ASSET MARKETS AND EXCHANGE RATES: MODELING AN OPEN ECONOMY

Parts I, II, and III of *Asset Markets, Exchange Rates, and Economic Integration: A Synthesis*

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1

An agenda

The point of departure

When we began this book, our aim was rather modest. We sought to reassess the effectiveness of national monetary and fiscal policies when capital markets are closely integrated and to use our findings in appraising the costs and benefits of economic unions, especially monetary unions. One of us had been working on the implications of capital mobility for the effectiveness of national policies.[1] The other had been working on the problems of monetary unification.[2] It looked as though we might put our work together once we had constructed a macroeconomic model that would be receptive to our questions. As we went along, however, we grew more ambitious. Encouraged by our colleagues and by each other, we came to believe that our model could be put to more extensive use. It was indeed becoming a synthesis of recent research on the theory of the balance of payments and exchange-rate determination. What had started as a monograph was becoming a treatise and might even be able to respond to Haberler's suggestion: "What would be welcome," he wrote recently, "is an updated version of Meade's classic treatise."[3]

The reader will have to decide if our response has been successful. First, however, we have to explain in what ways we have tried to "update" Meade, for we have not followed Haberler's prescription. He called for a marriage of Meade's approach to balance-of-payments theory, which stresses the roles of price and expenditure effects, to the "valid elements" of the monetary approach rehabilitated by Johnson and others, which stresses the requirements of long-run equilibrium in the money market.[4] We have sought instead to marry Meade's analysis of price and expenditure effects to a broad approach to asset-market equilibrium that looks at money *and* bond markets, one we believe to be much richer than the monetary approach and less doctrinaire in its implications. We build and use a model that borrows its treatment of goods markets from Meade, its treatment of saving and wealth from Metzler,[5] and its treatment of financial markets from Markowitz and Tobin.[6]

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[1] P. B. Kenen, *Capital Mobility and Financial Integration: A Survey*, Princeton Studies in International Finance 39, Princeton University, Princeton, N.J., 1976.

[2] P. R. Allen, *Organization and Administration of a Monetary Union*, Princeton Studies in International Finance 38, Princeton University, Princeton, N.J., 1976.

[3] G. Haberler, "Review of *The Monetary Approach to the Balance of Payments*," *Journal of Economic Literature*, 14 (December 1976), p. 1328. The reference, of course, is to J. E. Meade, *The Balance of Payments*, Oxford University Press, London, 1951.

A marriage of Meade's model to the modern monetary model would be an unhappy union. The partners would be incompatible. One of them, indeed, wants nothing to do with the other. In a paper published shortly after his death, Johnson defined the monetary approach in these terms:[7]

> The central propositions of the monetary approach are, first, that the balance of payments is a monetary phenomenon and requires analysis with the tools of monetary theory and not barter or "real" trade theory; second, that money is a stock, whereas real theory traditionally deals with flows, so that an adequate balance-of-payments theory must integrate stocks and flows; and third, that the money stock can be changed in two alternative ways, through domestic credit creation or destruction and through international reserve flows, the policy choice being important for balance-of-payments analysis.

[4] See, e.g., J. A. Frenkel and H. G. Johnson, eds., *The Monetary Approach to the Balance of Payments*, University of Toronto Press, Toronto, 1975, especially the editors' introductory essay and the papers by Johnson, Mundell, Frenkel, Dornbusch, and Rodriguez; also H. G. Johnson, "The Monetary Approach to Balance of Payments Theory: A Diagrammatic Analysis," *The Manchester School*, 43 (September 1975), pp. 220–74, and "The Monetary Approach to the Balance of Payments: A Nontechnical Guide," *Journal of International Economics*, 7 (August 1977), pp. 251–68, and J. A. Frenkel, "Adjustment Mechanisms and the Monetary Approach to the Balance of Payments: A Doctrinal Perspective," in E. Claassen and P. Salin, eds., *Recent Issues in International Monetary Economics*, North-Holland, Amsterdam, 1976, pp. 29–48. Other important contributions include R. Dornbusch, "Currency Depreciation, Hoarding, and Relative Prices," *Journal of Political Economy*, 81 (July/August 1973), pp. 893–915, R. A. Mundell, "The Optimum Balance of Payments Deficit," in E. Claassen and P. Salin, eds., *Stabilization Policies in Interdependent Economies*, North-Holland, Amsterdam, 1972, pp. 69–86, and R. Komiya, "Economic Growth and the Balance of Payments: A Monetary Approach," *Journal of Political Economy*, 77 (January/February 1969), pp. 35–48. For critical reviews of monetary models, see M. v. N. Whitman, "Global Monetarism and the Monetary Approach to the Balance of Payments," *Brookings Papers in Economic Activity*, 1975(3), pp. 121–66, and F. H. Hahn, "The Monetary Approach to the Balance of Payments," *Journal of International Economics*, 7 (August 1977), pp. 231–49.

