

Introduction

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MOST DEVELOPING countries at one time or another have faced the need for macroeconomic adjustment. Such a need typically arises when a country experiences a persisting imbalance between aggregate domestic demand and aggregate supply, reflected in a worsening of its external payments and an increase in inflation. While in certain cases external factors, such as an exogenous deterioration of the terms of trade or an increase in foreign interest rates, can be responsible for the emergence of the basic demand-supply imbalances, these imbalances can often be traced to inappropriate domestic policies that expand domestic demand too rapidly relative to the productive capacity of the economy. As long as adequate foreign financing is available, the relative expansion of domestic demand can be sustained for an extended period, albeit at the cost of a widening deficit in the current account of the balance of payments, a loss of international reserves, rising inflation, worsening international competitiveness, falling growth, and a heavier foreign debt burden. Eventually, however, the country would lose international creditworthiness, and as foreign credits ceased, adjustment would be necessary. This type of forced adjustment could prove to be very disruptive for the economy.

Adjustment programs are designed to eliminate the basic imbalances in the economy in a timely and orderly fashion. The first task is to stabilize the economy—lower the rate of inflation, restore international competitiveness, reduce the current account deficit, and check the loss of international reserves. Once macroeconomic stability is assured, policies to expand the productive capacity of the economy and to improve the efficiency with which resources are utilized are more likely to be successful. Experience and theory both suggest that to achieve a viable balance of payments in the context of price stability and a sustained rate of economic growth—the principal objectives of macroeconomic adjustment—macroeconomic adjustment and structural reform policies have to be effectively combined.

To achieve these goals requires a fairly comprehensive package of economic policies. With differences in emphasis, most economists would tend to subscribe to the inclusion of the following measures in a macroeconomic adjustment program:

- *Monetary restraint* aimed at reducing the growth of absorption and the rate of inflation.
- *Interest rate policies* aimed at keeping real interest rates positive but low.
- *Fiscal restraint* to reduce the fiscal deficit to a sustainable level and thereby restrain aggregate demand pressures.
- *Exchange rate action* to ensure a real exchange rate that improves international competitiveness and creates the incentive for expanding the production of internationally tradable goods.
- *External financing policies* to reduce the stock of external debt if it is perceived to be currently unsustainable, or to limit foreign borrowing if it is likely to become so in the future.
- *Structural reforms* (such as financial sector reforms, producer pricing policies, trade liberalization, and tax reforms) to make the economy flexible and efficient.

Because of the complex relationship between the various policies and objectives, formulating a package with such features turns out to be no easy task. A judicious blending of economic theory, informed judgment, and a thorough knowledge of the principal structural and institutional characteristics of the country in question is required.

In the end, however, a quantitative macroeconomic program cannot be formulated without a model, whether explicit or implicit. Formal models, by delineating the links between the principal macroeconomic variables of concern, allow both direct examination of the assumptions underlying the individual behavioral relationships and development of a synthesis of views on macroeconomic phenomena. Furthermore, macroeconomic models impose a discipline on the design of an adjustment program by requiring consistency among individual relationships and ensure that budget constraints and accounting identities are respected. Finally, the program's objectives, and the policies to attain them, have to be set quantitatively. Consequently, the policymaker needs to have information not only on the qualitative nature of the relationships between variables but also on the orders of magnitude of the relevant parameters. Empirical macroeconomic models in principle provide such information.

The papers in this volume are a representative sample of work on empirical macroeconomic models for developing countries carried out in the IMF during the 1980s. All of these models trace their roots back to

the work by Polak (1957) and Robichek (1967), which became the mainstay in the design of adjustment and stabilization programs supported by the IMF.¹ Some of the models are applied to, and thus are relevant for, specific countries. Others relate to groups of developing countries and can thus be seen as applying to an “average” developing country. While the models are dissimilar in certain important respects, they all have one common characteristic that is worth highlighting: they are all “small.” This preference for highly aggregated structures and parsimonious depiction of macroeconomic relations can be considered a legacy of the earlier Polak (1957) and Robichek (1967) approaches undertaken in the IMF. Attempts to build large-scale models for developing countries are virtually nonexistent in the Fund. This partly reflects the view that, for the main purpose for which such models are developed—to assist in designing programs—elaborate or detailed structures are not necessary. Furthermore, from a more practical viewpoint, the availability of data in developing countries constrains the degree of disaggregation that can be undertaken. However, being small does not necessarily imply that important aspects of macroeconomic policymaking are left unaddressed. Indeed, since in all the models considerable care is taken to link policies and targets, it would be correct to label them policy-based models.

