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ABSTRACT

This essay, written for The New Palgrave dictionary of economics, provides a selective and interpretive account of the development of thought on international financial questions. Attention is focused on the process of international adjustment and on the proper definition of external balance. Since the first descriptions of the price-specie-flow mechanism in Hume's time, the definition of external balance has evolved in response to changes in the world economy's structure. The foreign reserve constraint so central under the gold standard or in the early Bretton Woods years is less important under conditions of high international capital mobility. Increasingly, the current account and the national intertemporal budget constraint are emphasized in discussions of international adjustment. In analogy with the idea of a high-employment government budget surplus, a working definition of external balance might be a current account that maintains the highest possible steady consumption level consistent with the economy's expected intertemporal budget constraint. Intertemporal approaches to external balance become more difficult to apply when countries face credit rationing as a result of nonrepayment risk.

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International Finance

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Introduction. International finance is concerned with the determination of real income and the allocation of consumption over time in economies linked to world markets. Fundamental to international finance is the somewhat elusive idea of "external balance," which in practice entails a path of external indebtedness that does not threaten a country's ability to meet its international obligations. Because the nature of the linkages among economies has varied across historical episodes, the requirements of external balance have varied as well. International finance studies the policies and market forces which may lead to external balance under various conditions. The history of the subject illustrates how the nature of world market linkages has itself been changed by national efforts to cope with external constraints.

The national income identity is the necessary groundwork for any discussion of external balance. The national income of an open economy equals domestic product plus net factor payments from abroad plus net international transfer payments; the current account equals net exports of goods and services (including all net factor payments) plus net transfers. If national expenditure is defined as the sum of consumption and investment (by both the public and private sectors), the national income identity asserts that national income less national expenditure equals the current account. When in surplus, the current account therefore measures the growth of the economy's external assets; when in deficit, it measures the growth of external debt.

The Classical Paradigm. The classical Ricardo-Mill barter trade theory shows how the terms of trade and international production pattern are determined in a stationary world economy with balanced trade. The classical analysis of the transition to balanced trade may be viewed as an account of the convergence process to the long-run barter equilibrium. As Ricardo noted in the Principles (1817):

> Gold and silver having been chosen for the general medium of circulation, they are, by the competition of commerce, distributed in such proportions amongst the different countries of the world as to accommodate themselves to the natural traffic which would take place if no such metals existed, and the trade between countries were purely a trade of barter.

Historically, however, the classical paradigm of external adjustment preceded Ricardo. Major elements of the theory had been expounded quite clearly by the early eighteenth century, but the most coherent and effective exposition was given by Hume in 1752.

Hume assumed a world economy that settles trade imbalances exclusively through imports or exports of precious metals that also serve as money. Building on the quantity theory of money, he constructed a full dynamic model of the balance of payments and the terms of trade. The famous price-specie-flow mechanism was put forth as an automatic market process that always works to restore balanced trade. Hume's goal was to refute mercantilist and protectionist arguments by showing that market forces would ensure in the long run a "natural" distribution of specie among countries.

Hume invited his readers to imagine that four-fifths of Great Britain's money supply were "annihilated in one night." British prices would naturally fall, he argued, cheapening British exportables relative to foreign goods and creating a trade surplus. As a result of this

surplus Britain would accumulate foreign wealth in the form of specie, seeing its money supply, and hence its prices, rise. Abroad, the drain of specie would lower prices. Britain s trade surplus would dwindle and eventually disappear once its terms of trade had improved sufficiently, and at this point, the natural distribution of specie would prevail. A hypothetical fivefold increase in Britain's money supply would set off the reverse process, involving an initial improvement in Britain's terms of trade and a trade balace deficit. Over time, specie would flow abroad as the terms of trade deteriorated and external equilibrium was restored.

There is little exaggeration in saying that issues raised by Hume's analysis dominated writing in international finance up until the inter-World War years. In a period that culminated in the classical gold standard, it was natural to take as the benchmark of external balance an absence of international specie movements. Hume had placed relative price movements at the center of his account of how external balance would be attained, but subsequent writers asked whether direct income or wealth effects might also be operative, and whether external adjustment could take place in some cases without price changes. Such questions arose in the 1929 Keynes-Ohlin debate over the German transfer problem, but as Viner (1937) showed, the questions had been raised much earlier.

A simple model of a Humean world makes apparent some of the assumptions underlying the price-specie-flow mechanism. Such a model also serves as a springboard for understanding later developments in the analysis of external adjustment. (A more detailed exposition of a similar model is given by Dornbusch, 1973, whose analytical approach is, however, somewhat different from that taken here.)

Assume a world of two countries, each specialized in the production

of a single commodity that is consumed in both countries. With given supplies of capital and labor within each country and perfect wage flexibility, home-country output is fixed at the full-employment level x and foreign-country output is fixed at y. Let q denote the price of y-goods in terms of x-goods (the terms of trade), z domestic expenditure measured in x-goods, and z* foreign expenditure, also measured in x-goods. Then the domestic demands for the two goods are $c_x(q,z)$ and $c_y(q,z)$, while the foreign demands are $c_x^*(q,z^*)$ and $c_y^*(q,z^*)$.

Expenditure is determined by monetary conditions. The money supplies M and M* are for simplicity taken to consist entirely of gold, and P and P* denote the gold prices of home and foreign goods, respectively. The exchange rate between domestic and foreign currency can be set at unity with no loss of generality, so the terms of trade, q, equal P*/P. In each country there is a desired long run (or "natural") money supply that is proportional to nominal output, and saving behavior is governed by discrepancies between natural and actual money supplies. Because a country's net saving here equals its current account, which by assumption is settled in specie, saving behavior determines the evolution of national money supplies. These evolve according to the laws

$$dM/dt = \theta(\chi Px - M),\quad dM^*/dt = \theta^*(\chi^* P^* y - M^*),$$

where χ (χ^*) is the reciprocal of the home (foreign) country's long-run monetary velocity and θ (θ^*) is the home (foreign) marginal propensity to dissave out of monetary wealth. Expenditure levels are therefore

$$z = (1 - \theta\chi)x + \theta M/P,\quad z^* = (1 - \theta^*\chi^*)qy + \theta^* M^*/P,$$

where $\theta\chi,\ \theta^*\chi^* < 1$.

The model is closed by two equilibrium conditions. With a given

world stock of monetary gold, M^W, home saving must equal foreign dissaving, that is, world expenditure must equal world output. In addition, the market for domestic goods must clear. By Walras's law, these two equilibrium conditions imply equilibrium in the market for foreign goods.

