Modeling Stabilization Policy for the LDCs in an International Setting

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The major concern of both empirical and theoretical macroeconomic analysis of the LDCs has *not* been the question of stabilization within the framework of national income determination models. In a recent survey of the state of the art regarding the use of economy-wide models for LDCs, for example, Blitzer et al (1974) do not even include a chapter on macroeconomic income-determination models. The focus, instead, has been on growth, with the analytical framework provided by supply-oriented models characterized by very limited or no substitution possibilities and by binding capital and/or foreign exchange constraints.

Such an emphasis reflects two widely held views. 1) Growth is relatively a far more important economic objective (and stabilization less important) in the LDCs than in the DCs. 2) Keynesian income-determination models are inappropriate or of very limited appropriateness for LDCs.[1]

Some exceptions to the predominant view have long existed. Often these exceptions, moreover, have included considerable concern about the role of the foreign sector in stabilization. The participants in the "structuralist-monetarist" controversy in Latin America, for example, have accorded a significant role to stabilization policies, with special emphasis on the foreign sector.[2]

These exceptions, moreover, have been growing recently. The recognition of the existence of considerable underutilized capacity has increased

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[1] Rao (1952) presents an early statement of this view. Ranis (1974) gives a recent summary.

[2] For a summary of the "structuralist-monetarist" debate, see Campos (1964).

interest in the use of national-income-determination models for stabilization purposes.[3] A large number of Keynesian-based national-income-determination models for LDCs have been constructed and utilized.[4] Even the strongest advocates of supply-oriented capital-and-foreign-exchange-constrained analysis of the LDCs seem to be having second thoughts about the importance of short-run factors and stabilization problems. Throughout the above-cited survey by Blitzer et al (1974), for example, references to the need to treat short-run features (e.g., price responses, capacity-utilization determination, aggregate-demand-related policies) are frequent.

At the same time that interest in and use of stabilization models for the LDCs has been growing, controversies have emerged over the specification of income-determination models for the DCs. In the past decade, critics have claimed that deficiencies in the theoretical structure make any analysis of stabilization policies based on such models suspect. Recently, however, some convergence seems to have occurred at least in regard to the nature of the issues. Ando (1974), Blinder and Solow (1973), Hansen (1973a) and others have attempted to adjust the IS-LM model to explore these controversies.

Given some convergence on the nature of stabilization issues in the DCs and given the increasing preoccupation with stabilization problems in the LDCs, the time seems ripe to re-examine the applicability of modern stabilization analysis to the special situations of open LDCs. This paper begins such an attempt. The strategy is to examine, in turn, each of the components of recent models for stabilization in DCs and to consider how they need to be altered for analysis of stabilization issues in LDCs.

The prototype model for the DCs used as a starting point (Table 1) combines the features of the closed economy model of Ando (1974) and the analysis of international capital movements of Branson (1974).[5] This model is somewhat complex in order to incorporate a number of features discussed in recent controversies. Solution by differentiation does not lead to simple elegant expressions. For understanding beyond that provided below, the reader is referred to the papers by Ando and Branson.

Before proceeding to consider how the components of such a model must be modified in order to capture the features of LDCs, a caveat is in order. The LDCs are far from homogeneous. In terms of almost any relevant feature the range across countries is enormous. In what follows, therefore, the suggested modifications reflect characteristics not necessarily common to all LDCs, but at least to a significant number of them.

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[3]For an illustration, see Schydlowsky (1971, 1974).

[4]For an example and some references to others, see Behrman (1974, 1975).

[5]These models are equilibrium models. In recent years Barro and Grossman (1971), Clower (1965), and Leijonhufvud (1968), among others, have focused on disequilibrium features of national income determination. Their criticism of equilibrium models is provocative, but the disequilibrium mechanisms proposed to date are quite arbitrary and *ad hoc*.

1. Labor Market and Determination of Price

Equations (1) through (4) are the relations for the labor market and for the determination of prices and wages in a recent model for DCs.

Equation (1) depicts the short-run relationship between output and the required manhours for production. Producers' durable equipment is assumed to be in the form of putty-clay. At any point in time the economy has a collection of machines whose labor-output ratio was determined by the technology and the expected relative prices at the time each machine was manufactured. Given the relative prices of the current period, machines (and the labor associated with them) are used in production in order of their efficiency until the desired output is produced.

Equation (2) gives the unemployment rate as a function of manhours and population characteristics. It incorporates into one expression the determination of hours worked per person and the response of the size of the labor force to employment conditions and demographic features of the population.

Equation (3) is a Phillips-curve relation for the determination of the rate of change of wages as a function of the unemployment rate and price expectations.

Equation (4) determines the price level of output under the hypothesis that the price is determined by a (possibly lagged) mark-up on the minimized average cost. The price level should vary proportionally with the money wage level and reciprocally with long-run productivity. The mark-up factor is μ. Since the mark-up may vary in the short run with the utilization of capacity, the unemployment rate is also included in this function.

For the LDCs modifications are necessary in order to capture two important features.

1) Most of the LDCs are characterized by dualism of their labor and product markets.[6] The modern sector is market-oriented and pays wages approximately proportional to the value of the marginal product of labor. Its technology is fairly recent, and permits but limited substitution between primary factors.[7] In some countries unions are quite powerful in this sector. Since part of this sector is agricultural, an important source of disturbances usually is the weather.

The traditional sector is much less market-oriented. In most countries a major component of this sector is noncommercial agriculture. For this subsector the marketed surplus often is a small part of total production

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[6]This dualism is not necessarily between agriculture and industry. Generally, in fact, both of these sectors have modern and traditional components.

[7]The movement towards putty-clay considerations in the macroeconomic literature for DCs lags substantially the emphasis on *ex post* fixed proportions for the modern sector of the LDCs. Eckaus (1955) provides an early statement.

and *may* be an inverse function of price.[8] In this subsector, even more than in the modern sector, climatic variations often cause large disturbances. Factor substitution usually is possible; but the relatively high labor-to-capital ratio often results in disguised unemployment with marginal products substantially below those in the modern sector. Because of family and communal arrangements, however, the share of individual laborers is determined by tradition and is closer to the average than the marginal product.

Equations (1), (2), therefore, may be appropriate for the modern sector (with all the included variables referring only to that sector and with some modification to incorporate the role of weather). The traditional sector, however, is a residual claimant on labor.