The first paper in the volume, by *Carmen Reinhart* (Chapter 2), outlines a model that can be viewed as a reference point for evaluating the more complex and elaborate models developed in the IMF. This simple model has two building blocks: the first, a monetary block, is very much in the spirit of the Polak (1957) specification, while the second is a variant of the standard neoclassical growth model relating growth to rates of investment and labor force growth and to (exogenous) technical progress. The result of combining the monetary model and the neoclassical model is a unified framework in which the domestic price level, output, and the balance of payments can be simultaneously determined.² This merged model can be considered the simplest of macroeconomic models that can be usefully applied to analyze the effects of the main policies of adjustment programs. This simplicity is a virtue, as the model can be used operationally in countries where data are scarce. The empirical part of the paper presents estimates of the key parameters of the model for a sample of seven diverse developing countries and tests the validity of a subset of the theoretical assumptions. The estimated model is then

¹ Some of the papers on earlier models are contained in International Monetary Fund (1977). These earlier models are closely related to the monetary approach to the balance of payments; see Frenkel and Johnson (1976).

² For a detailed analytical exposition of this model, see Khan, Montiel, and Haque (1990) and Khan and Montiel (1989).

used for a variety of comparative static exercises, including the effects of fiscal and monetary policy changes, and devaluation, on the principal macroeconomic objectives.

In Chapter 3, *Mohsin Khan and Malcolm Knight* formulate a structural version of the monetary model, which makes inflation and output endogenous along with the balance of payments. Monetary disequilibrium plays a key role in the behavior of macroeconomic variables, and careful attention is paid to expectations (which are assumed to be formed adaptively) and to the dynamics of adjustment. The model is tested using a pooled sample of data for 29 developing countries during 1968–75, and the results are broadly supportive of the chosen specification. To analyze the policy implications of the model, two sets of simulation experiments are conducted. The first set shows the effects of certain policy-induced shocks. For example, an increase in the supply of domestic credit simultaneously raises growth and the rate of inflation and worsens the balance of payments. The dynamics, however, are much more complicated than those emerging from the simple monetary model of the balance of payments (of the type outlined by Reinhart in Chapter 2). The second set of simulations utilizes the model in a programming mode and compares the path for domestic credit for two types of adjustment programs—a one-year program and a five-year program—both designed to achieve a specified improvement in the balance of payments. Because of the dynamics built into the model, the paths for domestic credit are not smooth, with more pronounced fluctuations for the shorter-run program. Although the balance of payments target is obviously attained faster in the shock program, the growth rate suffers in comparison to the more gradual program.

The next four papers describe macroeconomic models for individual countries and thus build more detail into the specifications. The paper by *Bijan Aghevli and Cyrus Sassanpour* (Chapter 4) develops a model designed to analyze the impact of an increase in world petroleum prices for the case of an oil producing country, namely, the Islamic Republic of Iran. The paper expounds the basic idea that the bulk of government revenues in such economies is derived from oil exports and is denominated in foreign exchange. The domestic spending of these revenues increases aggregate demand for both traded and nontraded goods, leading to an increase in domestic output, imports, and prices of nontraded goods. If the nominal exchange rate remains fixed, the real exchange rate appreciates, as expected from the well-known “Dutch disease” phenomenon. Monetary disequilibrium plays a critical role in the model, which comprises six behavioral equations and three identities. Fiscal policy, however, is also a very important adjustment instrument. The

Aghevli-Sassanpour model is among the first to make a distinction between the overall fiscal deficit and the “domestic” fiscal deficit (excluding oil revenues and government foreign expenditures), arguing that only the latter is relevant for the rate of monetary expansion. Estimates of the model for 1960–77 confirm the basic hypothesis that the domestic fiscal deficit and monetary factors are important in the determination of prices and in variations in private expenditures. Simulation experiments for different values of oil revenues, and thus levels of government spending, show a clear trade-off between higher growth and higher rates of inflation.

