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8 Stabilization, Stagflation, and Investment Incentives: The Case of Kenya, 1979–1980

William H. Branson

8.1 Introduction and Summary

Stabilization programs in developing countries generally have three components: a reduction in government spending, devaluation, and a slowdown in money growth. If prices and wages are not perfectly flexible, the cut in government spending will produce a recession in the short run. With imported intermediate goods in the picture, the devaluation will generate stagflation; the price level will rise and value added will be squeezed. Both of these components of the program will squeeze profits, and the increase in the price of imported capital goods will raise the cost of capital. These additive effects will reduce investment and future growth. The purposes of this paper are to specify and analyze a model that describes these effects; to provide an illustration of the model by using data on Kenya; and to suggest how the stabilization program can be designed to minimize the effects on investment.

In section 8.2 the basic model is specified and analyzed. I focus on a stylized structure of an economy with two sectors. One produces an agricultural output that is exported and not consumed domestically. This is essentially the case in Kenya, where nearly all of the major export crops—coffee, tea, and sisal—and polyurethane are exported. I assume that output elasticity in this sector is low. The other sector produces a nontraded domestic good using domestic factors and an

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imported intermediate input, all of which have a low elasticity of substitution among them. A large fraction of capital goods are also imported, again consistent with the case of Kenya. The country is small in its export and import markets. The degree of wage indexation to the consumer price index (CPI) is introduced as a parameter. Section 8.2 goes on to show the effects of a stabilization program on prices, output, inputs, and profits in the nontraded sector and on the trade balance in terms of foreign exchange. Numerical results using Kenyan data are presented in table 8.3. The potential stagflationary effects of a devaluation are an extension of arguments presented in Branson (1983) and Katseli (1983), which in turn were extensions of the earlier results of Cooper (1971) and Krugman and Taylor (1978).

The effects of a stabilization program on investment incentives are discussed in section 8.3. The analysis focuses on the effect on Tobin's q-ratio, the ratio of the market value of assets to their replacement cost. These effects are summarized with numerical estimates from the Kenyan data. This section also compares the effects of a devaluation and a cut in government spending that yield the same result for the trade balance. The results are shown in table 8.4. The spending cut reduces employment somewhat more than the devaluation does, but has a significantly smaller effect on real profits and the relative price of capital goods and thus on investment incentives. The differences between the two alternatives decrease with an increase in the degree of wage indexation. The devaluation is, of course, inflationary, whereas the spending cut is deflationary.

The results in table 8.4 strongly suggest that a country in a situation comparable to Kenya's in 1979–80 should meet an external shock to the terms of trade by directly reducing absorption rather than by devaluation. With low levels of wage indexation, the spending cut will have a much smaller effect on investment incentives and avoid the inflationary consequences of devaluation, which in turn will allow the country to maintain nonindexed of wages. The cost of this program will be a small additional reduction in employment in the domestic goods sector.

In section 8.4 I turn briefly to a more general discussion of the role of devaluation. In an economy with this structure, which may still be typical of the African countries, a devaluation may increase the current deficit in terms of domestic prices, even if it improves the deficit in terms of foreign exchange. Thus, a combination of devaluation and a cut in government spending can be doubly recessionary, and devaluation may not be an appropriate component of a policy program designed to meet an external shock such as the terms-of-trade deterioration in Kenya in 1979–80. On the other hand, devaluation is an appropriate, even necessary, component of a *liberalization* program that follows a protracted disequilibrium characterized by domestic inflation with a fixed exchange rate and rising import controls. It therefore may be important to distinguish between devaluation as an undesirable component of a *stabilization* program and devaluation as a necessary part of *liberalization*.

8.2 A Model of a Stabilization Program

The standard monetary model of a stabilization program comprises one good, flexible wages and prices, and no imported inputs. The model is outlined in Branson (1983). An estimated version with considerable empirical detail is presented in Khan and Knight (1981). The usual stabilization program consists of a reduction in government spending, devaluation, and a reduction in the rate of growth of the money supply. The last is generally tied to the cut in the budget deficit. As discussed in Branson, the devaluation can be thought of as validating the existing money stock as an equilibrium one. The short-run impact of the program comes from the cut in government spending and the devaluation. The longer-run effects also depend on the reduction in money growth. This reduction, too, could have short-run effects if it influences inflationary expectations, but that is unlikely if the stabilization package is aimed at ending a long period of disequilibrium.

In almost any model the very short-run effects of such a stabilization package will be stagflationary. The cut in government spending will tend to reduce output, and the devaluation will push up the price level. In the standard monetary model these effects are very short-lived. Flexible real wages adjust to restore output to its full-employment level. The combination of reduced government spending and devaluation reduces domestic absorption and eliminates the current-account deficit. The anti-crowding-out effect of reduced government spending actually stimulates investment. In the Khan-Knight model the short-run period of stagflation lasts two to three years.

Many developing countries, however, have an economic structure that differs in important ways from the assumptions of the monetary model. Wages and prices may not be flexible in the short run. This can be the result of a Lewis-type structure in which labor is supplied to the modern sector at a wage, real or nominal, that is determined by conditions in the subsistence sector. It can also result from extensive government involvement in the modern sector through the financial sector or through "parastatal" companies. In this case wage determination may be part of the political process, and also be a political problem.

In this situation, a reduction in demand caused by the cut in government spending can result in a significant and persistent drop in output due to wage or price rigidity. In addition, many developing countries import intermediate goods and capital goods as inputs into the production process. This means that a devaluation can raise the costs of imported inputs. The result can be a recession and profit squeeze, reducing saving and investment. Thus, the implications of the stabilization program for output, investment, and growth can depend on wage and price rigidities and the structure of trade. I will show below that the *interaction* of the wage-setting regime with the presence of imported goods can be particularly important for the success of the program.

In many developing countries a useful disaggregation of output is into two sectors: one producing agricultural output that is traded internationally with little domestic consumption, and the other producing a nonagricultural output that is at best an imperfect substitute for imports. The nonagricultural sector uses imported intermediate inputs, and both sectors use imported capital goods.

This framework allows an analysis of the effects of a stabilization package on the two sectors separately, as a first approximation. In this section I lay out the model of the nonagricultural (N) sector. As a first approximation, I assume no domestic consumption of agricultural (A) sector output, and so effects on its output and exports will be determined simply by the movement of the A-sector price along its supply curve. The remaining subsections of this section first describe the model of the N sector with explicit solutions for price, output, profits, unemployment, and intermediate imports. Rough parameter estimates are then introduced for an example based on Kenya. Finally, the numerical results are given under varying assumptions concerning wage determination and the elasticity of substitution between imported intermediates and value added in the N sector.

8.2.1 A Model of the Nontraded Sector

This subsection sets out a model for analyzing the short-run effects of a stabilization program in the N sector. The analytical point of the exercise is to see how the separate components of the program—a cut in government purchases and devaluation—affect output, the price level, and profits. I also want to show how the answers to this question are influenced by the type and degree of wage rigidity, which are to some extent under government control. I want to specify the model in a way that the parameters can be interpreted using readily available data, so that I can later provide the Kenyan example.

The simplest model that meets these requirements is the following. The N sector produces output Q_n using capital K, labor N, and an imported input I. The capital stock is fixed in the short run. The input is supplied elastically at the world market price P_i^*, so that the domestic price is given by $P_i = eP_i^*$. Labor is supplied to the N sector at a wage rate that will be specified as following a parameterized indexation system, so that we can study the consequences of variation in the indexation parameter. Since nearly all the output of the exportable sector is exported, the CPI is also P_n.