Rao (1952) claims that the predominance of disguised unemployment in the traditional sector, instead of open unemployment as in more developed economies, implies a very limited labor supply response to changes in aggregate demand. This is the case, he maintains, because (i) the disguised unemployed labor is not aware of being unemployed and (ii) their share of income in the traditional sector is greater than the market wage (which reflects the low marginal product of labor). The supply of labor for the modern sector, he concludes, is very inelastic and expanded aggregate demand results primarily in price increases.[9]

The dominant view of the impact of dualism on the labor market, however, features the model of Lewis (1954). The average share of labor in the traditional sector, plus a differential for the costs of moving from in the traditional to the modern sector, provides a floor for wages in the modern sector.[10] The average share of labor in the traditional sector is assumed to remain approximately constant over a wide range of sizes for the traditional labor force.[11] Over a substantial range, therefore, the supply of labor for the modern sector will be quite elastic.

Prima facie this might seem to lead to a very Keynesian case in the modern sector with an "unlimited supply of labor" at a fixed wage. But

[8]If this response is inverse or positive but small, changes in aggregate demand may cause primarily price and not output changes for basic wage goods. The analysis in Behrman (1968), however, suggests that while these responses may be inverse, they also may be positive and quite large.

[9]That the average labor share in the traditional sector is more than the marginal product of labor in that sector, of course, does not necessarily imply that the supply curve of labor for the modern sector is very inelastic. The Lewis model discussed in the next paragraph, in fact, comes to the opposite conclusion about elasticity with respect to the real wage.

[10]The discrepancy between the marginal products in the two sectors obviously leads to static inefficiencies.

[11]The average share per laborer is generally assumed to be fixed by tradition until enough labor exits from this sector so that the marginal product of labor rises to this level and market prices begin to dominate (Fei and Ranis, 1964).

this wage is fixed in real terms, so the situation is very classical in an important sense. In a one-good model with no money illusion on the part of the laborers in the traditional sector, in fact, Equation (3) could be replaced by an equality between real wages in the modern sector and the exogenously given traditional average labor share. Equilibrium employment and output would be irresponsive to changes in aggregate demand.

A more realistic assumption is that the elasticity of the wage with respect to the price on the labor supply curve for the modern sector is positive, but less than one. It is less than one for at least two reasons. (i) At least in the short run, laborers apparently have some money illusion. Because the laborers in the traditional sector receive much of their income in kind, however, such money illusion may be less for them than for workers in DCs. On the other hand, less effective communications systems may work in the opposite direction. (ii) The overall price index is a weighted average of the price for the modern sector and the price for the traditional sector. One characteristic of dualism is that the former is more responsive to aggregate demand changes than the latter. Moreover, government price ceilings are usually directed largely towards traditional goods because of their importance as basic wage goods for modern sector laborers. Therefore, the real wage in terms of traditional goods can vary much less than the real wage in terms of all goods. As a result some response to changes in aggregate demand is generally possible in the modern sector, although probably not as much as in many DCs.

In some LDCs, however, unions or legal wage rates have substantial effects on the wage level in the modern sector. Where either of these factors are important, the modern-sector labor market may be extremely Keynesian with an exogenous fixed nominal wage. Shifts in aggregate demand should have substantial employment and output impact in those modern sectors. In such cases Harris and Todaro (1970) posit that in equilibrium, nevertheless, some unemployment which can not be eradicated by aggregate demand policies should be expected in the modern urban areas. They claim that rural-urban migration occurs as long as the expected income (taking into account both the higher modern-sector wage and the probability of obtaining employment) exceeds the traditional average labor share. The result will be some open employment as long as the government or unions cause a differential to persist between the traditional average labor share and the modern-sector wage.

2) The foreign sector plays a much more important direct role in labor, production and price relations in most LDCs (and probably in most small open DCs) than is indicated in the model of Table 1. Four modifications of the counterparts of Equations (1) — (4) for the modern sector need to be made to reflect the impact of the foreign sector.

(i) Some imported intermediate inputs and raw materials are critical in the production process. The elasticity of substitution between such imports and domestic factors is very low or zero. Especially in the disequilibrium exchange rate system common for many LDCs, the constraint

on production and employment may not be the putty-clay stock of machinery and equipment, but the availability of these imported inputs. Equation (1) needs to be modified to reflect this possibility.

(ii) The derivation of Equation (1) also needs to be modified due to the fact that technologies used in the modern sector are largely imported from DCs with much different factor endowments. Very little choice may be available (or may be thought to be available) even *ex ante* for the capital-labor ratio of the LDCs. Therefore, the putty-clay response to expected relative prices is constrained to a choice among relatively capital-intensive technologies. What Eckaus (1955) calls the "factor proportions problem" limits the absorption of labor by the modern sector.

(iii) The discussion above suggests that for many LDCs Equation (3) should be replaced or modified by considerations relating to the real labor share in the traditional sector, government minimum wages and union pressures. If some version of Equation (3) remains, however, one further modification needs to be made. In many LDCs an important and generally available index of inflationary expectations is the rate of change of the exchange rate. In addition to the history of past inflation, therefore, this variable (or some function of past values of it) should be included for such countries.

(iv) In light of the widespread importance of intermediate and raw material imports, Equation (4) also should be modified to reflect markups on imports as well as on labor. Changes in the international prices or in import policies, therefore, have direct effects on the domestic price level.

2. Product Market

Equation (5) in Table 1 is the definition of net national product. Equations (6) through (10) describe the demand for real output.

Equation (6) is the consumption function. In a life-cycle hypothesis variant, real consumption depends upon expected real disposable income (approximated by a distributed lag of actual real disposable income) and net worth.

For the LDCs, several hypotheses about private consumption behavior have been suggested. (i) Because of the existence of a large number of individuals at or near a subsistence income level, consumption may not be proportional to income even in the long run. If true, the high marginal propensity to consume at low income levels, *ceteris paribus*, may imply a relatively high multiplier. (ii) Retained business earnings (although not necessarily from corporations) are a relatively important source of savings. Therefore, a division at least between labor and non-labor income might be desirable. (iii) The marginal propensity to consume out of the income generated in some sectors — especially those related to exports — may be higher than elsewhere in the economy. The inclusion of a separate argument in the function for income from exports thus might be desirable. This modification would further increase the impact of the foreign sector on stabilization.

Mikesell and Zinser (1973) review the existing empirical evidence for private consumption behavior in LDCs. Some, although not unquestionable, support has been found for all three propositions.