The condition of zero desired world saving is (dM/dt) + (dM*/dt) = 0, or

$$(1)\quad P = \frac{\theta M + \theta^*(M^W - M)}{\theta\chi x + \theta^*\chi^* qy}.$$

Equation (1) shows that, for given terms of trade and money supplies, the world price level adjusts to maintain consistency between the countries' saving plans. In equilibrium, this condition makes P a function of q and M, P = P(q,M), with

$$\frac{q}{P}\frac{\partial P}{\partial q} = \frac{-\theta^*\chi^* qy}{\theta\chi x + \theta^*\chi^* qy} > -1, \qquad \frac{M}{P}\frac{\partial P}{\partial M} = \frac{(\theta - \theta^*)M}{\theta\chi P x + \theta^*\chi^* P^* y} \gtrless 0.$$

The market for x-goods clears when

$$(2)\quad c_x[q,(1 - \theta\chi)x + \theta M/P] + c_x^*[q,(1 - \theta^*\chi^*)qy + \theta^* M^*/P] = x.$$

Substitution of P= P(q,M) and M* = M^W - M into (2) gives the curve describing combinations of M and q at which both goods markets clear and aggregate world saving is zero. The curve is labelled XX in Figure 1 and is shown with a negative slope. The assumptions giving rise to this negative slope are crucial for analyzing the Humean adjustment process. An increase in M (which necessarily implies an equal fall in M*) causes an excess demand for x-goods equal to

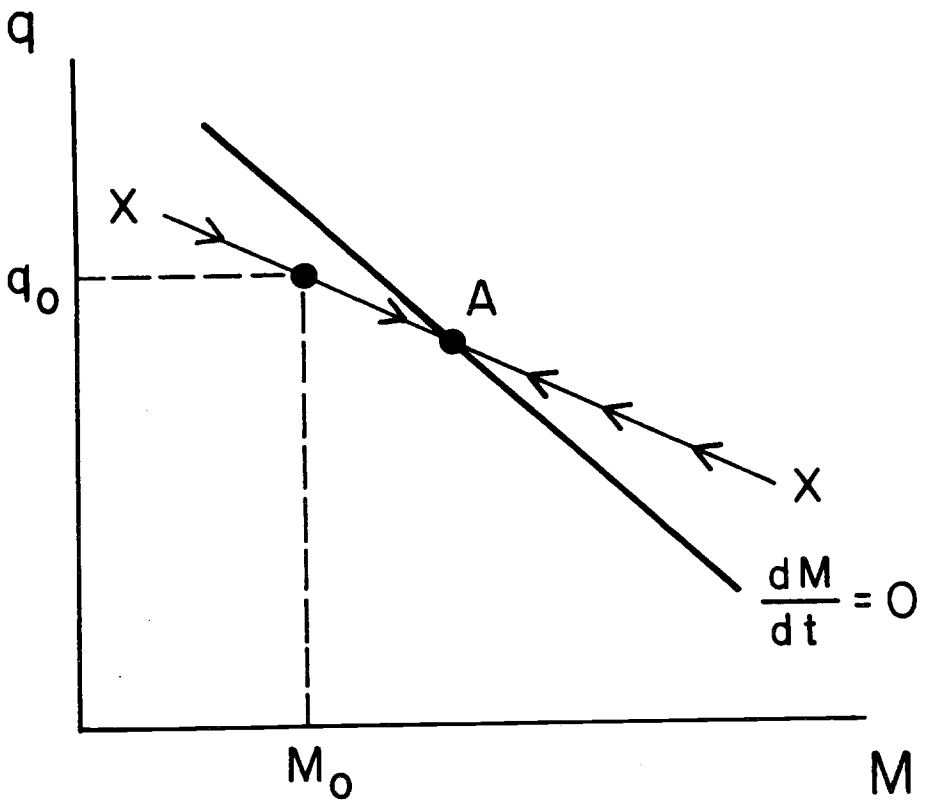

Fig. 1

$$\frac{\theta\theta^*(M + M^*)}{P(\theta M + \theta^* M^*)} [\partial c_x/\partial z - \partial c_x^*/\partial z^*]$$

near the system's long-run equilibrium (where dM/dt = dM*/dt = 0). The term $\partial c_x/\partial z - \partial c_x^*/\partial z^*$ is the difference between the two countries' marginal propensities to spend on home-country goods; if the home-country marginal propensity is larger--the "orthodox" presumption in transfer analysis (Samuelson, 1971)--a redistribution of nominal balances in favor of the home country creates an incipient excess demand for its output. This excess demand is eliminated by a fall in q if the home-goods market is Walras stable, so XX slopes downward under standard assmptions concerning marginal spending propensities and Walrasian stability.

The curve in Figure 1 labelled dM/dt = 0 describes points at which M = XP(q,M)x. This locus has a negative slope algebraically smaller than that of XX. With goods markets continuously in equilibrium, the world economy travels along XX to its long-run equilibrium at point A, where international prices and the distribution of specie give rise to balanced trade.

In most respects the model confirms Hume's account of the external adjustment process. A (small) fall in M to M_0, for example, leads to terms of trade q_0, which are worse for the home country. The terms-of-trade change is a direct result of the transfer of purchasing power to foreigners, which produces an excess supply of home goods at the initial prices. The home balance-of-payments surplus that simultaneously emerges causes a gradual redistribution of money in favor of the home country, so the home terms of trade improve during the transition to external balance.

If $\theta = \theta^*$, equilibrium P is a function of q alone, with a negative

elasticity greater than -1. The rise in q caused by a fall in M is thus accompanied by a less-than-proportional fall in P and a rise in P* that are reversed as the economy returns to point A. These results are in accord with Hume's predictions, but they need not hold if the expenditure responses to real balances differ sufficiently in the two countries. If $\theta > \theta^*$, a transfer of money abroad raises world saving for given terms of trade, so P* may fall along with P and then rise during the subsequent adjustment. Likewise, if $\theta < \theta^*$, a money transfer abroad may reduce world saving sufficiently that P must rise, along with P*, to restore goods-market equilibrium in the short run. In this case, the initial response to the disturbance is followed by price deflation in both countries.

This stylized version of Hume's paradigm may be used to analyze the transfer problem. Suppose that ownership of a portion of the foreign country's endowment is transferred to the home country. Does the home trade deficit necessarily increase by the amount of the transfer, or is the transfer undereffected, requiring a flow of specie to the home country to balance international accounts? A second focus of debate in the literature is the possibility that the transfer imposes a "secondary burden" on the paying country by adding an equilibrium terms-of-trade deterioration to the primary income burden. Keynes and Ohlin clashed on this point in 1929, with Keynes arguing that the secondary burden is inevitable.

To simplify, suppose that $\theta = \theta^*$ and $\chi = \chi^*$. Since long-run money demand rises with income, the $dM/dt = 0$ locus shifts to the right, implying that the transfer is undereffected and that the world's gold stock is redistributed toward the home country. Under the standard assumption regarding marginal spending propensities, the transfer also

creates an excess demand for x-goods at the initial terms of trade, so XX shifts downward. A secondary burden is thus imposed on the paying country, and this burden worsens over time as balanced trade is re-established.