An important feature of the production structure the model should capture is the low degree of substitutability between the domestic inputs K and N, and the imported input I in producing gross output Q. To describe this structure as simply as possible, I assume that the production function is separable with a constant elasticity of substitution (CES) between value added, $V = F(K, N)$, and I, and that F is Cobb-Douglas. The analysis follows the line taken by Marston and Turnovsky (1983). The demand side will be simpler. I assume that private nominal demand for output Q_n is determined by the money stock and that government demand is exogenous.

The Demand Side

The focus of the analysis in this paper is the complication introduced into the stabilization model when aspects of supply-side structure are taken into account, particularly the presence of imported intermediates and wage indexation. Since I have nothing new to introduce on demand side, I will strip it down to one equation. With all of the output of the A sector exported, and only intermediate imports, all private final expenditure is on the N good. I assume that private sector expenditure for the N-sector output Q_n is proportional to the money stock and that in addition the government purchases N-sector output. The nominal demand for N-sector output can then be written as:

$$P_n Q_n = kM + P_n G = E + P_n G,$$

where M is the money stock, E is private expenditure on Q_n, and G is government purchases in real terms. A demand relationship of this kind can be derived from the usual *IS-LM* analysis; it is also consistent with the structure of rational expectations models. The relationship could also be obtained in a more general two-sector demand structure with consumption of both the traded export and the domestic good and with a unitary elasticity of substitution between the two goods in demand.

Changes in demand are then given as:

$$(1) \qquad \hat{Q}_n + (1 - G/Q_n)\hat{P}_n = (E/P_n Q_n)\hat{M} + (G/Q_n)\hat{G},$$

where a hat (^) denotes a percentage change, e.g. $\hat{M} \equiv dM/M$. In equation (1) the policy variables are $\hat{M}$ and $\hat{G}$. Note that M is nominal and G is real. If the relevant budget variable were nominal government expenditure, $P_n G$, equation (1) would be:

$$(1') \qquad \hat{Q}_n + \hat{P}_n = (E/P_n Q_n)\hat{M} + (G/Q_n)\,(\widehat{P_n G}).$$

The analysis will use equation (1), with the assumption that government purchases of N-sector output are fixed in real terms. It is easy to rework the results using equation (1′). The elasticity of the demand curve is the ratio $\hat{Q}_n/\hat{P}_n = -(1 - G/Q_n)$ from equation (1), with $\hat{M} = \hat{G} = 0$. This ratio is clearly less than unity in absolute value as long as G/Q_n is positive, that is, as long as there is some government consumption of N-sector output.

The Supply Side

The prices of agricultural output P_a and imported inputs P_i will be taken as given, determined by the exchange rate e multiplied by the world price P^*. Both are traded, and the country in question is assumed to be a "small country." The analysis of the supply side will proceed as follows. First, wages are specified as partially indexed to the price of the nontraded good, which is also the CPI with no consumption of the export and all imports being intermediate goods. Next will come discussion of the production function and first-order conditions for profit maximization in the N sector. From these are derived the demands for labor and intermediates as functions of relative price changes. Then the supply curve of output Q_n as a function of relative prices can be obtained. This will then be combined with the demand side to obtain solutions for $\hat{Q}_n$ and $\hat{P}_n$ as functions of $\hat{P}_i$, representing exchange rate changes, and $\hat{G}$, representing the government budget component of the stabilization program.

The nominal wage in the N sector is assumed to be partially indexed to the CPI, which is P_n, such that:

(2) $$\hat{W} = \gamma \hat{P}_n; \quad 0 < \gamma < 1.$$

Here γ is the indexation parameter; $\gamma = 0$ denotes a fixed nominal wage; and $\gamma = 1$ denotes a fixed real wage. Below I will present results for the range of γ.

The production function for Q_n is assumed to be separable in value added, V, and intermediate inputs, I. I follow Marston and Turnovsky in assuming that value added is a Cobb-Douglas function of capital and labor inputs and that gross output in the N sector is a CES function of value added and intermediate inputs, such that:

(3) $$V = K^{1-\theta_n} N^{\theta_n}$$

(4) $$Q_n = [bI^{-\rho} + (1 - b)V^{-\rho}]^{-1/\rho}.$$

In the second-stage CES function, the elasticity of substitution between I and V is given by $\sigma = 1/(1 + \rho)$. To represent low substitutability between domestic factors and imported intermediates, I assume that $\sigma < 1$; in particular, I will present results for the case in which $\sigma =$

0.2 and for the limiting case of $\sigma = 0$. The 0.2 estimate is based on the previous work of Bruno and Sachs (1979).

In the neighborhood of an initial equilibrium, with the capital stock fixed in the short run, percentage changes in V and Q_n can be given by the following linear approximations:

$$\hat{V} = \theta_n \hat{N} \tag{5}$$

$$\hat{Q}_n = \theta_i \hat{I} + \theta_v \hat{V} = \theta_i \hat{I} + \theta_v \theta_n \hat{N}. \tag{6}$$

Here θ_n is the share of employment in value added, and θ_i and θ_v are the shares of intermediate inputs and value added, respectively, in gross output. The profit function π is given by:

$$\pi = P_n Q_n - WN - P_i I. \tag{7}$$

Producers are assumed to choose N and I to maximize π, given K.

The first-order conditions for profit maximization can be written as:

$$\hat{P}_i - \hat{P}_n = \frac{1}{\sigma}(\hat{Q}_n - \hat{I}) \tag{8}$$

$$\hat{W} - \hat{P}_n = \frac{1}{\sigma} \hat{Q}_n - \left[1 + \frac{1 - \sigma}{\sigma} \theta_n\right] \hat{N}. \tag{9}$$

The indexation equation (2) can be used to eliminate $\hat{W}$ from equation (9). Then (8), (9), and the production relation (6) can be solved to obtain the supply equation for $\hat{Q}_n$:

$$\hat{Q}_n = -\frac{\theta_i[\theta_n + \sigma(1 - \theta_n)]}{\theta_v(1 - \theta_n)} \hat{P}_i + \left\{\frac{\theta_n(1 - \gamma)}{1 - \theta_n} + \frac{\theta_i[\theta_n + \sigma(1 - \theta_n)]}{\theta_v(1 - \theta_n)}\right\} \hat{P}_n. \tag{10}$$

This is the equivalent of equation (6) in the Aizenman-Frenkel paper in this volume. From (6), (8), and (9) we can also obtain the reduced-form equations for $\hat{I}$ and $\hat{N}$. Alternatively, once we obtain $\hat{Q}_n$ from (10), we can solve recursively for $\hat{I}$ and $\hat{N}$ in (8) and (9). If indexation is complete, so that $\gamma = 1$, the supply equation (10) is homogeneous. Since the coefficient of $\hat{P}_n$ is positive, an increase in P_n increases Q_n; this is the slope of the supply curve. An increase in P_i reduces Q_n by squeezing value added and profits. This represents a shift of the supply curve.

The parameters of the supply equation (10) can be interpreted as output elasticities with respect to relative price changes. Using the notation that $s_n = \hat{Q}_n/\hat{P}_n$ with $\hat{P}_i$ equal to zero, and so on, we can rewrite equation (10) in the form:

$$(11) \qquad \hat{Q}_n = s_n\hat{P}_n + s_i\hat{P}_i,$$

where the s output elasticities are given by the parameter combinations from equation (10), with s_n positive and s_i negative. With equations (11) for N-sector supply and (1) for demand, we can now proceed to obtain explicit solutions for changes in Q_n and P_n as functions of the exogenous prices P_i and P_a.