Equation (7) is the investment function. For the DCs in which capital markets function well so that the cost of capital is well defined, investment decisions are based on a comparison of the present value of the expected stream of income generated by the investment and the cost of investment. Simultaneous variables which enter into the investment decision, therefore, include the capitalization rate applicable to real assets and net national product in real terms. The appropriate tax rates also have a role.

For some of the more advanced LDCs some evidence exists which supports the use of the same basic formulation (*e.g.,* Behrman, 1972). More generally, however, substantial modifications are needed to reflect special aspects of capital markets, social overhead capital, and international considerations.

(i) Domestic capital markets in LDCs often do not function well. Markets are very fragmented, especially between the traditional and modern sectors. In the modern sector legal limits on nominal interest rates frequently are effective so that credit rationing occurs in bank markets. Government planning organizations also often attempt to control the allocation of physical capital by nonmarket means.

The net result is that much of the domestically financed investment does not pass through a capital market (or, at least not through "the" capital market). Instead it originates in retained earnings or in direct flows from the government. Government policy is often directed towards increasing the former source through changing the terms of trade by price ceilings and foreign trade policies in favor of sectors in which investment is desired. Quite commonly industry is so favored over primary production, and import substitution or nontraditional exports are favored relative to traditional exports.

To capture these features, direct financial flows from the government and quantitative allocations mechanisms need to be included in the investment function. To represent the impact of policies which work through altering terms of trade, a multisector model is required.[12]

(ii) The development literature emphasizes repeatedly the role of social overhead capital in the development process. Because of externalities and increasing returns to scale over the relevant range, Rosenstein-Rodan

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[12]Hansen (1973b) also argues that substantial disaggregation is necessary because policies which operate on relative prices are pervasive. He therefore works on a commodity level of aggregation in his Afghanistan and Thai models. For LDCs with larger and more complex modern sectors such a level of disaggregation would be unmanageable for empirical work. Nevertheless more disaggregation than is common for models of the DCs is necessary because of the relative price effects, and perhaps some important commodities should be treated individually. Of course aggregate factor constraints need to be maintained no matter what is the degree of disaggregation (although it is not clear how these constraints are maintained in Hansen's commodity supply relations).

(1961) and others maintain that the government must increase substantially such social overhead capital in order to induce private investment. The role of social overhead capital in determining the stream of expected net income from investment therefore should be made explicit.

(iii) International considerations enter into investment decisions in at least two important ways.

First, in the modern sectors of many LDCs a not inconsiderable portion of the capital stock originates from direct foreign investment. One implication of this foreign ownership is that for such investment the relevant cost of capital reflects the opportunity cost in the international capital market (modified by local tax, repatriation and earnings regulations and expected exchange rate movements), not in the domestic market. Another implication is that net factor payments abroad may have a stabilizing influence if they are determined as a residual.

Second, for many of the LDCs much of the machinery and equipment for investment in the modern sector is imported. This relates to the factor proportions problem referred to above because of the concentration on developing relatively capital-intensive technology in the DCs which produce these imports. It also means that exchange-rate policy and other import policies have important roles in the determination of the cost of capital. If the elasticity of substitution between domestic and foreign investment goods is in fact very low and quantitative restrictions are an important component of trade policy as in many LDCs, moreover, the quantity of imported capital goods may constrain real investment and should be included as an argument in the investment function. Particularly in such cases, the availability of foreign capital inflows (both official and private) may directly or indirectly affect investment (e.g., see Areskoug, 1974).

Equation (8) defines total government expenditures as the sum of exogenous central government expenditures and endogenous local government expenditures. The latter respond fairly strongly to cyclical conditions of the economy.

For LDCs current government expenditures often (but not always) are more centralized than in DCs such as the United States. Nevertheless, there remains a large effectively endogenous component. The government is a relatively large employer in comparison to total modern-sector employment, the wage bill makes up a substantial portion of its expenditure, and cuts in this expenditure as part of stabilization policy would be extremely risky politically in most cases.

Government expenditures also generally are directly affected by foreign sector conditions. This is so because there usually is some response to available revenues, and taxes related to the foreign sector are a major source of variance in those revenues (see below). A further effect is through official capital inflows. The available evidence suggests (although not conclusively, see Mikesell and Zinser, 1973) that such flows are diverted partly to current government expenditures.

Equation (9) is the import function for DCs. Imports respond positively to the level of income and the domestic price level and inversely to the exchange rate (defined as the number of units of domestic currency per unit of foreign currency).

For most LDCs, as noted above, imports play a critical role in the provision of noncompetitive raw materials, intermediate inputs, and machinery and equipment capital goods for the modern sector. To capture the differential impact of various types of imports on growth and stabilization, therefore, some disaggregation is necessary.

Because many of these imports are noncompetitive and because import substitution policies often have reduced competitive imports to a low level, the price and exchange rate elasticities usually are low in absolute value. The income elasticities, on the other hand, are quite high. Some disaggregation, however, once again probably is necessary because of differential responses to different components of total income (e.g., the modern versus the traditional sector, investment versus consumption expenditures).

Policies to regulate imports are widely thought to be among the most potent available to the governments of LDCs in their quest towards growth, distribution and stabilization objectives. Among the policies often utilized are multiple exchange rate systems, tariffs, direct government imports, prior import deposits and quantitative restrictions.[13]

Quantitative restrictions frequently are used to maintain a disequilibrium system with overvalued exchange rate(s) and severe foreign exchange constraints. Disequilibrium is allowed to persist because of perceived negative distribution, inflationary and political effects of devaluation and widespread convictions about inadequacies of allocation by prices. The existence of strong vested interests in the disequilibrium system (e.g., owners of factors in import-substitution subsectors, the recipients of import licenses, or the government bureaucracy) also help to perpetuate the continuance of these systems. Due to substantial excess demand, nevertheless, controls generally are relaxed when foreign exchange becomes available from export booms or increased capital inflows. The import functions need to be modified, therefore, not only to include the above-mentioned policy tools, but also the availability of foreign exchange.

Equation (10) is the export function for the DCs. Exports are assumed to respond directly to the exchange rate and inversely to the domestic price level.