[5] L. A. Metzler, "Wealth, Saving and the Rate of Interest," *Journal of Political Economy*, 59 (April 1951), pp. 930–46.

[6] H. M. Markowitz, *Portfolio Selection*, Wiley, New York, 1959, and J. Tobin, "Liquidity Preference as Behavior Toward Risk," in D. D. Hester and J. Tobin, eds., *Risk Aversion and Portfolio Choice*, Wiley, New York, 1967, pp. 1–26, and "A General Equilibrium Approach to Monetary Theory," *Journal of Money, Credit and Banking*, 1 (February 1969), pp. 15–30.

[7] Johnson, "A Nontechnical Guide," p. 251.

Models fashioned in accordance with these tenets sometimes deny altogether the relevance of price and expenditure effects–the ingredients of "real" trade theory–that figure strategically in Meade's treatise. They focus single mindedly on monetary equilibrium in the never-never land of the stationary state, and they are constructed expressly to affirm the neutrality of money, which is to say that they assume it. The economy is dichotomized completely into real and monetary sectors.

Adherents of the monetary approach are right to remind us that the exchange rate is the relative price of money–the price at which one currency is sold for another. But they then go on to draw the dubious inference that the exchange rate is determined in and by the money market. The monetary theory of the balance of payments is crafted to explain endogenous adjustments in the money supply when the exchange rate is pegged. The monetary theory of exchange-rate determination is crafted to explain endogenous adjustments in the "price" of money when the rate is flexible. Both theories are simplified drastically in order to focus symmetrically and narrowly on behavior in the money market.

Our approach is different in all of these respects. Although we are concerned to amend Meade's analysis by adding the requisite stock-flow relationships and portfolio constraints, we do not look mainly at their long-run implications. We examine the effects of disturbances and policies from start to finish, stressing the behavior over time of saving, wealth, and asset holdings and their effects on trade and capital flows. We show how an economy adapts to the requirements of long-run equilibrium, including money-market equilibrium, and how its adaptations are affected by the exchange-rate regime and the strength of the connections between home and foreign markets, especially the degree of substitutability between domestic and foreign bonds. Thus, we integrate the analysis of relative prices and expenditure with an analysis of changes in aggregate demand (absorption) brought about by changes in interest rates, exchange rates, and wealth, rather than subordinating all of those effects to the study of money-market effects.

We do not dichotomize our model. Money is not necessarily neutral in the model, even in the long run, so that monetary phenomena, including changes in the "price" of money, can influence real economic activity. Many restrictive assumptions are required to impose neutrality, and some of them may blind us to important insights. We shall see, for example, that money is not neutral when there is more than one exogenous variable denominated in nominal terms. To impose neutrality, it is thus necessary to limit the number of outside assets held by an economy or to endow those assets with characteristics that trivialize the problem of portfolio selection; doing so, we can suppress asset-market processes that have an important influence on exchange-rate behavior.[8] Readers may decide that we go too far in the opposite direction by insisting that exchange-rate determination is dominated in the short run by wealth holders' choices between home-currency and foreign-currency assets, but our model may be more realistic in this regard than models that rule out this possibility in the attempt to impose classical neutrality.

The exchange rate is treated as the "price" of money, but it is not determined in and by the money market. Although the exchange rate is the price that *clears* the money market, it is determined jointly with other variables, including interest rates, by interactions between money and bond markets. Over time and in the long run, moreover, the exchange rate comes to conform with the requirements of equilibrium in the goods markets, not only in the bond and money markets. A decrease in the "price" of the home currency (a devaluation of a pegged exchange rate) is not equivalent in the long run to an increase in the quantity of money (an open-market purchase by the central bank).