Explicit Solutions for Price and Output in the N Sector

The demand and supply equations are shown in figure 8.1. The slope of the demand curve from equation (1) is given by $-1/(1 - G/Q_n)$, which is greater than unity. This means that the demand curve for the entire competitive industry is inelastic. An upward or leftward shift of the industry supply curve will therefore raise the value of output in the industry. As we will see in detail in section 8.2.2, this opens the potential for ambiguity in the response of profits to supply disturbances. The share coefficients of $\hat{M}$ and $\hat{G}$ in equation (1) give measures of the horizontal shift of the demand curve when M or G changes.

The slope of the supply curve, from equations (10) and (11) is given by $\hat{P}_n/\hat{Q}_n = 1/s_n$. Since θ_n and γ are both less than unity, this slope is positive. An increase in the indexation parameter γ increases the slope, making the supply curve steeper. The s_i coefficient in equations (10) and (11) gives the horizontal shift of the curve as P_i changes. An in-

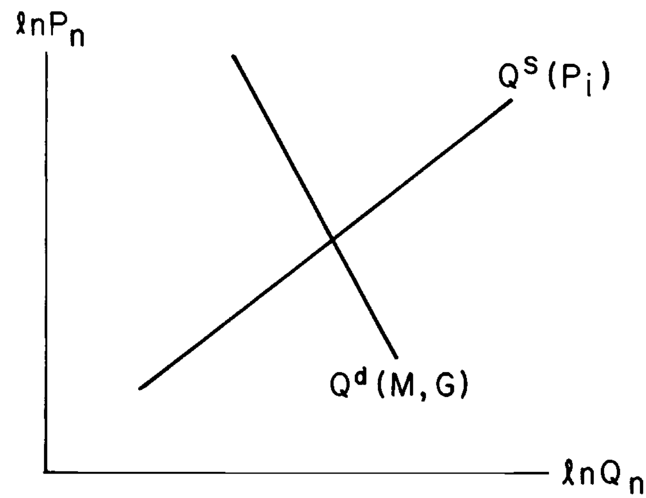

Fig. 8.1 Demand and supply in the N sector.

crease in the elasticity of substitution, σ, increases the coefficient of $\hat{P}_i$, yielding an increase in the supply shift when P_i increases.

This result, combined with the inelasticity of the demand curve, means that as the indexation parameter γ increases, the rise in the value of final output following a devaluation, which increases P_i, also itself increases. This is the source of the result, described below in section 8.2.2, that an increase in γ reduces the squeeze on nominal profits that follows from a devaluation with imported intermediates.

Let us now proceed to the solutions for changes in price and output. Equations (1) and (11) can be combined in matrix form, such that:

$$\begin{matrix}(11')\\(1'')\end{matrix}\qquad \begin{bmatrix}1 & -s_n\\ 1 & 1-G/Q_n\end{bmatrix}\begin{pmatrix}\hat{Q}_n\\ \hat{P}_n\end{pmatrix}=\begin{bmatrix}s_i & 0 & 0\\ 0 & E/P_nQ_n & G/Q_n\end{bmatrix}\begin{pmatrix}\hat{P}_i\\ \hat{M}\\ \hat{G}\end{pmatrix}.$$

The solution is:

$$(12)\qquad \begin{pmatrix}\hat{Q}_n\\ \hat{P}_n\end{pmatrix}=\frac{1}{|C|}\begin{bmatrix}1-G/Q_n & s_n\\ -1 & 1\end{bmatrix}\begin{bmatrix}s_i & 0 & 0\\ 0 & E/P_nQ_n & G/Q_n\end{bmatrix}\begin{pmatrix}\hat{P}_i\\ \hat{M}\\ \hat{G}\end{pmatrix}.$$

The determinant $|C| = 1 - G/Q_n + s_n > 0$. The solutions for $\hat{Q}_n$ and $\hat{P}_n$ can be written as:

$$(13)\qquad \hat{Q}_n=\frac{1}{|C|}\left[\left(1-\frac{G}{Q_n}\right)s_i\hat{P}_i+s_n\left(\frac{E}{P_nQ_n}\hat{M}+\frac{G}{Q_n}\hat{G}\right)\right]$$

$$(14)\qquad \hat{P}_n=\frac{1}{|C|}\left[-s_i\hat{P}_i+\frac{E}{P_nQ_n}\hat{M}+\frac{G}{Q_n}\hat{G}\right].$$

From these solutions and the assumed exogenous changes in prices and government purchases, we can calculate the effects on the rest of the variables in the model. Equation (8) gives $\hat{I}$. It also gives the percentage change in imports in foreign exchange terms, since the world price is exogenous. Equation (9) gives the change in employment $\hat{N}$. The change in the wage rate comes from the wage equation (2). The change in profits can then be computed as a residual, since we already have solutions for the change in output, $\hat{P}_n + \hat{Q}_n$, in the wage bill, $\hat{N} + \hat{W}$, and in the bill for imported intermediates, $\hat{P}_i + \hat{I}$. Profits, π, can be computed from the identity:

$$(15)\qquad \pi \equiv P_nQ_n - WN - P_nI.$$

Percentage changes in π are given by:

$$(16)\qquad \hat{\pi}=\frac{P_nQ_n}{\pi}(\hat{P}_n+\hat{Q}_n)-\frac{WN}{\pi}(\hat{W}+\hat{N})-\frac{P_iI}{\pi}(\hat{P}_i+\hat{I}).$$

The underlying share data of 0.3, 0.3, 0.4 for inputs, profits, and labor, respectively, make the profit equation in the Kenya example:

$$(17) \qquad \hat{\pi} = 3.33(\hat{P}_n + \hat{Q}_n) - 1.33(\hat{W} + \hat{N}) - 1.0(\hat{P}_i + \hat{I}).$$

The powerful effect of an increase in P_nQ_n along an inelastic industry demand curve can be seen in the first term on the right-hand side of equation (17).

Finally, the effects on the trade balance can be computed as follows. The percentage change in intermediate imports is given by $\hat{I}$; the arithmetic change is therefore $dI = \hat{I}I$. The percentage change in exports of the A sector is given by $\hat{X} = s_a\hat{P}_a$, where s_a is the elasticity of supply in the A sector. Thus, the arithmetic change in exports is $dX = s_a\hat{P}_aX$. The change in the trade balance, B, in foreign exchange terms is then simply:

$$dB = s_a\hat{P}_aX - \hat{I}I.$$

It will be convenient to state the change as a fraction of the initial level of exports, such that:

$$(18) \qquad dB/X_a = s_a\hat{P}_a - (I/X)\hat{I}.$$

In 1981 I/X in Kenya was about 2.0, as shown in table 8.1 below.

8.2.2 Illustrative Results Using Estimates of Kenyan Data

In this section I will present illustrative estimates of data from the Kenyan economy. These are meant to give an impression of the quantitive magnitude of the stagflation that follows a stabilization program, and the sensitivity of that stagflation to the presence of imported intermediates and to the degree of wage indexation. Here I will show effects per unit devaluation or change in government spending. In section 8.3 I will compare these results to those for an equal change in the trade balance.

The stabilization program is assumed in the short run to include a reduction in government spending and a devaluation. The spending cut is a negative $\hat{G}$ in equations (13) and (14). Under the small-country assumptions, the devaluation raises both P_i and P_a by the proportion of the devaluation. As is apparent from equations (12) through (14), the effects of the components of the program are additive. I will therefore present the multipliers of each component—the coefficients in equations (13) and (14)—separately and then in various combinations to analyze the results.