For LDCs the structuralists and a large number of other observers (e.g., Heller, 1954 and Higgins, 1968) maintain that a major source of instability is fluctuations in the value of exports. Not only do such variations directly affect total aggregate demand, they also change aggregate demand through the government deficit because of the dependence of government revenues on international trade revenues. Furthermore, they alter

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[13]In some LDCs considerable smuggling exists in attempts to avoid these policies.

production in the modern sector because of the tight foreign-exchange constraint and the low elasticity of substitution for critical imported inputs. The holders of this view conclude that general fiscal and monetary policy will not be very effective in stabilization attempts. Instead emphasis must be placed on exchange rate and tax policies directly related to exports. Some observers further conclude that movements towards less dependence on the foreign sector is desirable in order to lessen its destabilizing influence.

The seminal investigation of MacBean (1966) has been followed by a number of studies which suggest that the above-hypothesized strong relationship between export instability and overall instability is exaggerated. Mathieson and McKinnon (1974) even conclude that there is some slight indication that "outward-looking" trade policies may increase stability. MacBean (1966) posits that two factors lie behind the lack of a strong relationship between domestic variables and export fluctuations: i) the low value of the foreign-trade multiplier in part because of repatriation of factor returns to foreign owners and because of leakages into taxes on exports, and ii) the distributed lag nature of reactions to changes in exports.

These studies do bring into question the once-conventional wisdom about the destabilizing influence of international markets. The issue is far from resolved, however, because of the failure of such studies to specify adequately the structure (including the lags in responses, as MacBean's second point reflects) of the LDCs. Even the strongest doubters about the importance of international market fluctuations, moreover, grant that export variations probably are destabilizing in those cases in which exports are very concentrated in a few products.

The correct specification of the export function, therefore, is a critical component of a stabilization model for most LDCs. For many countries exports must be divided into two categories which differ substantially in exchange rate and tax-subsidy treatment: traditional (largely primary products) and non-traditional (often industrial products). The former often are major sources of government revenues. The latter frequently are subsidized in hopes of diversifying sources of foreign exchange and gaining entry into faster-growing markets. For the traditional exports of some LDCs, finally, the existence of some market power (perhaps within the framework of international commodity agreements) also needs to be represented.

3. Financial Markets and Assets

The financial market for the DCs in Table 1 is patterned on the extensions of Tobin's (1969) portfolio equilibrium model by Ando (1974) and Branson (1974). Equations (11) — (14) are demand functions of private-sector asset holders for four imperfectly substitutable assets: equities, bonds, foreign securities and money. Equation (15) is the definition of the net worth of the private sector. The demand for each asset is a function of

the rates of return (with a fixed zero rate of interest for money) and income (with a transactions demand for money). The nominal supplies of money and bonds and the interest rate for foreign securities are assumed to be exogenous.

All assets are gross substitutes. Domestic asset-holders must hold given quantities of equities and bonds, neither of which are traded internationally. Domestic asset-holders face an elastic supply of foreign securities at an interest rate fixed internationally. They are free to trade between money and foreign securities. Any purchase of the latter implicitly reduces domestic foreign exchange by an identical amount.

Equations (16) — (18) are relations between holding and capitalization, real and nominal, and holding and international rates for the three respective non-zero return assets. Equations (19) — (22) are simple hypotheses about the formation of expectations. Equation (23) determines the market value of real assets by capitalizing the expected stream of income from *existing* assets.

Branson (1974) analyzes a similar model for DCs. His main results are two. (i) The inclusion of non-internationally traded assets restores the effectiveness of monetary policy as measured by the possibility of altering rates of return on domestic assets relative to foreign securities. (ii) The relative impact of open-market operations on domestic-asset rates depends on which asset is the instrument of open-market operations.

For the LDCs a number of changes need to be made. As discussed above, asset markets generally are quite fragmented, function very poorly and are relatively unimportant in channeling investible funds. Dualism is a common feature, with changes in the organized market having but limited impact on the unorganized sector. Government-bond markets and private-security markets both generally are quite small.

Monetary policy usually is limited in scope, especially internally. The very small bond market precludes substantial open market operations. The nominal money supply is not exogenous, but is dependent on *de facto* or *de jure* obligations to finance the government deficit or on foreign exchange movements. Monetary instruments include marginal and average reserve requirements, rediscount rates, prior deposits on imports, and exchange rate(s). Also important are interest rate ceilings, and quantitative restrictions on internal credit and on international capital flows. The use of these latter policies requires that relations in the model be modified to reflect rationing due to quantitative variables. Uncertainty about future quantitative policies also may complicate the formation of expectations in Equations (19) — (22).

The foreign sector impinges on the financial markets in a number of important ways. As indicated in the previous paragraph, foreign exchange movements have substantial impact on the domestic money supply and the major discretionary monetary operations are in the foreign sector. Foreign direct ownership of domestic capital in the modern sector often is important, so Equation 22 or 23 must be modified so that only the value

of the domestically owned portion of the capital stock enters into domestic portfolio decisions.

In a few LDCs, such as Mexico (see Ladenson, 1974), moreover, the interest rate in the international market may effectively create a liquidity trap for the organized monetary market. In general, however, the international interest rate does not peg the domestic rate for at least one of two reasons: (i) Quantitative restrictions on capital movements break the link between domestic and international capital markets. (ii) The existence of Bransonian internationally nontraded assets which are not perfect substitutes for internationally traded assets permits some independence in interest rate movements.

4. Identities and Miscellaneous Relations

Equations (24) — (28) define disposable income, private savings, income from capital and the balance-of-payments surplus. For the DCs these definitions are basically self-explanatory. Note that capital gains on existing assets arise because of changes in the capitalization rate or changes in the expected stream of income from these existing assets due to varying economic conditions. They do not, of course, include additions to real assets from current net investment. For the LDCs the major special problem is the evaluation of capital gains because of the virtual absence of markets for internal equities.

Equation (29) is the tax function (net of transfers). For DCs the major complication behind this simple representation often is the treatment of the corporation income tax. Therefore income from capital is included as an argument in this function in addition to total personal income.

In LDCs conditions are much different for tax collections. (i) The traditional sector is not monetized. (ii) Literacy is relatively low. (iii) Systematic accounting systems are not widely used. (iv) The legitimacy of government revenue collection is less widely accepted and the tradition of voluntary compliance is less strong. (v) Lack of resources, low civil service pay, and traditional social relations often make efficient and honest tax collection very difficult.