The Interwar Period. The years between the World Wars saw a partial and ultimately unsuccessful return to the gold standard, followed by extensive experimentation with floating exchange rates and direct controls on international payments as means of attaining external balance. Nurkse's (1944) account of the period is probably the most influential one. Writers on international finance continued to conceptualize external balance in terms of reserve movements. The spread of the gold-exchange standard, under which central banks held as foreign reserves currencies tied to gold as well as gold itself, broadened the class of assets through which balance-of-payments deficits were financed.

International capital movements were discussed increasingly in the theoretical literature, but they were viewed for the most part as an adjunct to the classical balance-of-payments adjustment mechanism. The theoretical discussions merely formalized a mechanism that had long been exploited by the Bank of England to regulate gold flows. A country that suddenly developed a trade deficit would face declining international reserves, a declining money supply, and higher interest rates. Higher interest rates would, however, attract foreign capital inflows and thus dampen the resulting fluctuations in the balance of payments. On this view, interest-sensitive capital flows had a potentially stabilizing role to play in discouraging protracted reserve flows. Given the turbulent conditions of the period, contemporary writers fully recognized that capital flows motivated by fears of devaluation or political in-

stability could just as well destabilize an already bad external payments problem.

Such "short-term" or interest-sensitive capital movements were generally discussed separately from "long-term" international capital movements which directly financed investment or government expenditures. Theoretical discussions of long-term capital movements focused mainly on the transfer mechanism, the balance-of-payments and terms-of-trade adjustments that would accompany an inter-country transfer of capital. Conspicuously absent from the literature were attempts to develop a normative intertemporal theory of international capital transfer. Such a theory naturally would have extended the prevailing external balance concept to comprise changes in nations' overall indebtedness rather than just changes in the central bank's foreign assets. It had been known, at least since Ricardo's Principles, that producers and consumers could gain if long-term foreign investment equalized profits internationally. The insight did not alter thinking about the nature of external balance.

This gap in the literature is surprising in view of the developments in international capital markets over the previous century. Huge flows of long-term capital, primarily from Britain, had financed railroad construction and other investment in the Western Hemisphere. France and Germany also made significant foreign loans. In the early 1930s, widespread foreign debt default by the Latin American countries highlighted the need to analyze formally the sustainability of external debt paths. In the world assumed by Hume, specie flows had been the only means of settling current-account imbalances, and a concept of external balance based on balance-of-payments equilibrium had been defensible. Such a concept of external balance was outmoded, however, in a world where other types of asset trade could finance the current account.

The necessary change of perspective did not occur for several decades. Instead, the events and ideas of the interwar period led international financial theory to turn away altogether from the concern with the dynamics of international adjustment underlying the classical model. Emphasis shifted inward, to the interaction between the balance of payments and domestic economic conditions.

The Bretton Woods Period. The interwar experience had a profound influence on both the institutional framework of postwar international finance and the theoretical orientation of researchers. The international agreement reached at Bretton Woods in 1944 set up a world trading community linked by fixed dollar exchange rates, with a United States commitment to peg the dollar price gold at $35 per ounce providing an anchor for the world price level. The agreement's provisions aimed to promote free trade in goods, but private capital movements were viewed as potentially disruptive and the widespread capital controls then in force were not discouraged. A prevailing view that flexible exchange rates had failed during the interwar period motivated the adoption of a fixed-rate system. Provision was made, however, for infrequent exchange-rate adjustment, after due consultation, in circumstances of "fundamental disequilibrium" in the balance of payments.

Central to the design of the Bretton Woods system was a desire to avoid unemployment and ensure price-level stability. In the interwar years, many governments had resorted to competitive currency depreciations and trade restrictions aimed at reducing domestic unemployment. These "beggar-thy-neighbor" moves made all countries worse off. Having recently experienced the hardships of the worldwide Great Depression, the Bretton Woods signatories recognized the goal of "internal balance"-

-full employment with price stability--as a key aim of government policy. An International Monetary Fund was set up to reconcile the goals of internal and external balance. It was hoped that the availability of Fund credit would make it unnecessary for members to tolerate high unemployment in pursuing external balance, or to interfere with trade flows in pursuing internal balance.

In an environment of fixed exchange rates and extremely limited capital mobility, the overriding external consideration for governments was the available stock of foreign, particularly dollar, reserves. The operative external target was therefore the acquisition of as many dollars as possible through balance-of-payments surpluses. As the reserve center, the United States enjoyed the privilege of being able to finance its own balance-of-payments deficits by borrowing dollars from foreign central banks. In reality, however, the United States was not totally free of a reserve constraint. Foreign central banks could, and did, use their dollars to buy gold from the U.S. authorities at the official price. The problem of gold losses became important as the postwar period of "dollar shortage" ended in the late 1950s. In 1960, Triffin put the American external dilemma in its most somber light: Once foreign official dollar holdings exceeded the official value of the U.S. gold stock, it would become impossible to satisfy all foreign claims to U.S. gold without a rise in the dollar price of gold. The resulting confidence problem, Triffin predicted, would undermine the stability of the Bretton Woods system.

As it developed immediately after World War II, international financial theory reflected the new institutional arrangements, along with the economic assumptions underlying Keynes's (1936) diagnosis of the unemployment of the 1930s. The new paradigm, set forth very effec-

tively by Metzler (1948, pp. 212-213), assumed sticky price levels along with fixed exchange rates, thus precluding the relative-price adjustments at the heart of the classical paradigm while opening the door to employment fluctuations:

> The important feature of the classical mechanism ... is the central role it attributes to the monetary system. The classical theory contains an explicit acceptance of the Quantity Theory of Money as well as an implied assumption that output and employment are unaffected by international monetary disturbances. In other words, the classical doctrine assumes that an increase or decrease in the quantity of money leads to an increase or decrease in the aggregate money demand for goods and services, and that a change in money demand affects prices and costs rather than output and employment.... The essence of the new theory is that an external event which increases a country's exports will also increase imports <u>even without price changes</u>, since the change in exports affects the level of output and hence the demand for all goods. In other words, movements of output and employment play the same role in the new doctrine that price movements played in the old.

An increase in external demand for a country's exports, for example, would raise the country's trade surplus in the first instance, but once the multiplier effect of the disturbance had raised income and hence import spending, the initial impact on the trade balance would be reduced. Metzler noted, however, that even if one assumed that investment spending responds positively to a rise in real income, it was unlikely that multiplier effects alone would ensure complete trade-balance adjustment in the short run.

The Keynesian account of external adjustment therefore contained an important gap. Private capital movements were largely ruled out in the Keynesian models, so incomplete trade-balance adjustment implied incomplete balance-of-payments adjustment and growing or shrinking central-bank foreign reserves. The models pushed monetary factors to the background, implicitly or explicitly assuming that central-bank sterilization operations were offsetting any monetary effects of the balance of

payments. Only a few of the early postwar theorists, notably Meade (1951), assigned an important role to monetary factors.