The analysis will proceed as follows. First, table 8.1 presents the underlying data for the Kenyan economy. These are then combined to give the output response elasticities s_n and s_i and the system determinant C in equations (12) through (14) for the range of γ from 0 to 1 and for the alternative values of the elasticity of substitution of 0 and

0.2. This will represent the full range of wage stickiness from nominal rigidity to real rigidity, as well as a realistic range of substitutability between value added and imported intermediates. The effects for the dependent variables are then given in tables 8.3a and 8.3b.

The Kenyan Data and the Parameters

The relevant data from the Kenyan economy are assembled in table 8.1. The data are from the World Bank and the International Monetary Fund (IMF). N-sector output is the gross domestic product (GDP) at factor cost less output in the traditional, agricultural, and fishing and forestry sectors. Government expenditure on N-sector output G is taken to be general government consumption plus capital expenditures. This overstates G because of the consumption of agricultural sector output and the import of capital goods. The result is a seemingly high G/Q estimate of 0.6. Since the slope of the demand curve is given by $\hat{P}_n/\hat{Q}_n = 1/(1 - G/Q)$, the result is an exaggeration of the inelasticity of the demand curve.

The only quantitatively significant nonagricultural export of Kenya is petroleum products, which account for about 30 percent of total exports. Petroleum product exports are also about 40 percent of all

Table 8.1 **Parameter Estimates for Kenya**

Variable	Method of Calculation	Value	Source
G	1981 general government consumption plus capital expenditure (K£ millions)	952.7	Standard Tables, 1, 5.1
Q	GDP at factor cost less traditional, agricultural, forestry and fishing (K£ millions)	1,613.6	Standard Tables, 2.1
G/Q		0.6	
I	Imports less reexports of petroleum products (billion 1981 SDRs)	1.5	IMF
X	Exports less reexports of petroleum products (billion 1981 SDRs)	0.7	IMF
I/X		2.0	
θ_n	Share of labor in value added in N sector	0.57	Ahamed (1983)
θ_i	Share of imported inputs in total output in N sector	0.3	Ahamed (1983)
s_a	Elasticity of agricultural output with respect to its own price P_a	0.1	Ahamed (1983)

mineral fuel imports, with the rest of the imports being used in domestic production. To make the data aggregation consistent with the assumptions of the model, I subtract the reexport of petroleum products from both imports and exports to obtain the trade data in table 8.1. In doing so, I implicitly assume that the processing industry is not significantly affected by the stabilization program considered here.

The underlying shares of labor, capital, and imported inputs in gross output in the N sector are approximately 0.4, 0.3, and 0.3, respectively (see Ahamed 1983 and the references therein). The labor share of value added, θ_n, is therefore $0.4/0.7 = 0.57$. The elasticity of export supply is estimated to be approximately 0.1 in Ahamed.

The data in table 8.1 can be combined to give the parameter estimates in tables 8.2a and 8.2b under the range of assumptions for γ and σ. As the indexation parameter γ increases, the supply curve becomes steeper and s_n decreases. The output elasticity of P_i does not depend on γ, since imported inputs do not enter the CPI directly. The determinant C is equal to $1 - G/Q + s_n$, so that it therefore decreases as γ increases. An increase in σ increases s_n, flattening the supply curve. It also increases s_i, the shift parameter.

The Effects on Output, Prices, Inputs, Profits, and the Trade Balance

The effects of changes in P_i, P_a, and G, the components of the stabilization program, on output and the price level in the N sector and on the wage rate, employment, profits, and the trade balance are shown in table 8.3a for $\sigma = 0$ and in table 8.3b for $\sigma = 0.2$. I will henceforth refer to these pairs of tables as one unit, that is, "table 8.3" means

Table 8.2a Parameter Values in the N-Sector Model, $\sigma = 0$

	Value of γ		
Parameter	0	0.5	1.0
s_n: The Slope of the Supply Curve	1.89	1.23	0.57
s_i: The Output Elasticity of P_i	−0.57	−0.57	−0.57
$\|C\|$: The Determinant of Supply	2.30	1.64	0.98

Table 8.2b Parameter Values in the N-Sector Model, $\sigma = 0.2$

	Value of γ		
Parameter	0	0.5	1.0
s_n	1.98	1.32	0.65
s_i	−0.65	−0.65	−0.65
$\|C\|$	2.39	1.73	0.06

"tables 8.3a and 8.3b." Since the equations for $\hat{Q}_n$ and $\hat{P}_n$ are linear, the effects of independent changes in each variable can be combined to study any particular combination of disturbances. An across-the-board devaluation will increase P_i and P_a by the same proportion; a spending cut will reduce G. The numbers in table 8.3 give the percentage change in each endogenous variable per percentage change in the exogenous variable. For example, in the first row of table 8.3a, with $\gamma = 1.0$ (full indexation), a 10 percent increase in P_i would reduce Q_n by 2.4 percent.

The results in panel A of table 8.3 can be most easily understood by reference to figure 8.2. An increase in P_i caused by a devaluation shifts the supply curve left. An increase in γ steepens the supply curve, and the steeper the supply curve, the greater the effect on both P_n and Q_n as we move up the fixed demand curve. $\hat{Q}_n/\hat{P}_i$ and $\hat{P}_n/\hat{P}_i$ both increase with γ.

An increase in G shifts the demand curve in figure 8.2 out. The steeper the supply curve, the smaller the effect on Q_n and the larger the effect on P_n. $\hat{Q}_n/\hat{G}$ falls and $\hat{P}_n/\hat{G}$ rises as γ increases. An increase in σ both flattens the supply curve and increases its shift with an increase in P_i. The result when G changes is less change in P_n and more change in

Table 8.3a Effects on Output, Prices, and Inputs, $\sigma = 0$

Effects on Endogenous Variables			Value of γ: 0	0.5	1.0
A.		$\hat{Q}_n/\hat{P}_i$	−0.10	−0.14	−0.24
		$\hat{Q}_n/\hat{G}$	0.48	0.44	0.34
		$\hat{P}_n/\hat{P}_i$	0.25	0.35	0.58
		$\hat{P}_n/\hat{G}$	0.26	0.36	0.60
B.	$\hat{P}_i = \hat{P}_a$	$\hat{W}/\hat{P}_i$	0	0.17	0.58
	$\hat{G} = 0$	$\hat{N}/\hat{P}_i$	−0.18	−0.25	−0.42
		$\hat{I}/\hat{P}_i$	−0.10	−0.14	−0.24
		$\hat{\pi}/\hat{P}_i$	−0.18	−0.08	0.16
		$(\hat{\pi} - \hat{P}_n)/\hat{P}_i$	−0.42	−0.42	−0.42
		$\frac{(dX - dI)}{X}/\hat{P}_i$	0.30	0.38	0.58
C.	$\hat{P}_i = \hat{P}_a = 0$	$\hat{W}/\hat{G}$	0	0.18	0.60
		$\hat{N}/\hat{G}$	0.85	0.72	0.60
		$\hat{I}/\hat{G}$	0.48	0.44	0.34
		$\hat{\pi}/\hat{G}$	0.85	0.96	1.20
		$(\hat{\pi} - \hat{P}_n)/\hat{G}$	0.60	0.60	0.60
		$\frac{(dX - dI)}{X}/\hat{G}$	−0.97	−0.89	−0.69