As a result, the relative significance of alternative sources of tax revenues differ from patterns in DCs. General personal and corporation income taxes are much less important. Instead dependence is greater on import and export taxes, indirect taxes and taxes on income generated by foreign-owned corporations. Taxes related to the foreign sector are much more significant because generally they are relatively simple to administer and difficult to evade. This greater dependence on the foreign sector adds to the difficulties of stabilizing these economies because balance-of-payments considerations may conflict with the use of taxes for stabilization purposes. The more regressive nature of the tax structures with its greater dependence on indirect taxes, moreover, implies less "automatic stabilization" from the tax system than in DCs.

Equation (30) is the government budget constraint which Christ (1968) and others emphasize repeatedly. In a closed economy or in an economy with balance-of-trade equilibrium, this relation need not appear explicitly. The model already contains the private sector accounts and a full recording of transactions between the private and government sectors. If the private sector accounting identities are satisfied, so must be those for the government sector.

5. The Foreign Sector and Stabilization in LDCs

To this point the present paper basically has taken a macro-stabilization model for the DCs and has suggested how it might be modified to fit better the situations of LDCs. Such a procedure, unfortunately, does not lead to a nice neat model whose differentials will tell the story for at least three reasons. (i) The initial model for the DCs is sufficiently complex so that such a process is not very fruitful in that case unless one has considerable empirical evidence about the size of parameters. (ii) The LDCs are not homogeneous. Conditions vary substantially across countries. (iii) Modeling of stabilization in closed LDCs is at a very primitive stage. Many problems — such as how to treat the channeling of investible funds — have not been treated adequately. Therefore, there is not much of a basis on which to add foreign-sector considerations.

Nevertheless, this paper hopefully serves as a beginning. Several interesting points are suggested by the analysis.

(i) The traditional sector is subject to fluctuations originating in natural conditions and in export markets for traditional products. At the same time the traditional sector is fairly independent of fluctuations in aggregate demand originating in the modern sector because of variances in investment in that sector or in the availability of non-competitive imports for that sector. The focus of stabilization questions concerning domestic aggregate demand management, therefore, is the modern sector. Stabilization policy for the traditional sector, in contrast, must concentrate on reducing vulnerability to variations in natural conditions (e.g., through better water control) and in traditional export markets (e.g., through diversification or international commodity agreements).

(ii) If the traditional sector determines the real wage for the modern sector and there is no money illusion, the modern-sector labor market is very classical. Changes in aggregate demand will not alter its employment and production.

(iii) The modern sector often is like a very small, open economy in respect to its dependence on the foreign sector for critical raw material, intermediate and capital imports. Variations in noncompetitive raw material and intermediate imports may be the major cause of fluctuations in this sector (even if the real wage is fixed by the traditional sector). Attempts to maintain disequilibrium exchange rates exacerbate any destabilizing forces originating in the foreign sector.

(iv) Because of the importance of the foreign sector as a source for government revenues, fluctuations therein not only have potentially destabilizing effects on the supply and possibly the demand side, but also through government deficits. Government deficits, in turn, affect the money supply quite directly because of *de facto* or *de jure* obligations of the banking system to finance such deficits. The impact of changes in foreign exchange reserves on the money supply, on the other hand, may tend to be counteracting.

(v) The international capital market generally does not limit stabilization options in LDCs by fixing domestic interest rates. In part this is so because of the existence of Bransonian non-internationally traded assets and because of quantitative restrictions which break the link between international and domestic markets. Probably more important is the lack of integrated and well functioning financial markets — which limit stabilization policies even if there is no access to international markets.

(vi) International capital flows, nevertheless, may have significant destabilizing effects. The mechanism is through varying the constraint on imports, with the resulting supply impact noted above.

(vii) International creditors, moreover, often limit the policy options open to LDCs. Because foreign debts frequently are quite large, LDCs cannot blithely ignore the views of such creditors.

(viii) Given the important role of the foreign sector, perhaps stabilization policies should be directed towards it. Some attempts have been made in this direction, both on the level of individual countries and in cooperation with other countries. Stabilization problems, however, often are viewed as less important than concerns relating to growth, distribution and the foreign economic position. If a temporary foreign exchange surplus is available due to an export boom or increased capital inflows, for example, pressures are enormous to utilize it to alleviate other problems. Only rarely do governments find it feasible to conserve such an excess for use when the next foreign exchange deficit occurs. Only if governments are convinced that the costs of fluctuations are larger than previously perceived or that there are gains in other policy dimensions of increased stabilization are more resources likely to be utilized for stabilization purposes.

Table 1

Macroeconomic Model for DCs

I. Labor Market

Demand for Labor

$$E = E(Z) \tag{1}$$

Supply of Labor and the Definition of Unemployment Rate

$$u = u(E, N) \tag{2}$$

Determination of Money Wage Level

$$\frac{\dot{W}}{W} = W(u, L[\,(\frac{\dot{P}}{P})_{-1}\,]) \tag{3}$$

Determination of Real Wage Rate and Price Level

$$P = W\,f\,(L[\frac{E}{Z}], \mu, u) \tag{4}$$

II. Product Market

Definition of Net National Product

$$Z = C + I + G + X - IM \tag{5}$$

Consumption Function

$$C = C(Y, A) \tag{6}$$

Investment Function

$$I = I(z, r_k, \tau) \tag{7}$$

Government Expenditure

$$G = G_{ex} + G_{end}\,(Y, N, r_k) \tag{8}$$

Import Function

$$IM = IM\,(ER, P, Y) \tag{9}$$

Export Function

$$X = X\,(ER, P) \tag{10}$$

III. Financial Markets and Assets

Demand for Real Assets

$$V = A \cdot f^V (r^h_k, r^r_b, r^h_s, Y) \tag{11}$$

Demand for Bonds

$$B/P = A \cdot f^B (r^h_k, r^r_b, r^h_s, Y) \tag{12}$$

Demand for Foreign Securities

$$\frac{S \cdot ER}{P} = A \cdot f^S (r^h_k, r^r_b, r^h_s, Y) \tag{13}$$

Demand for Money

$$M/P = A \cdot f^M (r^h_k, r_b, r^h_s, Y) \tag{14}$$

Definition of Net Worth

$$A = V + \frac{M + B + S \cdot ER}{P} \tag{15}$$

Relation Between Holding Rate and Capitalization Rate

$$r^h_k = r_k - \frac{r^e_k - r_k}{r_k} \tag{16}$$

Relation Between Real and
Nominal Short-Term Interest Rates

$$r^r_b = r_b - \frac{P^e - P}{P} \tag{17}$$

Relation Between Holding and International
Rate for Foreign Securities

$$r^h_s = r_s + \frac{ER^e - ER}{ER} \tag{18}$$

Generation of Expected Rate of Change of r_k

$$\frac{r^e_k - r_k}{r_k} = F^k (L[\frac{r_k}{r_k}]) \tag{19}$$

Generation of Expected Rate of Change of Prices

$$\frac{P^e - P}{P} = F^P (L[\frac{P}{P}]) \tag{20}$$

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Generation of Expected Rate of Change of Exchange Rate