The paper by *Reza Vaez-Zadeh* (Chapter 5) also deals with an oil producer—Venezuela—but extends the framework by attempting to take into account the “confidence effect” that oil wealth might have on the behavior of economic agents. This effect arises from the impact of resource availability (oil) on future expected income, which in turn influences saving behavior, the pattern of expenditures, and the composition of asset portfolios. However, not only current oil wealth but also future wealth is important for the confidence effect. Oil is an exhaustible resource, and exhaustibility is likely to influence expectations about future income, thus inducing shifts in perceived wealth that alter the private sector’s present behavior. The model incorporating this confidence effect is estimated for 1965–81, and the results are generally supportive of the theory. The confidence effect manifests itself particularly in private expenditures and in the demand for money, dampening the inflationary consequences of expansionary shocks but adversely affecting private saving and investment. The paper shows that a larger monetary intervention is required following exogenous disturbances to stabilize the economy in the presence of the confidence factor associated with resource availability. Furthermore, this factor also affects significantly the timing of needed monetary interventions.

The model for Singapore contained in Chapter 6 by *Ichiro Otani and Cyrus Sassanpour* analyzes the transmission processes and attempts to quantify the importance of alternative policy instruments—specifically monetary, exchange rate, and wage policies—in influencing key macroeconomic variables, including output, prices, and foreign reserves. The model makes two notable advances: first, it introduces wage behavior and wage policies; and second, it explicitly incorporates an exchange rate reaction function. Both these additions are unusual for developing countries, but are clearly important for a country like Singapore. The model is estimated for 1979–86 on a quarterly basis, and the behavioral relationships are by and large well determined. The simulations show that a restrictive wage policy improves the balance of payments, lowers in-

flation, depreciates the exchange rate, and increases output, while an expansionary fiscal policy worsens the balance of payments, increases inflation, appreciates the exchange rate, and lowers output. The model thus suggests that flexibility in financial, exchange rate, and wage policies is crucial in achieving noninflationary growth with external payments viability. If trade-offs develop between outcomes from a particular policy, other instruments must be used. In the specific case of Singapore an appropriate wage policy is an important complement to exchange rate policy, but this result is generalizable to other developing countries.

The objective of the paper by *Leslie Lipschitz* (Chapter 7) is to provide some empirical generalizations regarding appropriate credit and exchange rate policies in a developing country, using Korea as a case study. A model is specified and estimated, and then simulations are used to determine policy responses to a variety of domestic (output and monetary) shocks, as well as to external terms of trade shocks. The model assigns a central role to monetary disequilibrium in determining trade flows, absorption, and prices. The importance of expectations is recognized, although formally expectations are taken to be static in nature. The estimates of the model containing four behavioral equations—for inflation, exports, imports, and real absorption—using quarterly data covering 1965–78 yield generally well-determined parameters. For simulation, the model is expanded to include reaction functions for domestic credit expansion and nominal exchange rate adjustment. The expanded model thus allows appropriate policy responses to different types of shocks to be determined. Four particular results stand out. First, exchange rate policy is a powerful instrument for adjustment even when estimated price elasticities of trade are small. Second, the source of the disturbance to the economy is often more important than the manifestation of the disturbance in determining the best policy response. Third, monetary conditions have a large and rapid effect on the balance of payments. Finally, the appropriate policy response to any disturbance depends on whether the shock is transitory or permanent.

The paper by *Pierre-Richard Agénor* (Chapter 8) is among those that introduce rational expectations (as opposed to static or adaptive expectations, which have been far more commonplace). This paper formulates and estimates a short-term monetary model for a small, open developing economy, using a sample consisting of annual time-series observations on a cross-section of eight countries. The model incorporates illegal trade transactions, foreign exchange rationing, currency substitution, and forward-looking rational expectations. Various simulation exercises are conducted to quantify the impact of alternative policies on major macroeconomic variables. Anticipated expansionary credit and fiscal policies

have a positive impact on real output and prices, a negative effect on net foreign reserves, and are associated with a depreciation of the parallel exchange rate. The analysis shows that the balance of payments adjustment process following a temporary shock is inversely related to the degree of rationing in the official market for foreign exchange. The higher the degree of rationing, the lower will be the offsetting effect on the money supply coming through the balance of payments, and the higher the rate of depreciation of the parallel exchange rate generated by an expansionary policy. A once-for-all devaluation of the official exchange rate is associated in the short run with a contraction in output, a rise in inflation, a fall in reserves, and a depreciation of the parallel rate. In the long run, devaluation results in a permanently higher price level and a more depreciated parallel exchange rate, but has no effect on the spread, as predicted by standard perfect-foresight currency substitution models.