Table 8.3b **Effects on Output, Prices, and Inputs, σ = 0.2**

Effects on Endogenous Variables			Value of γ: 0	0.5	1.0
A.		$\hat{Q}_n/\hat{P}_i$	−0.11	−0.15	−0.25
		$\hat{Q}_n/\hat{G}$	0.49	0.45	0.36
		$\hat{P}_n/\hat{P}_i$	0.27	0.37	0.61
		$\hat{P}_n/\hat{G}$	0.25	0.34	0.55
B.	$\hat{P}_i = \hat{P}_n$	$\hat{W}/\hat{P}_i$	0	0.19	0.61
	$\hat{G} = 0$	$\hat{N}/\hat{P}_i$	−0.09	−0.18	−0.38
		$\hat{I}/\hat{P}_i$	−0.26	−0.28	−0.33
		$\hat{\pi}/\hat{P}_i$	−0.09	0.01	0.23
		$(\hat{\pi} - \hat{P}_n)/\hat{P}_i$	−0.36	−0.37	−0.38
		$\frac{(dX - dI)}{X}/\hat{P}_i$	0.61	0.66	0.76
C.	$\hat{P}_i = \hat{P}_n = 0$	$\hat{W}/\hat{G}$	0	0.17	0.55
		$\hat{N}/\hat{G}$	0.82	0.74	0.55
		$\hat{I}/\hat{G}$	0.54	0.52	0.47
		$\hat{\pi}/\hat{G}$	0.82	0.91	1.11
		$(\hat{\pi} - \hat{P}_n)/\hat{G}$	0.57	0.57	0.55
		$\frac{(dX - dI)}{X}/\hat{G}$	−1.07	−1.04	−0.95

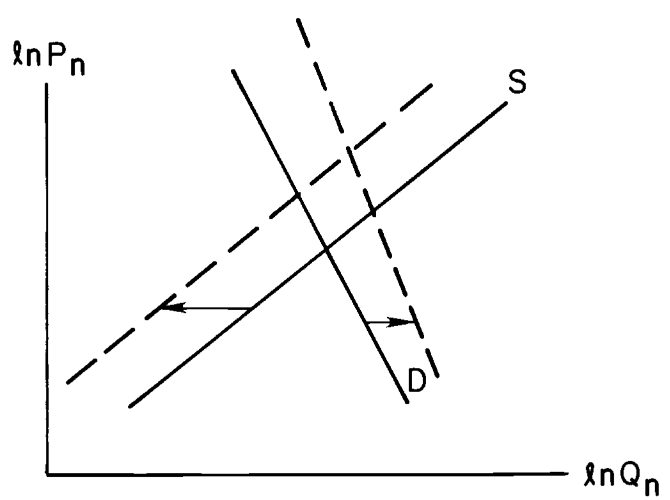

Fig. 8.2 Effect of a stabilization program on Q_n, P_n.

Q_n as σ increases. The net result when P_i changes is not very sensitive to σ in the range of 0 to 0.2.

The effects of a devaluation only with $\hat{P}_i = \hat{P}_a$ on wages, employment, profits, and the trade balance are shown in panel B of table 8.3. There we see that an increase in indexation increases the effect of a devaluation on the nominal wage and on employment, as expected. An increase in γ, however, by steepening the supply curve in figure 8.2, makes the increase in P_nQ_n larger as long as the demand curve is inelastic. This means that the drop in profits is greatest with $\gamma = 0$ and that profits actually rise with a devaluation with $\gamma = 1.0$! In the fourth row of panel B the CPI increase is subtracted from the percentage change in nominal profits. The percentage decrease in real profits is nearly invariant to the degree of indexation, but it falls as the elasticity of substitution increases.

The last row of panel B gives the effect on the trade balance in foreign exchange terms. Paradoxically, this effect increases with the degree of wage indexation! Why? When all imports are intermediate goods with a low elasticity of substitution against domestic factors in the short run, the effect of the devaluation on imports comes mainly from its depressive effect on output. In the extreme case of zero substitution there is no relative price effect. Since the reduction in output increases with the degree of wage indexation, so does the effect on intermediate inputs. This provides a striking illustration of the importance of the role of economic structure in determining policy outcomes, as emphasized in Branson (1983). The basic result was already established in Katseli and Marion (1982). The effect of devaluation on imports in Kenya does not come through substitution among final goods in consumption; it comes mainly through the reduction of imported inputs into production.

The effects of a cut in spending on wages, employment, profits, and the trade balance are shown in panel C of table 8.3 (with signs changed). A reduction in G reduces the wage rate more, the larger the indexation parameter γ, since a cut in G reduces P_i. A reduction in G results in a smaller loss of employment, the larger the value of γ, for the same reason. A cut in G reduces nominal and real profits by an amount that is nearly invariant to the value of γ or σ.

The last row of panel C shows the effects of a spending cut on the trade balance. Since there is no effect on the price of exports (fixed at $P_a = eP^*$), there is no export supply effect. The numbers in this row are twice the $\hat{Q}_n/\hat{G}$ numbers in panel A, with signs reversed. As wage indexation increases, the effect on intermediate imports decreases with the output effect. As σ increases, however, the effect of a change in G on the trade balance increases.

8.3 Investment Incentives in a Stabilization Program

The effects of a stabilization program (or any other exogenous disturbance) on investment can generally be analyzed in two steps. The first step is to determine the effect on the incentive to invest, the net real rate of return in the affected sector. Once the incentive effect is calculated, it can then be multiplied by an estimate of the elasticity of investment relative to that effect to determine the investment effect. This procedure presumably summarizes the effects on growth, at least within the existing economic structure and in the short run, of the given stabilization program.

The elasticity of investment with respect to the net real rate of return must be determined empirically in individual cases. These numbers can be culled from existing studies and assembled into an educated guesstimate, or an econometric study could be attempted if data are available. I focus here on the procedures for determining the effect on investment incentives, building on the model of section 8.2.

The basic approach taken in subsection 8.3.1 is to concentrate on the effects on Tobin's q (see Tobin 1969), the ratio of the market value of new capital stock to its production cost. This gives the addition made to the present value of the firm by a new investment, which in turn is an increase in the capital stock, dK. The capital stock should be an increasing function of q; $dK = f(q)$, with $f(1) = 0$. This is a useful measure partly because it combines the major influences on investment—the real productivity of capital, financial costs, and the real cost of production—into one number. It also permits consideration of disequilibria, where $q \neq 1$ for a significant length of time. In subsection 8.3.1 I show how effects of a stabilization program on q can be calculated in terms of the multipliers of table 8.3. Then in subsection 8.3.2 I calculate the effects on investment incentives of a devaluation versus a spending reduction as alternatives to achieve a given improvement in the trade balance.

8.3.1 Effects on Tobin's q

The q-ratio is defined as the ratio of the market value of an asset (implicit or explicit) to its production cost. If this ratio exceeds unity, a profit-maximizing firm will invest. The task here is to see how a stabilization program is likely to affect q in the N sector.