$$\frac{ER^e - ER}{ER} = F^{ER} (L[\frac{\dot{ER}}{ER}]) \tag{21}$$

Expected Income From Capital

$$\pi^e = F^\pi (\pi, P \cdot L[(\pi/P)_{-1}]) \tag{22}$$

Market Value of Capital

$$P \cdot V = \frac{\pi^e}{r_k} \tag{23}$$

IV. Identities and Miscellaneous Relations

Definition of Disposable Income

$$P \cdot Y = P \cdot Z + r_b \cdot B - P \cdot T + r_s \cdot S \cdot ER \tag{24}$$

Definition of Savings

$$d(P \cdot A) = P \cdot Y - P \cdot C \pm d*(P \cdot V) \tag{25}$$

Definition of Income from Capital

$$\pi = P \cdot Z - W \cdot E - \tau_c(P \cdot Z - W \cdot E) \tag{26}$$

Capital Gains on Existing Capital

$$d*(P \cdot V) = d(P \cdot V) - P \cdot I \tag{27}$$

Balance-of-Payments Surplus

$$H = P \cdot X - P \cdot IM + r_s \cdot S \cdot ER - ER \cdot dS \tag{28}$$

Tax Function

$$P \cdot T = T(P \cdot Z + r_b \cdot B + r_s \cdot S \cdot ER, \pi, \tau) \tag{29}$$

Government Budget Constraint

$$dM + dB = P \cdot G - P \cdot T + r_b \cdot B \tag{30}$$

V. Variable Definitions

A   : Net Worth of Consumers

B   : Government Debt Held by Private Sector

C   : Consumption in Constant Currency

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d*PV : Real Capital Gain on Existing Real Assets in Current Currency

E : Employment in Manhours

ER : Exchange Rate in Domestic Currency per Unit of Foreign Currency

ER^e : Expected Exchange Rate in Domestic Currency per Unit of Foreign Currency

G : Total Government Expenditures in Constant Currency

G_{ex} : Exogenous Government Expenditures in Constant Currency

G_{end} : Endogenous Government Expenditures in Constant Currency

H : Surplus on Balance of Payments in Current Currency

I : Net Investment in Constant Currency

IM : Imports in Constant Currency

L : Lag operator

M : Money Supply in Current Currency (Currency Plus Reserves)

N : Vector Expressing Total Population and Its Structure

μ : Standard Mark-up Factor (i.e., the Ratio of Price of Output to its Minimized Cost of Production Expected to Prevail Under Normal Employment Conditions)

P : Price Level for Output

P^e : Price Level Expected to Prevail

Π : Income from Real Assets in Current Currency

Π^* : Expected Income from Existing Real Assets in Current (not future) Currency

r_b : Nominal Rate of Interest on Government Debt

r^r_b : Real Rate of Interest on Government Debt

r_k : Capitalization Rate (in real terms) Applicable to Real Assets

r^e_k : Level of r_k Expected to Prevail

r^h_k : Holding Rate (in real terms) Applicable to Real Assets

r_s : Real Rate of Interest on Foreign Securities

r^h_s : Holding Rate (in real terms) Applicable to Foreign Securities

S : Foreign Securities Held by Private Sector

T : Taxes in Constant Currency

τ : Tax Rates (Subscript "C" refers to Corporations)

u : Unemployment Rate

V : Market Value of Existing Real Assets in Constant Currency

W : Nominal Wage Rate Per Manhour

X : Exports in Constant Currency

Y : Disposable Income in Constant Currency

Z : Net National Product in Constant Currency

References

Ando, Albert. 1974. "Some Aspects of Stabilization Policies, the Monetarist Controversy, and the MPS Model." *International Economic Review*, October, 1974.

Areskoug, Kaj. 1974. "Private Investment and Capital Formation in Developing Countries." New York University. (Mimeographed)

Barro, R. J. and Grossman, H. I. 1971. "A General Disequilibrium Model of Income and Employment." *American Economic Review* 61: 82-93.

Behrman, Jere R. 1968. *Supply Response in Underdeveloped Agriculture: A Case Study of Four Major Annual Crops in Thailand, 1937-1963.* Amsterdam: North-Holland Publishing Co.

_____. 1972. "Sectoral Investment Determination in a Developing Economy," *American Economic Review* 62: 825-841.

_____. 1974. *Foreign Trade and Economic Development: The Chilean Experience.* New York: National Bureau of Economic Research.

——————————. 1975. *Macroeconomic Policy in a Developing Country: An Econometric Investigation of the Postwar Chilean Experience.* Philadelphia: University of Pennsylvania. (In process)

Blinder, Alan S. and Solow, Robert M. 1973. "Does Fiscal Policy Matter?" *Journal of Public Economics* 2: 319-337.

Blitzer, Charles R., Clark, Peter B. and Taylor, Lance, (eds.) 1974. *Economy-Wide Models and Development Planning.* Washington: International Bank for Reconstruction and Development. (Mimeographed)

Branson, William H. 1974. "Portfolio Equilibrium and Monetary Policy with Foreign and Non-Traded Assets," (Draft for Third Paris-Dauphine Conference, 3/28-30) (Mimeographed)

Campos, Robert de Olivira. 1964. "Economic Development and Inflation with Special Reference to Latin America." In *OECD Development Plans and Programmes*, 129-37. Paris: OECD Development Center.

Christ, C. F. 1968. "A Simple Macroeconomic Model with a Government Budget Restraint." *Journal of Political Economy* 76: 53-67.

Clower, R. 1965. "The Keynesian Counter-Revolution: A Theoretical Appraisal." In *The Theory of Interest Rates*, edited by F. H. Hahn and F. Brechling, 103-125. New York: Macmillan Co.

Eckaus, R. S. 1955. "The Factor-Proportions Problems in Underdeveloped Areas." *American Economic Review* 45: 539-565.

Fei, J. C. H. and Ranis, Gustav. 1964. *Development of the Labor Surplus Economy.* Homewood: Irwin Publishing Co.