In the preface to his book, Meade acknowledges indebtedness to Keynes and to Machlup, Metzler, and Nurkse, who were among the first to use Keynesian methods in balance-of-payments analysis. He also acknowledges a debt, however, to Robinson and others for their work on price effects and what we have now come to call the elasticities approach to exchange-rate theory.[9] It was Meade's chief contribution to synthesize Keynesian expenditure theory and neoclassical price theory.[10]

Meade is sometimes criticized, indeed, for devoting excessive attention to price elasticities and thereby neglecting the effects of changes in expenditure–for failing to emphasize the need for changes in absorption to validate a change in the exchange rate. True, he fails to allow for the possibility of endogenous changes in absorption, whether they be those invoked by Laursen and Metzler, Alexander, or Dornbusch.[11] But Meade does not neglect the policy problem posed by students of the absorption approach. In effect, he assigns monetary and fiscal policies to the regulation of aggregate demand–to the task of making the changes in absorption required to validate a change in the exchange rate. Meade was among the first to warn that a devaluation cannot improve the balance of payments of a fully employed economy if the government does not engineer a reduction in absorption or if labor will not countenance a cut in the real wage.

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[8] The formulation here, and in Chapter 5, draws on the discussion in P. Isard, *Exchange-Rate Determination: A Survey of Popular Views and Recent Models*, Princeton Studies in International Finance 42, Princeton University, Princeton, N.J., 1978, pp. 25–6, Isard, in turn, cites D. Roper, "Two Ingredients of Monetarism in an International Setting," Seminar Paper 46, Institute for International Economic Studies, Stockholm, 1975.

[9] Meade, *The Balance of Payments*, pp. ix–x.

[10] The following discussion is adapted from P. B. Kenen, "Flexible Exchange Rates and National Autonomy," *Rivista Internazionale di Scienze Economiche e Commerciali*, 23, 1976(2), pp. 106–12.

[11] S. Laursen and L. A. Metzler, "Flexible Exchange Rates and the Theory of Employment," *Review of Economics and Statistics*, 32 (November 1950), pp. 281–99, S. S. Alex-

Meade's use of price elasticities is not in the partial-equilibrium tradition of Robinson and others who were the first to use them. On the contrary, it evokes Edgeworth's warning about the deceptive simplicity of offer-curve analysis. Offer curves, said Edgeworth, are like the hands of a clock. There is much machinery concealed behind them. Similarly, much machinery is moving behind the foreign-exchange market in Meade's model.

Meade's book, moreover, deals with many of the issues that are in vogue today, and says things that economists are saying now as though they had never been said before. His chapter on nontraded goods, for example, tells us much that we have been learning anew from Dornbusch, Jones and Corden, and Krueger,[12] and much that will be found in this book too. It tells us how substitution in production and consumption determines the extent to which effects of changes in exchange rates spread out from the markets for traded goods to influence activity and prices in markets for nontraded goods. It does so, moreover, without making the small-country assumption that is so popular today–without pretending that adjustments in internal prices are the only ones that matter. In a chapter that compares international with interregional payments adjustment, Meade anticipates many statements made by Mundell, Ingram, and others concerning the roles of labor and capital mobility in the adjustment process.[13] And Meade's chapter on speculation in the foreign-exchange

ander, "Effects of a Devaluation on a Trade Balance," *International Monetary Fund Staff Papers,* 2 (April 1952), pp. 263–78, and Dornbusch, "Currency Depreciation, Hoarding, and Relative Prices."

[12] R. Dornbusch, "Devaluation, Money, and Nontraded Goods," in Frenkel and Johnson, eds., *The Monetary Approach to the Balance of Payments,* pp. 168–86, R. W. Jones and W. M. Corden, "Devaluation, Non-flexible Prices, and the Trade Balance for a Small Country," *Canadian Journal of Economics,* 9 (February 1976), pp. 150–61, and A. O. Krueger, "The Role of Home Goods and Money in Exchange Rate Adjustments," in W. Sellekaerts, ed., *International Trade and Finance: Essays in Honour of Jan Tinbergen,* Macmillan, London, 1974, pp. 139–61.

[13] R. A. Mundell, "A Theory of Optimum Currency Areas," *American Economic Review,* 51 (December 1961), pp. 657–65, and J. C. Ingram, *The Case for European Monetary Integration,* Essays in International Finance 98, Princeton University, Princeton, N.J., 1973.

market is superior pedagogically to Friedman's famous article,[14] because Meade is careful to articulate fully the assumptions one must make in order to establish that private speculation will help to stabilize a flexible exchange rate.

Meade does not neglect capital movements in his account of balance-of-payments adjustment, and his model includes a well-defined money market. When capital movements appear in his examples, however, they serve mainly to supplement movements of goods. Look in particular at Chapter XV of *The Balance of Payments,* where Meade compares adjustment under a gold standard with adjustment under a flexible exchange rate. One could delete all references to capital movements without altering substantially Meade's major conclusions. And though the stock of money appears in his model, it does not constrain economic behavior. In most of his book, Meade instructs the central bank to maintain a constant interest rate; the bank's open-market operations offset changes in the supply of money caused by movements of reserves and offset changes in the demand for money caused by movements in domestic income.[15]

What is most important from our standpoint, Meade does not connect capital movements with behavior in bond markets. Demands for claims on foreigners are added to his model; they are not extracted from the model as excess demands for bonds. There are, in fact, no bond markets in Meade's model and thus no way to link flow demands for bonds with the level of saving or to link stock demands with the level of wealth.