The q-ratio can be defined as:

$$q \equiv (R/r)(P_k/P_n), \tag{19}$$

where R is the real rate of return on new investment, and r is the discount factor used to convert that return into an asset value. Thus, R/r is the real market value of the asset; P_k is the cost (or price) of the new investment; and P_n is the output price from section 8.2. P_k/P_n is therefore the real cost of the asset in terms of units of output. For a given value of the discount rate, r, the effect of the stabilization program is given by:

$$\hat{q} = \hat{R} - (\hat{P}_k - \hat{P}_n). \tag{20}$$

The effect on the real rate of return, R, is given by the effects on real profits from panels B and C of table 8.3 divided by the existing capital stock K. The expression for $\hat{R}$ is thus:

$$\hat{R} \equiv \left\{ \left[\frac{(\hat{\pi} - C\hat{P}I)}{\hat{P}_i}\right]\hat{P}_i + \left[\frac{(\hat{\pi} - C\hat{P}I)}{\hat{G}}\right]\hat{G} \right\} / K. \tag{21}$$

The expression in parentheses is the effect on real profits from table 8.3. The two terms in brackets are the multipliers from the fourth rows of panels B and C, respectively, in that table. These are multiplied by the assumed percentage devaluation, $\hat{P}_i$, and the assumed cut in government spending, $\hat{G}$, to calculate the effect on real profits. Since the $\hat{P}_i$ multiplier in table 8.3 is negative, the $\hat{G}$ multiplier is positive, $\hat{P}_i$ is positive (devaluation), and $\hat{G}$ is negative (spending cut), $\hat{R}$ will be negative in a stabilization program.

What happens to the cost of capital goods? Let us assume that capital goods are both produced by the N sector and imported, in shares β and $(1 - \beta)$. The percentage change in the real price of capital goods is then given by:

$$\hat{P}_k - \hat{P}_n = [\beta\hat{P}_n + (1 - \beta)\hat{P}_i] - \hat{P}_n,$$

or

$$\hat{P}_k - \hat{P}_n = (1 - \beta)(\hat{P}_i - \hat{P}_n). \tag{22}$$

Here $(1 - \beta)$ is the share of imports in capital goods supply; and devaluation raises its cost. Table 8.3 gives the changes in P_n per unit change in P_i and G. These can be inserted into equation (22) to give the effect of a stabilization program on the cost of capital goods, such that:

$$\hat{P}_k - \hat{P}_n = (1 - \beta)\left(1 - \frac{\hat{P}_n}{\hat{P}_i}\right)\hat{P}_i - (1 - \beta)\frac{\hat{P}_n}{\hat{G}}\hat{G}. \tag{23}$$

If $(1 - \beta)$ is 0.8 and $(\hat{P}_n/P_i)$ is 0.37 (from table 8.3a in the case in which $\gamma = 0.5$), a 10 percent devaluation would increase the relative cost of capital goods by 5.04 percent. With $\hat{P}_n/\hat{G}$ equal to 0.34 (in the same case), a 10 percent cut in government spending would raise the relative cost of capital goods by 2.72 percent by reducing P_n for a given P_i. Both parts of the stabilization program thus tend to increase the relative price of capital goods if a significant fraction of these are imported, that is, if $(1 - \beta) >> 0$. As long as $\hat{P}_i > 0$ and $\hat{G} < 0$, the cost of capital goods in equation (23) increases.

The expressions for $\hat{R}$ from equation (21) and $(\hat{P}_k - \hat{P}_n)$ from (23) can be substituted into equation (20) for $\hat{q}$ to obtain the net effect on investment incentives for the stabilization package. Both parts of the package reduce the real rate of return, R, and increase the relative cost of capital goods $(P_k - P_n)$. In the next section I compare these effects for a given effect on the trade balance.

8.3.2 A Comparison of Devaluation and Spending Reduction

The data in table 8.3 can now be used to compare the effects of a devaluation and a cut in spending as alternative ways to achieve a given improvement in the trade or current-account balance. I will compare the effects on employment and investment incentives and, for completeness, the price of N-sector output as a proxy for inflation. The object here is to investigate the possibilities for minimizing the effects on employment or investment incentives of a stabilization program that is designed to achieve a given improvement in the external position.

The comparison is shown in table 8.4a for $\sigma = 0$ and in table 8.4b for $\sigma = 0.2$. The first row shows the ratio of a devaluation to a spending cut that is aimed at achieving the same reduction in the trade deficit. This is the ratio of the last rows of panels C and B in table 8.3, with the sign changed for $\hat{G}$. As the degree of wage indexation rises, it takes a bigger cut in spending to achieve a given reduction in output and in imports of intermediates. This effect is reduced as the elasticity of substitution increases.

The effects of a cut in spending are shown in panel B of table 8.4. The first three rows repeat the data of table 8.3, showing the reductions in P_n, Q_n and real profits per percentage-point reduction in government spending. The last row of panel B gives the increase in the relative price of capital goods, calculated from equation (23) with $1 - \beta$, the share of imports in capital supply, equal to 0.8. As the price of output falls, the relative price of capital goods increases.

As the degree of wage indexation rises, the employment effect of a cut in spending falls and the effect on investment incentives rises. The latter result comes from an increasing effect on the relative price of capital goods with a rise in wage indexation.

The effects of an equivalent devaluation are shown in panel C of table 8.4. The first three rows are obtained by multiplying the $\hat{P}_i$ effects in table 8.3 by the ratios in panel A of table 8.4. The devaluation is assumed to raise both P_i and P_a. The entries in the last row for $\hat{P}_k - \hat{P}_n$ are calculated from equation (23), with the term for $\hat{P}_n/\hat{P}_i$ taken from table 8.3 and the $\hat{P}_i$ multiplier taken from the ratio in panel A of table 8.4.

Table 8.4a A Comparison of the Effects of a Devaluation and an Equivalent Spending Cut, $\sigma = 0$

	Value of γ		
	0	0.5	1.0
A. Ratio of a Percentage Devaluation to a Percentage Cut in Spending for the Same Reduction in the Trade Deficit	3.23	2.34	1.19
B. Effects per Percentage Cut in G			
Price of Output, $\hat{P}_n$	−0.26	−0.36	−0.60
Employment, $\hat{N}$	−0.85	−0.78	−0.60
Real Profits, $\hat{\pi} - \hat{P}_n$	−0.60	−0.60	−0.60
Price of Capital, $\hat{P}_k - \hat{P}_n$	0.21	0.29	0.48
C. Effects per Equivalent Devaluation			
Price of Output, $\hat{P}_n$	0.81	0.82	0.69
Employment, $\hat{N}$	−0.58	−0.59	−0.50
Real Profits, $\hat{\pi} - \hat{P}_n$	−1.36	−0.98	−0.50
Price of Capital, $\hat{P}_k - \hat{P}_n$	1.94	1.22	0.40

Source: Table 8.3a.

Table 8.4b A Comparison of the Effects of a Devaluation and an Equivalent Spending Cut, $\sigma = 0.2$

	Value of γ		
	0	0.5	1.0
A. Ratio of a Percentage Devaluation to a Percentage Cut in Spending for the Same Reduction in the Trade Deficit	1.75	1.58	1.25
B. Effects per Percentage Cut in G			
Price of Output, $\hat{P}_n$	−0.25	−0.34	−0.55
Employment, $\hat{N}$	−0.82	−0.74	−0.55
Real Profits, $\hat{\pi} - \hat{P}_n$	−0.57	−0.57	−0.55
Price of Capital, $\hat{P}_k - \hat{P}_n$	0.20	0.27	0.44
C. Effects per Equivalent Devaluation			
Price of Output, $\hat{P}_n$	0.47	0.51	0.76
Employment, $\hat{N}$	−0.16	−0.28	−0.48
Real Profits, $\hat{\pi} - \hat{P}_n$	−0.63	−0.58	−0.48
Price of Capital, $\hat{P}_k - \hat{P}_n$	1.02	0.79	0.39

Source: Table 8.3b.