Hansen, Bent. 1973a. "On the Effects of Fiscal and Monetary Policy: A Taxonomic Discussion." *American Economic Review* 63: 546-71.

——————————. 1973b. "Simulation of Fiscal, Monetary and Exchange Policy in a Primitive Economy: Afghanistan." In *Economic Structure and Development*, 215-237. Amsterdam: North-Holland Publishing Co.

Harris, John R. and Todaro, Michael P. 1970. "Migration, Unemployment and Development: A Two-Sector Analysis." *American Economic Review* 60: 126-142.

Heller, Walter W. 1954. "Fiscal Policies for Underdeveloped Economies." In *Conference on Agricultural Taxation and Economic Development*, edited by Haskell P. Wald. International Program in Taxation, Harvard Law School, Cambridge.

Higgins, Benjamin. 1968. *Economic Development: Principles, Problems and Policies.* Rev. Edition. New York: W. W. Norton & Co.

Ladenson, Mark L. 1974. "A Foreign Exchange Liquidity Trap for Mexico?" *International Economic Review* 15:93-98.

Lewis, W. Arthur. 1954. "Economic Development with Unlimited Supplies of Labor." *The Manchester School* 22: 139-191.

Leijonhufvud, A. 1968. *On Keynesian Economics and the Economics of Keynes.* Oxford: Oxford University Press.

MacBean, Alasdair, I. 1966. *Export Instability and Economic Development.* Cambridge: Harvard University Press.

Mathieson, Donald J. and McKinnon, Ronald I. 1974. "Instability in Underdeveloped Countries: The Impact of the International Economy." In *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*, edited by Paul A. David and Melvin W. Reder, 315-332. New York: Academic Press.

Mikesell, Raymond F. and Zinser, James E. 1973. "The Nature of the Savings Function in Developing Countries: A Survey of the Theoretical and Empirical Literature." *Journal of Economic Literature* 11: 1-26.

Ranis, Gustav. 1974. "Short-Run Policy in Semi-Industrialized Economies: Comment." *Economic Development and Cultural Change* 22:345-6.

Rao, V. K. R. V. 1952. "Investment, Income and the Multiplier in an Underdeveloped Economy." *The Indian Economic Review.*

Rosenstein-Rodan, Paul N. 1961. "Notes on the Theory of the 'Big Push'." In *Economic Development for Latin America*, edited by Howard S. Ellis. New York: St. Martin's Press.

Schydlowsky, Daniel M. 1971. "Short-Run Policy in Semi-Industrialized Economies." *Economic Development and Cultural Change* 19: 391-413.

——————————. 1974. "Short-run Policy in Semi-Industrialized Economies: Reply." *Economic Development and Cultural Change* 22: 347-8.

Tobin, J. 1969. "A General Equilibrium Approach to Monetary Theory." *Journal of Money, Credit and Banking* 1: 15-30.

Discussion

Bent Hansen

In view of his general search attitude to the question of modeling stabilization policies for LDCs, Behrman might as well have entitled his paper "In Search of a Paradigm." I sympathize very much with this attitude. So much work has gone into long-term models of planning for LDCs, so little into short-term models for stabilization policies. Models set up for studying short-term problems of DCs do not carry over to LDCs without modification. Behrman's attempt in this paper to start out from a DC model based on models by Ando and Branson clearly demonstrates that the modifications required, even for relatively advanced countries (which is probably what Behrman had in the back of his mind) may be so profound that little is really left of the original DC model.

Behrman himself makes the point that LDCs are many different things. They range from preindustrialized to fairly industrialized countries; from private-enterprise countries via mixed economies with public ownership of modern enterprises and controls to varying degrees with the remaining private activities to communist countries; from being almost autarkic to heavy dependency on foreign trade and loans; and from virtually free foreign trade and payments to tightly controlled foreign economic relations. Platitudes apart, it would appear difficult to say anything general about the international aspects of stabilization policy for LDCs with such a variety of levels of development and institutional arrangements. Behrman himself emphasizes the lack of homogeneity of the LDCs and the primitive state of stabilization analysis for such countries; considering also his own failure in coming out with a definite LDC model, one would not have expected him to be able to have anything general to say about the stabilization problem in its relation to international transactions. Nonetheless, he does conclude the paper with eight "interesting points," which to me, however, just prove how difficult it is to come out with general conclusions in this matter. Let me comment briefly on these points before I return to the basic issue of the paradigm:

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Behrman's point (i) states that "the focus of aggregate demand stabilization questions...is the modern sector." But this cannot possibly be generally true. Countries at the preindustrialization level — and there are still quite a few — may experience both inflation and balance-of-payments difficulties, as well as fluctuations in the distribution between rich and poor and between urban and rural areas (both highly traditional) that call for stabilization policies. Had Behrman been talking about the "monetized sector," I could have followed him better.

Behrman then goes on in his point (ii) to explain that "changes in aggregate demand will not alter [the modern sector's] employment and production," granted that the traditional sector determines the real wage for the modern sector and there is no money illusion. Since it is also held that "the traditional sector is fairly independent of aggregate demand," the conclusion seems to be that demand management has consequences only for the price level and the balance of payments and not for domestic production. Now, this is first of all at variance with Behrman's own analysis, where he rightly points out that to the extent that the modern sector does not produce wage goods, the situation is indeed Keynesian, even though *real* wage rates are determined in the traditional sector. Moreover, the statement assumes equality between wage rates and marginal value product of labor, even in the short term; this assumption has been heavily criticized (from Patinkin to Grossman) for DCs and is probably even less realistic for LDCs, in particular when the modern sector in such countries is in a monopolistic position and exposed to price controls. The statement also contradicts the experience from so-called "stabilization programs" in LDCs which typically create recessions in the short term. Let it not be forgotten here that part of the modern sector's production is related to investment activities (construction), and nobody would presumably deny that such activities are dependent upon effective demand.

To the following points (iii) to (vii), I have less objection, partly because they are much less categorical (they are mostly conditioned by words such as "often," "may," etc.). It is certainly true that the availability of raw materials and intermediate imports may cause fluctuations in the modern sector; that destabilization via the budget may take place because of the predominance of foreign trade taxes; and that changes in the availability of foreign loans may have serious consequences for the stability of the domestic economy. Yet I find it a mistake to consider foreign trade only as a source of disturbances. The foreign trade leakage is obviously a stabilizer in regard to domestic production and prices; this is particularly important in relation to one of the major sources of instability in LDCs (and, let us add the Soviet Union, viz. crop fluctuations), the effects of which on prices, consumption, etc. are most easily neutralized through foreign trade.