The model outlined in the paper by *Nadeem Haque, Kajal Lahiri, and Peter Montiel* (Chapter 9) is in the same spirit as that of Agénor. However, although it too incorporates advances in modern macroeconomics, it no longer adheres closely to the monetary model. The model is more eclectic and is thus more in tune with conventional economic theory. Rational expectations are assumed, and at the same time developing country characteristics are explicitly incorporated. For example, the model allows the effectiveness of capital controls (which exist in many developing countries) to be empirically tested, and the foreign exchange constraint on imports (which many of these countries face) to be endogenously treated. An appropriate econometric procedure to estimate rational expectations models with pooled time-series data is developed and is then applied to a group of 31 developing countries (over the period 1963–87). The estimated parameters conform to standard economic theory and in many cases approximate those available in the literature. An interesting result to emerge from the empirical analysis is that barriers to capital mobility seem to be quite ineffective in developing countries.³ This result has important policy consequences, suggesting that effects of changes in credit policy on the balance of payments are substantial. The estimates also suggest that imports have tended to be restricted by the availability of foreign exchange. The interaction of perfect capital mobility, forward-looking behavior, and an endogenous foreign exchange constraint presents a novel framework in which to study the dynamic responses of developing economies to exogenous and policy shocks.

³This finding is a generalization of a similar conclusion reached by Edwards and Khan (1985).

In Chapter 10, *Nadeem Haque and Peter Montiel* utilize their model to study the economy's path of adjustment to several domestic policy shocks—devaluation, expansionary fiscal policy, and domestic credit expansion—as well as to changes in external demand and in foreign interest rates. The paper shows that the dynamic response of the principal macroeconomic variables to both policy and exogenous shocks depends critically on several features in developing countries (such as the degree of wage-price flexibility and the extent of capital mobility), about which no clear consensus exists among informed observers. This conclusion has important implications for both policy and research on developing country macroeconomics and the adjustment process. Regarding policy, the implication is that the state of knowledge for most developing countries suggests that real-time macroeconomic “fine-tuning” is likely to be very difficult, because the dynamic responses of the system to policy choices will, in most cases, be highly uncertain. Regarding research, the analysis identifies specific areas—such as wage-price formation and capital mobility—that merit particular attention in developing a greater understanding of macroeconomic adjustment in these economies.

The role of rational expectations is also highlighted in the final paper in this volume, by *Nadeem Haque, Peter Montiel, and Steven Symansky* (Chapter 11). These authors specify a general-equilibrium simulation model that relies on familiar analytical assumptions, such as a Mundell-Fleming two-good commodity structure, a permanent-income specification for private consumption, a neoclassical investment function, and rational expectations. In addition, several of the more distinct structural features of developing economies, such as the role of imported intermediate and capital goods, the absence of domestic equity or securities markets, and the existence of dual markets for foreign exchange, are also incorporated explicitly into the model. Although the model is not directly estimated, representative developing country parameters are used to perform a variety of simulations from which several useful insights are derived about the “average” developing economy's general-equilibrium interactions, as well as the dynamics of the effects of various policy choices. For example, the dynamic response to a shock is fundamentally affected by the way expectations are modeled—rational expectations make a significant difference to the impact effect and to the adjustment path. Moreover, the impact effects of many policy choices turn out to be opposite to their medium-term effects. But it is reassuring to note certain familiar results, such as the expansionary effect on output and prices of increases in government spending and in the supply of credit to the private sector. Also, the current account is improved by a devaluation, although there may be a temporary contractionary effect on output.

In conclusion, it is evident from the collection of papers in this volume that empirical macroeconomic models for adjustment in developing countries have come a very long way from the earlier efforts in the IMF that are associated with the names of Polak and Robichek. Three basic factors account for the advances. First, the changed focus of adjustment programs—the balance of payments is no longer the sole objective. In programs of the 1970s and 1980s inflation and growth became equally important objectives, mainly because the balance of payments can be sustained only in an environment of price stability and satisfactory growth performance. Second, a deeper understanding of the economies of developing countries has emerged, along with a recognition that the structural and institutional characteristics need to be explicitly included if the models are to realistically represent macroeconomic behavior in these countries. Finally, the state of macroeconomic theory has changed considerably during the past two decades, and many of the analytical developments have been absorbed into the models. As evident from the papers in this volume, all these factors combine to make today's models quite different in both form and substance from those of yesterday.

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