Even if the sterilization assumption were granted, however, consideration of the system's inherent dynamics made clear the infeasability of a permanent sterilization policy. Countries with persistent deficits would ultimately exhaust their available international reserves, including IMF credit; and even surplus countries might be unable to sterilize indefinitely if domestic financial markets were thin. How, then, could trade-balance equilibrium ever be restored after a permanent external shock? Fiscal policy could be effective in situations where the needs of internal and external balance were both served by the same measure. In dilemma situations, however, where fiscal measures could move the economy toward external balance only at the cost of increasing its distance from internal balance, the "fundamental disequilibrium" clause of the IMF Articles of Agreement could be invoked and the currency devalued. No automatic market mechanism pushing the economy toward balance-of-payments equilibrium was featured in the early postwar writing.

In a series of remarkable papers published in the early 1960s, Mundell revived the explicit dynamic analysis of international adjustment. His models placed the monetary sector in the foreground, adopting a Keynesian liquidity-preference view of interest-rate determination. A prescient paper by Metzler (1960), written at about the same time, took a similar approach.

Mundell's paper on "The International Disequilibrium System" (1961) criticized the Keynesian model's failure to account for the dynamic effects of payments imbalances. Even in a Keynesian world, Mundell argued, an income-specie-flow mechanism, analogous to Hume's price-

specie-flow mechanism, ensures long-run balance-of-payments equilibrium. A "fivefold increase" in a country's money supply, for example, depresses domestic interest rates, stimulates investment spending, and creates a deficit in the balance of payments. As the central bank loses reserves, however, the interest rate gradually rises and reduces investment, the process coming to an end (for a small country) only when the domestic money supply, the interest rate, investment, and output have returned to their original levels. The introduction of dynamic adjustment made it clear that sterilization could have only limited success as a policy response to permanent balance-of-payments disturbances. One source of dynamic effects, however, was not explicitly analyzed in Mundell's work of the period. The omitted effect was the real-balance effect on expenditure, central to the classical account but possibly relevant (as Pigou had shown) under Keynesian conditions as well.

In line with the increasing international capital mobility that followed the European move toward currency convertibility in 1958, Mundell gave the capital account a prominent role in his models. The presence of capital mobility suggested a solution to the policy dilemmas that could arise under fixed exchange rates when the goals of internal and external balance appeared to conflict. Mundell showed that by gearing monetary policy to external balance and fiscal policy to internal balance, governments could simultaneously attain both goals. The key to the argument is the observation that monetary and fiscal expansion both raise output but have different effects on the capital account, monetary expansion causing capital outflows (by driving down the home interest rate) and fiscal expansion causing capital inflows (by raising the interest rate). With two independent instruments, both internal and external policy targets can be attained simultaneously.

While a major step forward, the Mundellian argument for a policy mix suffered from two drawbacks. First, the theoretical specification of the capital account as a function of international interest-rate levels was weak: it seemed unlikely that capital would flow at a uniform level forever even if the interest differential remained fixed. Missing was a discussion of stock equilibrium in international asset markets. The second problem with the policy mix was its definition of external balance. Would any policymaker view with satisfaction a permanently high interest rate that brought about balance-of-payments equilibrium by crowding out domestic investment and encouraging a buildup of external debt? Key considerations omitted from Mundell's model were the stock of net foreign claims and the associated flows of interest payments. Mundell himself (1968, p. 207) recognized that in many contexts, the definition of external balance as balance-of-payments equilibrium might be inadequate:

> Just as the composition of output is important (the division of output between investment and consumption affects additional growth targets), so an appropriate composition of the balance of payments is a legitimate target of policy.

Indeed, in spite of the continuing obligation to peg dollar exchange rates, the standard definition of external balance was becoming increasingly outmoded by the late 1960s. The balance of payments remained a legitimate concern, of course, in part because a large or persistent imbalance might look like "fundamental disequilibrium" to the market and spark a speculative attack on the currency involved. But the increasing integration of national financial markets--a development epitomized by the growth of Eurocurrency trading--weakened the bite of the balance-of-payments constraint. In a hypothetical world of <u>perfect</u>

capital mobility, a central bank short on reserves can (within limits) borrow them from abroad at no net cost simply by contracting domestic credit. Such an action, by causing an incipient rise in the home interest rate, leads to an instantaneous private capital inflow and an official reserve gain equal to the fall in domestic credit. The home interest rate, the money supply, output, and the national external debt are unchanged in the final equilibrium: the central bank holds more foreign assets and fewer domestic assets, while the home private sector, having made the mirror-image adjustment, holds fewer foreign assets and more domestic assets.

The case of perfect capital mobility is an extreme one that does not fit the facts of the late Bretton Woods period. Nonetheless, the opportunities for central banks other than the Federal Reserve to borrow dollar reserves in the international capital market had grown since the early 1960s. The situation facing the United States was quite different. As the primary international reserve issuer, its responsibility was to peg the dollar price of gold, a responsibility that would have required the gearing of U.S. monetary policy to that external commitment. In spite of such expedients as the two-tier gold market established by central banks in 1968, the U.S. did not succeed in preserving the dollar's link to gold. Triffin had been right. After a series of violent speculative attacks, the U.S. severed the dollar's gold link in August 1971 and in December 1971 devalued the dollar against major foreign currencies. The patchwork system of fixed exchange rates proved unstable, and in the first months of 1973 the postwar period of floating exchange rates began.

Floating Exchange Rates. The industrialized countries adopted float-

ing dollar exchange rates as an interim measure, but in fact a significant body of economists had come to advocate floating rates by 1973. Friedman's (1953) powerful case for flexible rates was the opening shot in a campaign to revise the then-prevailing view, expounded by Nurkse (1944), that the floating-rate experiments of the interwar years were disastrous. By the time Johnson wrote his well-known polemic of 1969, Friedman's views had gained many adherents.

The fundamental argument for floating rates was that they would free governments of the balance-of-payments constraint and allow them to use monetary policy to attain domestic economic goals. Equilibrium in the balance of payments would be automatic if central banks simply refrained from intervening in the foreign exchange market. At the same time, floating rates would permit central banks to target their nominal money supplies without being frustrated by offsetting interest-sensitive foreign reserve flows. Widespread restrictions on trade and capital movements, motivated in part by a desire to impede reserve flows under the fixed-rate regime, could be dismantled.