In his final point (viii), Behrman raises an important question that is difficult to discuss without a concrete model. He says that "given the important role of the foreign sector, perhaps stabilization policies should be

directed towards it." What he has in mind here is presumably the possibility of nipping the disturbances "in the bud." It can be shown that the structure of models may be such that it is possible to neutralize the effects of disturbances on all target variables by using a smaller number of instruments than the number of targets [Hansen, 1971]. It is easy to give examples. If all export and import prices increase in the same proportion, the effects on the domestic economy and its targets, no matter how many they are, are neutralized by a proportional devaluation. But generally everything here depends upon the model structure. That foreign disturbances should be countered at the border, as it were, is, of course, an old idea. Commodity arrangements, buffer stock policies, etc., serve this purpose. There is a substantial literature on this issue, and substantial disagreement about this kind of policy. Behrman might have taken them up for discussion.

Returning to the problem of the paradigm, I believe that something general can be said, despite the disparity of the LDCs in regard to levels of development and institutional setups.

(a) First, of course, the diversity itself indicates that we should not search for *the* paridigm. Not even in its broad features may there exist a paradigm capable of covering all cases.

(b) Controls and public ownership may profoundly change the behavioral equations. These should be derived not only under the individual budget constraints, but also under the constraints implied by controls and public ownership. The main reference at this point is, of course, Clower and Grossman. The assumption of profit maximization may have to be dropped. Behrman mentions two well-known examples: the arguments of the investment function may have to be capital goods imports (licenses) and government capital grants rather than national income, interest rates, etc.; and that of the import function may have to be exports rather than national income. Also, the consumption function ought to be formulated on the assumption of such constraints; when the upper income brackets are prevented from buying imported luxury cars, do they increase savings, start drinking, or, perhaps, stop earning income?

(c) To be useful for designing short-term stabilization policy, a model should identify major sources of disturbances, major targets, and be able to accommodate all possible policy instruments. Without prejudice in regard to statistical frequency and size, crop fluctuations, public expenditure for investment and defense, and prices in foreign trade may from a short-term stabilization point of view perhaps be considered the major disturbances in LDCs. In addition to the traditional targets of growth, price stability, and foreign payments equilibrium, another — the need for equalization of income and wealth distribution, has recently emerged with increasing emphasis, often with a rather detailed specification. Policy instruments in LDCs often work via relative prices or, as already mentioned, take the form of special commodity arrangements designed so as

to nip the disturbances "in the bud." Considering, moreover, that fluctuations of crops and foreign trade prices are often concentrated on specific commodities, it follows that far-reaching disaggregation, down to major commodities, may be needed to discuss policy problems adequately.

Disaggregation, incidentally, has the advantage of making most of the "great issues" in model building for LDCs evaporate into thin air. With disaggregation on agriculture, modern industry, and traditional services, we can let supply constraints dominate in agriculture and modern industry (if raw material supplies are constrained, for instance) and demand constraints dominate in traditional services and modern industry (if capacity is underutilized and raw materials available). With agriculture broken down by major commodities we can accommodate both the view that total agricultural supply responds little to demand and prices in the short term, and the view that individual commodities respond strongly. And with a sufficiently detailed sector breakdown we can accommodate both the view that factor substitution is negligible for individual sectors and substantial for the economy as a whole through changes in the composition of demand and output by sector. And so on, and so forth. Most of these issues have only arisen because the LDCs have been presented in terms of oversimplified aggregate models.

(d) The data situation in LDCs, finally, not mentioned at all by Behrman, is much more decisive for the choice of model than it is in DCs. It is no secret that data are scanty and often of poor quality in LDCs; black and gray spots dominate the map. This situation gives rise to two considerations:

First, it raises the question of what we realistically can and should aim at. To hope for quantitative predictions with well-defined probabilistic properties is nothing but pipe dreams. Full-fledged econometric analysis on the total level is simply impossible, basic data being what they are. The most we can hope for is simulation studies that in the worst of cases may be little more than numerical examples.

Second, the scantiness of data points to disaggregation rather than the opposite. Almost all countries present official, aggregative national income statistics with some breakdowns by producing sectors and expenditure categories. Behind these aggregative "data" there are some primary price, quantity and/or value data for individual goods and services. It would be a great mistake to believe that one covers the total economy by using the aggregative "data" in an aggregated model and that in restricting oneself to using the primary data in a disaggregated model one would lose any information, despite the fact that a disaggregated model necessarily would have to leave parts of the economy uncovered. The "complete" coverage obtained by using aggregative data is more often than not a statistical illusion; the gaps in information have somehow been filled in by those who constructed the "data" and aggregative analysis serves only to hide such gaps.

All the considerations under (a) through (d), taken together, have led me to the conclusion that, at least for countries at a low level of development with relatively few direct controls, a Walrasian type of model specifying demand, supply, and price determination equations for all major, individual goods and services (sectors) is superior for discussions of short-term stabilization models. Such models tend to become large, but they are computationally feasible as models set up for Afghanistan [Hansen and Kreidieh, 1972] and Thailand [Neu, 1974] have already demonstrated. They make optimal use of existing information; they are honest in disclosing where hard information ends and soft information begins; and they are sufficiently detailed in their specification for allowing all important disturbances and policy instruments to be studied. But such Walrasian demand-supply models may be difficult, even impossible, to apply to more complex economies at higher levels of development or with heavy government controls.

Here other paradigms may have to be applied.

References

Hansen, Bent. 1970. "Feasible Sets of Policy Instruments." Berkeley: Unpublished lecture notes, March 7.

_____ . 1973. "Simulation of Fiscal, Monetary and Exchange Policy in a Primitive Economy: Afghanistan," in *Economic Structure and Development: Essays in Honour of Jan Tinbergen,* edited by H. C. Bos, H. Linneman, and P. de Wolff. Amsterdam.

_____ and Kreidieh, Rabab. 1972. "An Afghanistan-Type Model for Simulating Fiscal, Monetary and Foreign Exchange Policy." *Working Paper No. 25.* Berkeley: Department of Economics, University of California, April.

Neu, Werner. 1974. "Model for Simulation of Fiscal, Monetary and Balance of Payments Policies in a Developing Economy: Thailand," PhD dissertation, University of California.