The first two rows of panel C show again the stagflationary effect of devaluation. The third and fourth rows show the effects on real profits and the relative price of capital goods. With the elasticity of substitution equal to zero, both effects are significantly larger than the effects of a spending cut for the same effect on the trade balance, except with nearly complete indexation. With the elasticity of substitution equal to 0.2, the real profits effects are about the same (-0.57 versus -0.58) with $\gamma = 0.5$, but the effect on the cost of capital is much larger for the devaluation than for the spending cut.

With no wage indexation, a spending reduction has a much smaller negative effect on investment incentives and a slightly higher effect on employment in the N sector than a devaluation has, and it is of course deflationary rather than inflationary. With high indexation the effects of the two alternatives on investment incentives and employment are about the same; the big difference is in the movement of the price level.

These results suggest that if the source of the problem is a shock to the terms of trade in an essentially noninflationary initial situation, the best policy is a reduction in absorption with no devaluation and no wage indexation. An absence of wage indexation will be easiest to maintain if the initial situation is one of price stability. It would be hard to sustain in the face of devaluation-induced inflation, however. Thus, in the situation facing Kenya in 1979–80, the best program may well have been a spending reduction as needed to reduce absorption, but no devaluation and the maintenance of nonindexation of nominal wages.

8.4 The Role of Devaluation: Liberalization vs. Stabilization

Stabilization programs generally include devaluation as part of the policy package. In a simple monetary model of the balance of payments, with only one good, the devaluation validates the existing money stock as an equilibrium by raising the domestic price level. Indeed, the model of section 8.2 shows the effect of devaluation on the price of nontraded output, P_n. It seems unlikely that devaluation would be proposed solely for this purpose, however. If the only problem is a disequilibrium money stock, the supply of money can be reduced to restore equilibrium.

More commonly, devaluation is proposed to eliminate, or at least to reduce, a current-account deficit. This benefit must be balanced against the concomitant depressive effect on output, profits, and investment in the nontraded sector, as shown in section 8.3. The results there suggest that devaluation may not be an appropriate component of a stabilization program in countries with an inelastic supply of exports and with intermediate imports. These include many of the developing countries of Africa, which still rely on one or two agricultural products as their principal exports. In the light of this argument, one might ask what is the appropriate role for devaluation in these countries. In answer to this question, it is useful to distinguish between stabilization and liberalization.

A case of pure stabilization arises when a country that is roughly in internal equilibrium is hit by an external shock that necessitates a reduction in absorption. The terms-of-trade deterioration in 1979–80 in Kenya is an example. In this case domestic absorption has to be reduced unless there is clear evidence that the disturbance is temporary and the means to finance the deficit are at hand. If the disturbance appears likely to last indefinitely, for example, if the terms-of-trade follow something like a random walk over time, or if financing is not available, spending must be reduced. But a devaluation may only import inflation and depress profits, with little effect on the current-account deficit in the short run. The problem is that absorption is too high, not that the country is insufficiently competitive in trade.

Alternatively, consider a country with a protracted disequilibrium generated by budget deficits and monetary expansion. If the exchange rate is not allowed to move, perhaps following a crawling peg, then import controls and export subsidies are likely to appear to contain the current-account deficit. As the disequilibrium continues, the real exchange rate will appreciate, and increasing stringency of controls will be required. In this case *liberalization* would be appropriate. This would be a package of a decontrol of imports, an elimination of export subsidies, and devaluation to restore an equilibrium real exchange rate. The liberalization could be independent of stabilization. A country could, for example, liberalize in trade and move to a crawling peg after the initial discrete devaluation. Liberalization programs can also produce stagflationary results, however, as shown by Buffie (1984). But devaluation is an appropriate component of a liberalization package.

Stabilization and liberalization can be combined if the objective is twofold: stabilization after a protracted period of disequilibrium, and liberalization to rationalize production and make efficiency gains. The argument here, though, is that it should be clear whether the devaluation is aimed at carrying out the stabilization or the liberalization goal. The former might not be useful, and mixing the two together can result in devaluation being included in a pure stabilization package where it is not needed.

Kenya in 1980 may have been an example of a country in need of pure stabilization. The external shock was a terms-of-trade deterioration caused by a temporarily strong position after the coffee boom. There was no clear history of domestic inflation or overvaluation of the currency in real terms. The 1983 *World Development Report* cites Kenya as a country with a relatively low degree of trade controls. Because Kenya needed to reduce absorption, the devaluation may have been counterproductive. The case of Tanzania may be more complicated. This is probably a situation of a country's maintaining a long disequilibrium by using real exchange rate and trade controls. There the need for *stabilization* versus the need for *liberalization* is a basic choice facing policy makers. The two can be kept separate, however, and devaluation should probably be considered part of a liberalization program, independent of the decision on stabilization.

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Comment Jacques R. Artus

Branson's paper is an important contribution to the literature on the design of stabilization programs. In a research area in which dogmatic views are so common, it is a refreshing attempt to rely on the analytical and empirical evidence. Moreover, it focuses on a very timely issue, namely, whether adjustment to a lasting deterioration in the external terms of trade can be achieved better through devaluation than through a cut in government spending.

Although I like Branson's basic analytical approach because it is well rooted in economic theory, I have serious reservations about the specific empirical application and the policy conclusions derived from it. Taking first the model and the parameter estimates as given, I believe that Branson is going too far when he states that his results strongly suggest that a country with an economic structure such as the one of Kenya should adjust through a cut in government spending rather than through a devaluation. The results warrant a much more subtle conclusion. If we look at the key estimate corresponding to an elasticity of substitution between value added and imported inputs (σ) of 0.2[1] and an indexation coefficient (γ) of 0.5, the decline in employment is nearly *three times larger* when the adjustment is sought through a cut in government spending rather than through a devaluation (see table 8.1). This is a very high price to pay to avoid the two disadvantages of devaluation: the increase in the price of output, and the marked rise in the relative price of imported capital goods.

Furthermore, the disadvantages of devaluation are overstated. In particular, the rise in the price of imported capital goods could be a benefit in disguise. Since the elasticity of the domestic supply of saving with respect to the yield on saving is probably small, the amount of investment may be unaffected. The effect is instead likely to be a substitution of domestically produced capital goods for imported capital goods, through changes both in production techniques and in the structure of production. There could also be a change in the pattern of development toward more labor-intensive techniques of production and economic activities. Given the existence of a large pool of unemployed labor, the ultimate effect could be a significant rise in economic growth.

In contrast, Branson understates the disadvantages of a cut in government spending. The resulting reduction in economic activity would likely have a negative effect on private investment. Entrepreneurs do not add to their capital stock when a large part of it is idle. Moreover, a cut in government spending would probably

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mean a decline in public investment and social expenditures. Ultimately, there is no doubt that in Branson's model the "size of the pie" is smaller with the cut in government spending than with the devaluation, since output is less and the current-account balance remains unchanged. Unless it leads to lower investment, the cut in government spending could imply a much lower private consumption than the devaluation would. Thus, it is not obvious that the cut in government spending would be more socially and politically acceptable than the devaluation.