Meade's book appeared just 15 years after Keynes's *General Theory,* years in which there was intermittent warfare between two Cambridge Colleges. At Kings, Keynes maintained that the rate of interest depends on the demand for money, reflecting liquidity preference. At Trinity, Robertson maintained that it depends on the demand for loanable funds, reflecting thrift or saving. The skirmishing ended only when the two sides had digested Hicks's *Value and Capital,* reminding them of Walras's law, and came to understand that excess demand in one market implies excess supply in another. When the markets for goods and money clear, the market for bonds must also clear. The truce between the Colleges, however, led many to believe that they were free to concentrate on the demand for money, neglecting the demand for bonds, and this is what Meade did. The method is permissible, but it can be hazardous. When we write out an equation to describe the money market, we make important statements about the bond market, and we should write them out too, if only to be sure that we are content with the statements we have made about the money market. When we work with open systems, moreover, in which goods and asset markets are connected with their counterparts in other countries, it is absolutely essential that we do so.

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[14] M. Friedman, *Essays in Positive Economics,* University of Chicago Press, Chicago, 1953, pp. 157–203.

[15] On money and monetary policy in Meade's model, see S. C. Tsiang, "The Role of Money in Trade Balance Stability," *American Economic Review,* 51 (December 1961), pp. 912–36.

To bring Meade's treatise up to date, it is therefore necessary to specify fully and explicitly the requirements of equilibrium in each and every asset market–along with the relationships between demands for stocks of assets and the flows by which those stocks are altered through time. Furthermore, holdings of assets, including money, must be constrained by wealth. Saving must be made to add to wealth. And wealth must be allowed to influence the level of saving and therefore to influence aggregate expenditure.

The need to include and exploit stock-flow relationships is, of course, a major tenet of the monetary approach to the balance of payments. Even in the simplest of monetary models, where money is the only asset, hoarding (saving) adds to money holdings (wealth), and the level of those holdings affects the rate of hoarding.[16] But stock-flow relationships appeared for the first time in modern balance-of-payments analysis in a different context–in attempts to show why some of us had failed to prove statistically that capital flows are sensitive to interest rates.[17] They came to be included in general open-economy models when wealth and portfolio-balance constraints were invoked to modify Mundell's conclusions regarding the optimum policy mix and the assignment problem.[18]

[16] See, e.g., Dornbusch, "Currency Depreciation, Hoarding, and Relative Prices."

[17] See, e.g., W. H. Branson, *Financial Capital Flows in the U.S. Balance of Payments*, North-Holland, Amsterdam, 1968, and N. C. Miller and M. v. N. Whitman, "The Outflow of Short-term Funds from the United States: Adjustments of Stocks and Flows," in F. Machlup et al., eds., *International Mobility and Movement of Capital*, Columbia University Press for the National Bureau of Economic Research, New York, 1972, pp. 253–86.

[18] The first of the general models was, we believe, the one in R. I. McKinnon and W. E. Oates, *The Implications of International Economic Integration for Monetary, Fiscal, and Exchange-Rate Policies*, Princeton Studies in International Finance 16, Princeton University, Princeton, N.J., 1966. On the development of the approach, see J. Myhrman, "Balance-of-Payments Adjustment and Portfolio Theory: A Survey," in Claassen and Salin, eds., *Recent Issues in International Monetary Economics*, pp. 203–37. See also T. Scitovsky, *Money and the Balance of Payments*, Rand McNally, Chicago, 1969, especially chap. 7, which anticipates subsequent contributions. On the reformulation of Mundell's conclusions, see M. v. N. Whitman, *Policies for Internal and External Balance*, Special Papers in International Economics 9, Princeton University, Princeton, N.J., 1970, pp. 23–30, and the sources cited there; also W. H. Branson and T. D. Willett, "Policy Toward Short-term Capital Movements: Some Implications of the Portfolio Approach," in Machlup et al., eds., *International Mobility and Movement of Capital*, pp. 287–310.