Subsequent experience was to provide only partial vindication to the advocates of floating. In the decade after 1973, barriers to capital movement were reduced to insignificant levels in many of the industrial countries. This development helped spark unprecedented growth in international financial intermediation. Under the new exchange-rate regime, however, policymakers became more acutely aware that the traditional definition of internal balance as full employment cum price stabilty really involved two, quite distinct, goals. Under a floating exchange rate, monetary expansion aimed at domestic unemployment translates immediately into currency depreciation, higher import prices, and heightened inflationary expectations. Conversely, a rapidly-adjusting

exchange rate provides a powerful channel through which inflationary expectations can have a direct and immediate effect on inflation in an open economy. Any short-run tradeoff between inflation and unemployment would therefore be less favorable under a floating rate. Floating rates certainly allow countries to choose their own trend inflation rates. But it soon became evident that if disturbances to the economy originated predominantly outside the money market, the inflationary cost of using monetary policy to target employment could be quite high.

Sharp exchange-rate movements might also have adverse distributional effects in the economy, and these, together with a desire for price-level stability, led central banks to intervene, at times heavily, in the foreign exchange market. Correspondingly, the predicted drop in central banks' demand for international reserves did not materialize (although the composition of reserves did change over time as the deutschemark and yen became important reserve currencies and the pound sterling retreated). Central banks' use of foreign reserves to manage exchange rates did not necessarily imply an operative balance-of-payments constraint, however, since in many countries the same exchange-rate effects could have been achieved at an unchanged reserve level through domestic credit measures.

Under conditions of limited capital mobility, such as those existing in the early 1950s when Friedman wrote, the automatic balancing of international reserve payments by a floating exchange rate amounted essentially to the automatic balancing of the current account. With means other than reserve flows available to settle current-account imbalances, however, there is no theoretical necessity for a floating rate to balance the current account in the short run. A current-account deficit, say, can be financed entirely through domestic borrowing abroad

with no decline in the central bank's foreign assets. Experience was to show that floating exchange rates themselves could not prevent the emergence of large and persistent current-account imbalances. These imbalances were problematic not only because they usually entailed problems of shifting productive resources between the economy's tradable and nontradable sectors, but also because they implied changes in foreign debt and thus in sustainable future consumption levels.

Attention therefore shifted to the mechanism of current-account adjustment under floating exchange rates and capital mobility, with researchers asking, as Hume had, if market forces would automatically push economies toward current-account balance. The new generation of dynamic open-economy models produced in the mid-1970s built on a number of antecedents in the literature. One of these was the neo-classical monetary approach to the balance of payments, which stressed the real balance effect and the transition to long-run payments equilibrium. (See, for example, Frenkel and Johnson, 1976.) The second important antecedent was the closed-economy literature on money and growth, which had clarified the stock-flow distinction in multi-asset models with wealth accumulation. Building on the rational-expectations revolution in macroeconomics, many model builders endowed agents with forward-looking exchange-rate expectations that played a key role in clearing the asset markets.

The intrinsic dynamic mechanism in these models is fueled by wealth, broadly defined to include not only real monetary balances, but also foreign assets and possibly capital, physical as well as human. (See Obstfeld and Stockman, 1985, for a survey.) In line with the long-run nature of the inquiry, the "classical" conditions of price flexibility and full employment were generally assumed, giving a produc-

tion structure similar to the Humean model set out above. Where the models differed essentially from Hume was in the wider spectrum of marketable assets, and in the resulting portfolio problem of private agents. Each given configuration of world asset stocks determines a short-run equilibrium defined by the the requirement of market clearing in asset as well as goods markets. The resulting equilibrium wealth levels and real interest rates determine consumption levels at home and abroad, but there is no necessary requirement of current-account balance in the short run: goods-market equilibrium implies only that one country's planned current-account surplus equals the other's planned current-account deficit. The international adjustment process can now be visualized. All else equal, the deficit country is running down its wealth by borrowing from abroad, so its consumption is falling and foreign consumption is rising. Under the othodox transfer criterion, this redistribution of wealth between the countries causes the deficit country's terms of trade to deteriorate over time; if anticipated, the evolution of the terms of trade has further repercussions on world real interest rates and expenditure levels. The process comes to an end once the deficit country's consumption has fallen into line with its income, which is lower than initially because of the increased interest burden of the external debt. (A very similar adjustment process would take place with mobile capital and a fixed exchange rate, but reserve movements rather than exchange-rate movements would contribute to asset-market balance during the transition to long-run equilibrium.)

This simple picture of the adjustment process becomes more complicated once domestic capital accumulation is allowed. A current-account deficit may now finance an investment boom in which the deficit country's terms of trade improve over time. Eventually, however, the

international wealth-flow mechanism restores a balanced current account. Further complications arise when the classical assumptions are drooped and Keynesian price stickiness in output markets is assumed. In such models, the approach to the long-run, full-employment equilibrium can be oscillatory.

For a single economy with Keynesian features, there is an analogue to the Mundellian idea of using monetary and fiscal policy simultaneously to attain internal and external targets. Figure 2, which is developed more fully in Obstfeld (1985, pp. 408-410), illustrates this approach. The downward sloping internal-balance schedule shows combinations of monetary and fiscal ease consistent with full employment. On the assumption that monetary ease improves the current account by depreciating the currency, the external-balance schedule, which shows policy settings consistent with some current-account target, slopes upward. The intersection of the two schedules shows how policies should be set to achieve both of the government's goals in the short run.

Even if one leaves aside the complex game-theoretic problems surrounding interactions between expectations and policy, the usefulness of the above framework as a normative guide is limited by its failure to incorporate some key dynamic elements. If the government can hit its targets only by running a budget deficit, its fiscal stance must eventually be reversed if the government debt is to be serviced. In addition, the policy equilibrium shown in Figure 2 may imply a domestic investment rate that is socially sub-optimal. Finally, the framework itself gives no guidance as to the appropriate external-balance criterion. The balanced current account reached in the hypothetical long-run equilibrium of a stationary world economy may be far off the mark in the short run in which policy decisions must be made. Recently,