Even more important, I believe that some of the specific values assigned to key parameters of the model should be modified. Once this is done, the model would lead to the conclusion that devaluation is clearly the better policy. In particular, the value of 0.1 assigned to the supply elasticity of exports with respect to their own price (s_a), is much too low.[2] There is considerable empirical evidence on the agricultural response to prices in Sub-Saharan African countries. Most studies find that the supply elasticity for the cash crops exported by those countries are in the ranges 0.3 to 0.5 in the first year and 0.5 to 1.5 after three to five years.[3] Of course, the response will be influenced by the initial situation and the overall policy strategy of the authorities; the response will tend to be relatively small if the initial price is already sufficient to ensure that the plantations will be well maintained and well harvested, or if there is a severe shortage of credit, fertilizer, and other inputs. This was not the case in Kenya in 1980. Moreover, Kenya's exports of manufactures account for about 20 percent of its total nonoil exports. The supply elasticity for those manufactures is probably sizable.[4]

It is also likely that the value Branson assigns to the elasticity of substitution between value added and imported inputs in the nontraded sector (σ) is too low. He indicates that the 0.2 estimate is based on the work of Bruno and Sachs. The problem is that the estimate of Bruno and Sachs referred to the substitution between value added and intermediate inputs in industrial countries. Basically, those authors were looking at the effect of changes in the prices of fuels and raw materials on their uses in production. This price effect tends to be small because it is difficult to substitute labor and capital for either fuels or raw materials, say, in the production of steel. The issue is quite different in Kenya. A large part of the imported inputs used in the Kenyan nontraded sector is accounted for by semifinished products. A change in the exchange rate can affect the demand for these products even if there is no change in the techniques of production. First, some products may be manufactured in Kenya rather than imported. Second, some of the relatively few specific sectors that import much of the semifinished products and contribute little domestic value added may have to scale down their production.

The use of more realistic values for the supply elasticity of exports (s_a) and the elasticity of substitution between domestic value added and imported inputs (σ) would be enough to tilt the scale in favor of devaluation in Branson's model. The results appear to be particularly sensitive to the value of the σ parameter. For example, in the central case in which $\gamma = 0.5$, the increase in the value of σ from zero to 0.2 reduces by half the negative effects of devaluation on employment and real profit (see table 8.1). In contrast, the unfavorable effects of the cut in government spending are not reduced when the value of σ increases.

Although devaluation would emerge as the better policy in Branson's model once more realistic values were chosen for the important parameters, it is easy to conceive of an extended model in which this might not be true. A cut in spending could be a good alternative if it were limited to categories of expenditures that have a relatively high import content and a relatively low marginal utility. It could also be a good alternative if the model were extended to include other countries exporting the same primary commodities. If all those countries shared the same external adjustment problem, devaluation by all of them could lead to a deterioration in their terms of trade.

Finally, and on a different level, the situation of Kenya in 1980 was far more complex than Branson indicates. In particular, import controls were extremely pervasive. Indeed, the 1983 *World Development Report* cited by Branson classifies Kenya as one of the developing countries with the highest degrees of protection of domestic manufacturing (see p. 62 of that report).[5] Moreover, by 1980 budget deficits and monetary expansion had been a problem for several years. Monetary expansion (broad money) averaged 23 percent per annum over the years, 1975–79, during which time the inflation rate averaged 14 percent per annum. Since the exchange rate had not been allowed to move, the international competitiveness of Kenya had deteriorated substantially. These considerations largely explain why Kenya did choose to devalue in 1981. Nonetheless, this observation should be viewed as an aside. Branson's paper is mainly concerned with the case for devaluation when a country with the economic structure of Kenya is experiencing a lasting decline in its terms of trade, rather than the specific policy options of Kenya in 1980. With respect to this broad analytical issue, Branson's analytical framework is moving us in the right direction. But more work, especially on the empirical side, has to be done. At the present state of knowledge on the subject, Branson's policy conclusions are thus rather premature.

Notes

1. Branson indicates that he took the estimate $\sigma = 0.2$ from Bruno and Sachs (1979). Since this is a point estimate, it is unclear why he presents stimulations for $\sigma = 0.2$ and $\sigma = 0$ and speaks of a range from 0.2 to 0. The range should extend on both sides of the 0.2 estimate.

2. Branson refers to this elasticity as the "elasticity of agricultural output with respect to its own price" because of his assumption that all agricultural output is exported and nothing else is exported.

3. See, for example, Marion E. Bond, "Agricultural responses to prices in Sub-Saharan African countries," *International Monetary Fund Staff Papers* 30, no. 4 (December 1983).

4. Logically, one should consider exports of both goods and services rather than exports of goods only. International tourism, for example, is an important source of foreign exchange for Kenya, and there is little doubt that it is influenced by exchange rates.

5. The report classified Kenya as a country with a relatively low *overall* degree of price distortion mainly because Kenya did not have major price distortions in agriculture or in the energy sector.

Comment Ravi Gulhati

The main conclusions of the Branson paper are as follows. First, in 1979–80 Kenya experienced an external shock, a deterioration in its terms of trade. Internally, the situation was "roughly in internal equilibrium." Second, the appropriate policy response by the Kenyan government would have been to reduce absorption and not to devalue. Third, the Kenyan case is typical of many African countries, which rely on few primary exports whose supply tends to be inelastic. Those countries also use imported intermediate goods that constitute a large share of their total imports. In all those African countries devaluation is the wrong policy. Finally, by contrast, the Tanzanian case was characterized by a long disequilibrium accompanied by a proliferation of monetary controls. Branson advocates instead the use of devaluation when reforms are aimed at liberalization.

My own assessment of Kenya in 1979–80 is quite different from Branson's. The country faced a major structural adjustment problem at that time, and the deterioration in the terms of trade was merely aggravating the situation. That structural problem was reflected in a number of more specific problems. First, the rate of growth of agricultural production had slowed down because of the exhaustion of land with high agricultural potential; the lack of technological programs suitable for the cultivation of arid and semiarid areas; an overvaluation of the Kenyan shilling and a policy of protection against imports of

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manufactures produced in the domestic economy, which made the internal terms of trade disadvantageous for agriculture; and the adverse effects of government intervention in the pricing and marketing of several agricultural goods. Second, the growth of manufacturing production had also decelerated because of a reduction in the growth of the internal market and a breakdown of the East African Common Market. Third, an acceleration in the population growth rate was exerting pressure on arable land, accentuating already serious underemployment and adding to budgetary problems by expanding fiscal outlays for education and other government services.

In those circumstances the economic policy recommended by Branson, which would merely have reduced effective demand in order to adjust to the deterioration in the terms of trade, would have been grossly insufficient. What was required was a policy package that combined reduced outlays, devaluation, trade liberalization, improved budget controls, and measures to reduce fertility.

To assess the role of exchange rate policies in securing economic recovery in Africa, we need an analytical framework that addresses not only short-term stabilization issues, but also questions bearing on diversification in the commodity and market structure of exports; reduction in the import component of consumption, production, and investment without violating the canons of dynamic comparative advantage; and mobilization of domestic savings and external resources. The Branson model does not provide such a framework. The author's position is instead characterized by a great deal of unnecessary pessimism regarding the response of export production and import requirements to price adjustments. Elsewhere I have argued that although structural rigidities are present in many African countries, there are no grounds for unqualified pessimism about elasticity (Gulhati, Bose, and Atukorala 1985). But it is true that the short-run response is unlikely to be large unless excess capacity exists and can be activated quickly. What is essential in most African countries is a set of policies (of which the exchange rate is a critical part) that will bring about diversification in the structure of production and corresponding changes in the supply of tradables—both exports and import substitutes.

Reference

Gulhati, R., Bose, S., and Atukorala, V. 1985. Exchange rate policies in eastern and southern Africa, 1965–83. Washington, D. C.: World Bank Staff Working Paper.

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