £28.6 million. In this situation, Newman would say that Fn must equal 38.1 'to reach full success'. But he has no instrument variable in (15R) which can be varied in order to render the two equations compatible with each other. The only thing which can 'give' in this model is 's', and so the level of Fn determined by (15R) will always be the one which obtains.

Were C & B doing the Newman exercise, they undoubtedly would have left one more degree of freedom in the system by leaving En as a policy variable in (15). In this event, we would have a choice between s and Fn, given Vn^*, due to our ability to vary En.

We may summarize the above remarks briefly. Understanding the Chenery and Bruno article is difficult because the authors neglect to state explicitly what assumptions they are making at each point. Understanding Newman's article is difficult because he does not seem to have understood the nature of his model? or the Chenery and Bruno piece? or the nature of simultaneous equation systems?[11]

ALTERNATIVE VERSION OF THE ABOVE NOTE:

In the Chenery and Bruno article from which Newman draws his model, the authors search out solutions of an apparently over-determined model by allowing several variables to take on different values without explicit notice so long as the values of those variables remain within specified limits. In Newman's adaptation of the C & B model, there are insufficient degrees of freedom to permit this to happen. The result is that Newman's numerical results are correct, but his discussion of what they mean is totally misleading.

References:

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11 Zilch (1966, p. 105).