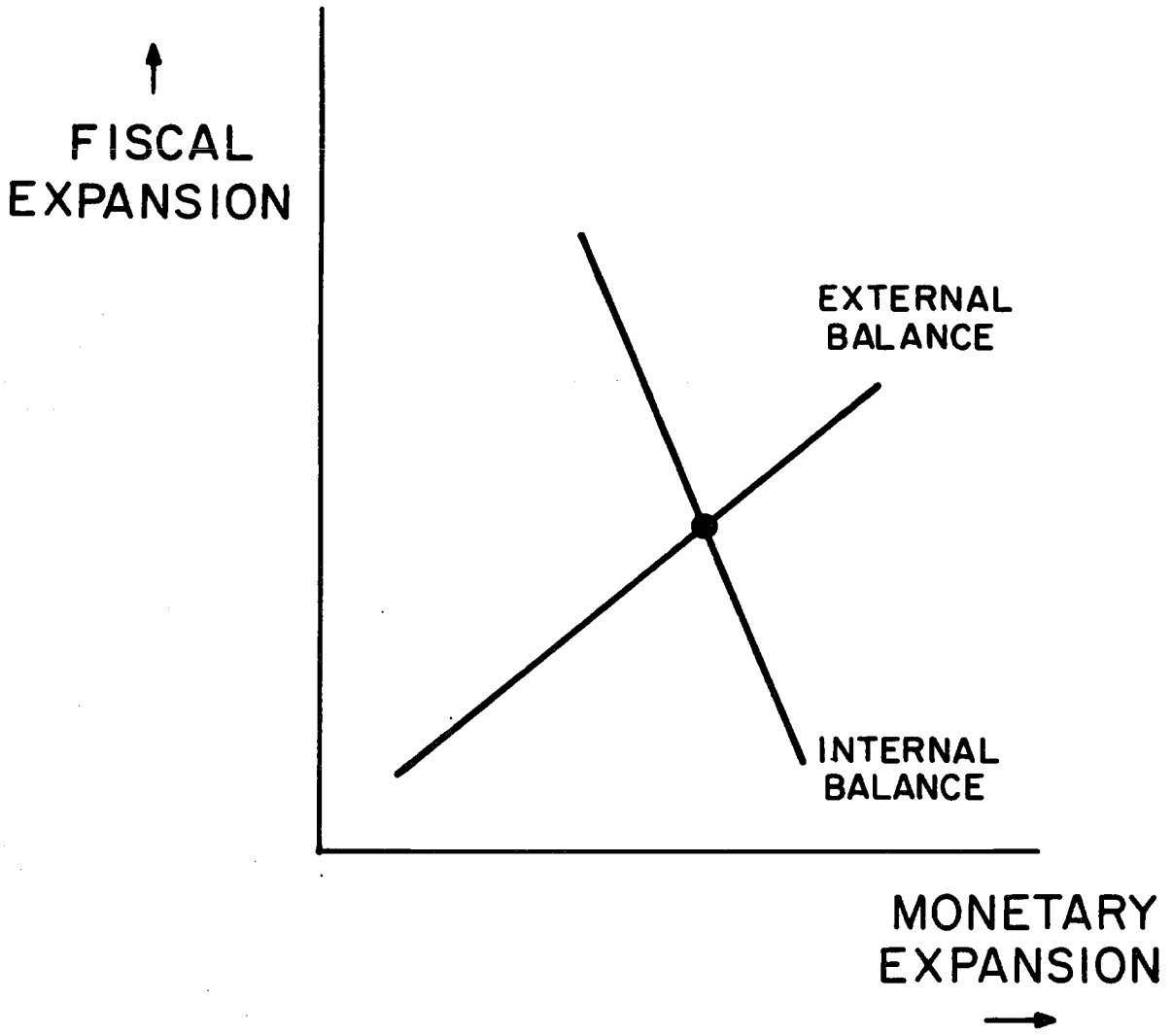
FISCAL
EXPANSION
EXTERNAL
BALANCE
INTERNAL
BALANCE
MONETARY
EXPANSION

Fig. 2

the theory of international finance has made partial progress in addressing these issues.

The Intertemporal Analysis of External Balance. In the 1980s, it became increasingly common to analyze the dynamic behavior of open economies in terms of the intertemporal maximization hypothesis applied by Fisher (1930) to the theory of saving and investment. As usual, this trend was the result of both new theoretical approaches in macroeconomics generally and of economic events that existing open-economy models seemed ill-equipped to analyze.

Lucas's (1976) influential critique of econometric policy evaluation was important in motivating the intertemporal approach. Lucas argued that the standard econometric models of the time would generally not be invariant to policy changes. Because the parameters estimated were not the "deep" parameters describing preferences or technology, but instead reflected both deep structure and the policy environment prevailing over the estimation period, the models could not be used to analyze changes in the policy environment. Lucas's analysis suggested that more reliable policy conclusions might be drawn from open-economy models if demand and supply functions were derived from the optimal decision rules of maximizing households and firms.

Further impetus to develop an intertemporal approach came from events in the world capital market, particularly the international pattern of current accounts following the sharp oil-price increases of 1973-74 and 1979-80. The divergent patterns of current-account adjustment by industrialized and developing countries raised the inherently intertemporal problem of characterizing the optimal response to external shocks. Neither classical nor Keynesian transfer analysis offered any

reliable guidance on this question. Similarly, the explosion in bank lending to developing countries after the first oil shock sparked fears that some countries' external debt burdens would become unsustainable. The need to assess developing-country debt levels again led naturally to the notion of an intertemporally optimal current-account deficit.

Any intertemporal analysis of external balance must begin by specifying the economy's technological and market opportunities for shifting consumption over time. These opportunities are described by the economy's intertemporal budget constraint, which specifies the terms on which the economy can borrow or lend abroad, as well as the domestic investment technology. Separate analysis of the public and private sector's budget constraints illuminates the link between the public finances and external imbalance, as measured by the balance of payments or by the current account. The economy-wide budget constraint results from consolidation of the public- and private-sector constraints.

Assume for simplicity that a single good is consumed and produced on each date, and consider the position of a small open economy that can borrow or lend internationally at the real interest rate ρ. For each date t, the government of the economy chooses a level of real government consumption, g(t), and a (possibly negative) level of real transfers to the private sector, τ(t). The government finances its outlays by issuing debt, by printing money, and by drawing on the interest paid by the central bank's foreign reserves. (For present purposes, the central bank's budget best is viewed as a component of the government's budget.) Let b^G(t) denote real government bond holdings (other than central-bank foreign reserves), D(t) the money value of central-bank domestic credit, P(t) the money price level, and r(t) real foreign reserves. If the government pays the interest rate ρ on its domestic debt ($-b^G$(t)), then

the path of government bond holdings satisfies the equation:

$$(3)\quad db^G(t)/dt = \rho[b^G(t) + r(t)] + [1/P(t)]dD(t)/dt - g(t) - \tau(t).$$

Changes in the economy's money supply, $M^S(t)$, result from changes in the central bank's foreign or domestic assets. If the world price level P* is constant (so that proportional changes in P(t) equal proportional changes in the exchange rate), then the central-bank balance-sheet identity implies $dM^S(t)/dt = P(t)[dr(t)/dt] + dD(t)/dt$. Let m(t) denote the private sector's desired real money balances and $\pi(t)$ the home inflation rate. On the assumption that the money market is continuously in equilibrium, $m(t) = M^S(t)/P(t)$ and equation (3) becomes

$$(4)\quad d[b^G(t) + r(t)]/dt = \rho[b^G(t) + r(t)] + \pi(t)m(t) + [dm(t)/dt] - g(t) - \tau(t).$$

Integrate (4) forward from t = 0 and impose the condition $\lim_{t\to\infty}\exp(-\rho t)[b^g(t) + r(t)] \geq 0$, which restricts the government to borrowing paths such that the public debt is asymptotically paid off. The result is the intertemporal budget constraint of the government,

$$\int_0^\infty [g(t) + \tau(t)]\exp(-\rho t)dt \leq \int_0^\infty [\pi(t)m(t) + dm(t)/dt]\exp(-\rho t)dt + b^G(0) + r(0).$$

The inequality states that the present value of net government outlays must be less than the present value of the seigniorage from money creation plus the government's intial asset position. The latter quantity, in turn, equals central-bank foreign reserves less the public debt. For a world of perfect capital mobility, the constraint makes clear that it is the government's overall asset position that is relevant for assessing solvency. The level of foreign reserves r(0) has

little significance in itself. As noted earlier, the central bank can increase its reserves by selling other government assets (thus reducing $b^G(0)$ by an amount equal to the rise in reserves). The transaction requires no change in the path of planned government outlays, $g(t) + \tau(t)$.

Consider next the private sector. Let $b(t)$ denote net private real bond holdings and $k(t)$ real capital holdings. (By assumption capital's real price equals unity.) Foreigners do not hold domestic money or capital, although the analysis could easily be modified to account for these possibilities. Given an inelastic labor supply normalized at unity and a neo-classical production function $x[k(t),t]$, private-sector assets obey the equation

$$(5)\quad d[b(t) + k(t) + m(t)]/dt = x[k(t),t] + \rho b(t) + \tau(t) - c(t) - \pi(t)m(t).$$

Define investment $i(t)$ as $dk(t)/dt$. The sum of (4) and (5) is

$$d[b(t) + b^G(t) + r(t)]/dt = x[k(t),t] + \rho[b(t) + b^G(t) + r(t)] - c(t) - i(t) - g(t).$$

The sum $b(t) + b^G(t) + r(t)$ will be denoted by $f(t)$; $f(t)$ equals the economy's overall net claims on the rest of the world. Integrated forward and combined with the condition $\lim_{t\to\infty}\exp(-\rho t)f(t) \geq 0$, the above equation implies the economy's overall intertemporal budget constraint,

$$(6)\quad \int_0^\infty \{c(t) + i(t) + g(t) - x[k(t),t]\}\exp(-\rho t)dt \leq f(0).$$

(The same constraint is relevant when the private sector is prohibited from transacting in the world capital market, but the paths of consumption, investment, and output would generally change if such a prohibi-

tion were imposed.)

Inequality (6) states that the present value of the economy's expenditures cannot exceed the present value of output plus initial net external assets. Alternatively, (6) constrains the present value of the economy's trade balance deficits to its initial foreign asset stock. The initial foreign asset stock thus limits the economy's ability to maintain absorption levels in excess of output.

An implication of the analysis is that the most appropriate indicator of flow disequilibrium in external transactions is the change in the economy's overall external assets--the current account. A surplus in the balance of payments may indicate low domestic credit expansion or growing domestic money demand; but when the government has unilimited access to the world capital market, a growing stock of foreign reserves is, in itself, neither a necessary nor a sufficient condition for a sound external position. Only when the domestic government and private sector cannot borrow abroad does the balance of payments equal the change in external claims.

The important consequences of current-account flows do not imply that external balance and current-account balance are the same. In analogy with the idea of a high-employment government budget surplus, external balance could be defined roughly as a current account that maintains the highest possible steady consumption level consistent with the economy's expected intertemporal budget constraint. (A more exact definition would require a more explicit treatment of the preferences of households and the government.) Temporary unfavorable movements in output, world interest rates, or the terms of trade are appropriately offset by temporary current-account deficits, while temporary surpluses are an appropriate response to temporary favorable shocks. External

balance in the face of a permanent shock, however, generally requires a rapid adjustment to current-account equilibrium.

Similarly, increases in the productivity of investment can justify a current-account deficit that is fully consistent with external balance in a long-run sense. In terms of equation (6), a technological innovation implying a gradual upward shift of the production function $x[k(t),t]$ generates higher levels of consumption and investment, and thus an initial current-account deficit. The ability to borrow abroad prevents the sharp rise in the interest rate and drop in consumption that would occur initially in a closed economy; a higher investment level than under intertemporal autarky is supported by the foreign capital inflow. As productivity growth returns to normal, investment falls and current-account balance is restored with consumption and output at permanently higher levels.

These points can be made graphically in terms of a two-period Fisherian model (see Figure 3). The axes measure amounts of the two goods available, present and future consumption, and the indifference curves show preferences over those goods. Investment opportunities are described by the production-possibilities frontier, which indicates the amount of future consumption obtained from a given input of present consumption. With the opportunity to borrow abroad at an interest rate ρ, the economy chooses to invest at point A and consume at point B, both of these points lying on the economy's budget line, which has slope $-(1 + \rho)$. Given preferences and technology, it is optimal for this economy to run a first-period current-account deficit equal to the horizontal distance between B and A; in period two, the country runs a surplus to repay its earlier borrowing. External balance thus entails an initial current-account deficit for the country shown, but a surplus for

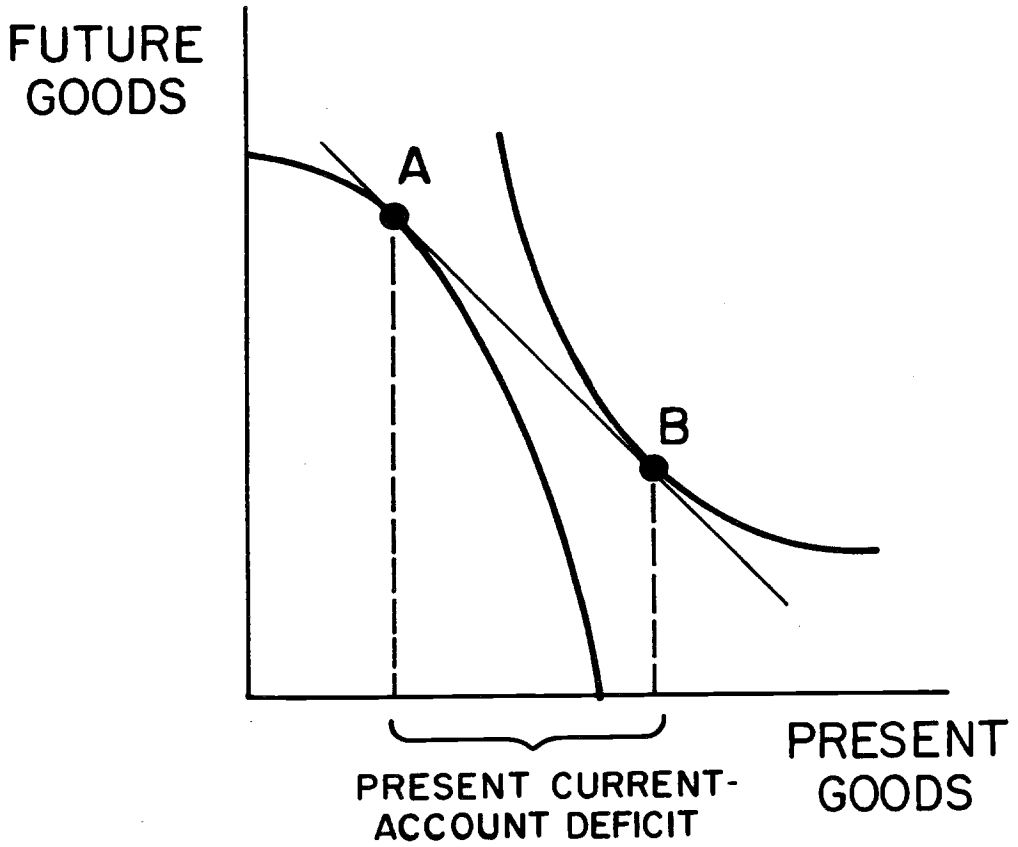
FUTURE GOODS
A
B
PRESENT GOODS
PRESENT CURRENT-ACCOUNT DEFICIT

Fig. 3

countries whose autarky interest rates are less than the equilibrium world rate ρ. The model is a parable of the development process.

When distortions in the economy cause the actual current account to diverge from its optimal level, governments may find it appropriate to adopt policies, such as taxes or subsidies on capital movement, that move the economy closer to the ideal external balance. Policies that operate directly on the distortions in question (if these can be identified) will, as usual, be best. Interesting problems arise when the countries being analyzed are large enough that their governments can affect world real interest rates (and other world prices) through their actions. In this situation, the normative guidelines offered by the above approach are not directly applicable to policy analysis, and governments instead condition their actions on the conjectured responses of other governments. A Nash-Cournot equilibrium, in which each government maximizes over policy settings taking as given the policies of other governments, will in general be Pareto-inefficient from a global viewpoint. When governments recognize their policy interdependence, welfare in each country can be improved though policy cooperation. The practical difficulty lies in the negotiation process through which all parties agree to choose a particular point on the world contract curve.

Sovereign Borrowing and Credit Constraints. The intertemporal analysis of external balance sketched above assumes a world in which individuals or at least governments can borrow unlimited amounts in the world capital market, subject only to their intertemporal budget constraints. Individual and sovereign borrowers alike, however, often appear to face binding credit constraints as a result of nonrepayment risk. After the early 1980s, the extreme difficulty for many in-

dustrializing countries of tapping world credit markets focused attention on how countries' borrowing possibilities are affected by the possibility of sovereign debt default. The problem is a central one because most developing-country debts are either contracted directly by government agencies or are government-guaranteed.

Eaton and Gersovitz (1981) presented the first explicit analysis of the sovereign repudiation problem in an international setting. Claims on sovereign debtors are usually not legally enforceable, so the analysis of sovereign default cannot be conducted in terms of bankruptcy laws that govern cases of individual default. Eaton and Gersovitz hypothesized that a sovereign debtor defaults whenever the present discounted benefit of doing so exceeds the present discounted cost. Potential lenders, understanding the debtor's decision rule, will never lend so much that a sure incentive to default is created. Accordingly, sovereign borowers will in general find themselves credit-rationed, unable to borrow as much as they would like at the interest rate quoted by lenders.

There are several potential costs of sovereign default. A defaulting country's external assets, such as foreign reserves or goods in transit, can be seized. The country could, in addition, find itself unable to borrow in the future in response to unexpected changes in its income or technology. Continued participation in the world trade and payments system might become infeasible altogether.

This "willingness to pay" hypothesis has radical implications for the analysis of external balance. The borrowing country shown in Figure 3, for example, would repudiate its foreign debt if that action were costless, thus avoiding the resource transfer it would otherwise have to make in the second period. As a result, period-one borrowing would take

place at a country-specific interest rate reflecting the probability of default, with the extent of borrowing limited by the market's estimate of default costs. At interest rates so high that default was certain, no lending at all would occur.

The analysis of external balance becomes much more complex in such a setting. Not only is the allowable current-account deficit more severely circumscribed; in addition, the policymaker must consider how various policy actions will affect the costs of default and hence the availability of foreign credit. Trade liberalization measures that move the economy away from an autarkic production allocation increase the cost of default by making the economy more vulnerable to disruption of its foreign trade. Such measures will therefore ease international credit constraints at the same time as they improve the static allocation of national resources. Conversely, trade restrictions aimed at improving the current account may well reduce a country's creditworthiness.

The traditional balance-of-payments target has a rationale if the government believes that foreign credit lines may disappear unexpectedly. There is then a case for holding precautionary reserves to finance current-account deficits that may become necessary at times when credit happens to be tight or nonexistent. The same purpose would be served, however, if foreign assets held by government agencies other than the central bank were run down at such times.

Internal and external balance may be irreconcilable for countries that seek to continue external debt service in the face of severe limitations on foreign borrowing. After the early 1980s, many developing countries were able to obtain external finance only through "forced" bank lending orchestrated by the IMF and central banks. Measures to

reduce current-account deficits in line with the external funds available (and in line with IMF stabilization targets) pushed many economies into deep recession. As of this writing, it is unclear how long it will remain politically feasible for debtor governments to downplay internal-balance goals in order to continue avoiding default. There are increasingly-frequent calls for some form of debt relief. Such proposals amount to the ex post indexation of debt contracts to adverse contingencies that were not entirely under the debtors' control.

The debt crisis of the 1980s has raised deep and serious questions about the types of assets traded between developed and developing countries. Before the debt crisis, the typical loan contract between banks and developing-country borrowers was indexed only to the London Inter-Bank Offered Rate, and not to other factors that might alter the borrower's ability to repay. Trade between developed and developing countries in a wider spectrum of state-contingent assets would improve the international allocation of risk, and thus help to avoid future debt crises. A greater share for equity in settling current-account imbalances is one possible step in this direction. Such reforms would not eliminate the sovereign-default problem entirely, nor would they eliminate the moral-hazard problem emphasized by critics of debt-relief proposals. The possibility of a widespread and synchronized default could be sharply reduced, however, under innovative external financing arrangements.

The structure of international financial intermediation also has implications for the mutual adjustment process of industrialized countries. Current-account imbalances are only one avenue through which countries can maintain long-run consumption levels in the face of real income fluctuations or changes in investment productivity. Similar

consumption-smoothing can be obtained with smaller current-account imbalances, however, if there is a greater degree of international portfolio diversification. Lucas (1982), for example, models a world of two exchange economies with perfect international risk sharing in which consumption levels can be perfectly correlated internationally even though current-account imbalances never take place. The problem of external balance therefore never arises in Lucas's idealized setting. In reality, the extent of international portfolio diversification seems to be much smaller than plausible financial models of an integrated world capital market would predict. Why this should be so is a major empirical puzzle, and a problem for policy as well.

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