The earliest of these portfolio models were quite simple–too simple to deal with many issues studied in this book. Typically, they focused on wealth holders' choices between the domestic money and a single bond, and they did not always specify the currency in which the bond was denominated.[19] Progress in this field has been rapid, however, and the model used throughout this book, although new when we began to build it, is not new today. Inspired by concern about the implications of asset-market integration for national autonomy, especially monetary autonomy, model builders have included foreign and domestic bonds, so as to define asset-market integration by the degree of substitutability between pairs of securities.[20] Inspired by concern about the amplitude of exchange-rate fluctuations after rates began to float, model builders have included home-currency and foreign-currency assets, so as to explain exchange-rate behavior by shifts between the two.[21]

[19] See, e.g., McKinnon and Oates, *The Implications of International Economic Integration*, and R. I. McKinnon, "Portfolio Balance and International Payments Adjustment," in R. A. Mundell and A. K. Swoboda, eds., *Monetary Problems of the International Economy*, University of Chicago Press, Chicago, 1969, pp. 199–234; also P. R. Allen, "A Portfolio Approach to International Capital Flows," *Journal of International Economics*, 3 (May 1973), pp. 135–60, P. B. Kenen, "International Capital Movements and the Integration of Capital Markets," in F. Machlup, ed., *Economic Integration: Worldwide, Regional, Sectoral*, Macmillan, London, 1976, pp. 187–200, and P. R. Allen and P. B. Kenen, "Portfolio Adjustment in Open Economies: A Comparison of Alternative Specifications," *Weltwirtschaftliches archiv*, 112, 1976(1), pp. 34–71. Some models appear to be richer than our own because they include equities, but they are not truly so, as equities and bonds are made to be too much alike. See, e.g., R. Dornbusch, "A Portfolio Balance Model of the Open Economy," *Journal of Monetary Economics*, 1 (January 1975), pp. 3–20, where bonds are indexed in terms of the consumption good, and "Capital Mobility, Flexible Exchange Rates, and Macroeconomic Equilibrium," in Claassen and Salin, eds., *Recent Issues in International Monetary Economics*, pp. 261–78, where there are two countries, two equities, and two bonds, but all four assets are defined in real terms and are assumed to be perfect substitutes. For models in which equities appear alone, see J. E. Floyd, "Portfolio Equilibrium and the Theory of Capital Movements," in Machlup et al., eds., *International Mobility and Movement of Capital*, pp. 91–124, and J. A. Frenkel and C. A. Rodriguez, "Portfolio Equilibrium and the Balance of Payments: A Monetary Approach," *American Economic Review*, 65 (September 1975), pp. 674–88.

[20] See, e.g., W. H. Branson, "Stocks and Flows in International Monetary Analysis," in A. Ando et al., eds., *International Aspects of Stabilization Policies*, Federal Reserve Bank of Boston and International Seminar in Public Economics, Boston, 1975, pp. 27–50, where there are domestic equities and foreign bonds, and "Portfolio Equilibrium and Monetary Policy with Foreign and Nontraded Assets," in Claassen and Salin, eds., *Recent Issues in International Monetary Economics*, pp. 241–50, where there are domestic bonds and equities as well as foreign bonds.

[21] See L. Girton and D. Henderson, "Central Bank Operations in Foreign and Domestic Assets Under Fixed and Flexible Exchange Rates," in P. Clark et al., eds., *The Effects of Exchange Rate Adjustments*, U.S. Treasury, Washington, D.C., 1977, pp. 151–78, and "Financial Capital Movements and Central Bank Behavior in a Two-Country, Short-Run

The plan of the book

The model built and used in Part II, where we address ourselves to these concerns, contains two bonds, one of which is denominated in foreign currency. The model describes a single country whose residents (households) hold domestic money issued by the central bank, a home-currency bond issued by the government, and a foreign-currency bond issued by the outside world. The domestic assets are held at home, not traded, and the interest rate on the domestic bond is determined endogenously. The foreign bond is held at home and abroad and is traded freely; it can in fact be bought or sold in unlimited quantities at a fixed (exogenous) foreign interest rate. (The country represented by the model is thus a net foreign creditor and is also a foreign-currency creditor. The outside world is therefore a net foreign debtor, but it is not a foreign-currency debtor, because its debts are in its own currency. This distinction must be borne in mind when interpreting our work. It may at first appear that our model has very limited applicability, because it deals only with a foreign-currency creditor. But countries can be foreign-currency creditors even when they are net foreign debtors. In fact, all countries can be foreign-currency creditors simultaneously, even though some must be net foreign creditors and others must be net foreign debtors. One has only to assume, as in our model, that countries hold claims in foreign currency but do not issue debts in foreign currency.)

The model includes three goods as well as three assets, but only one of them is nontraded. The country produces and consumes two commodities, an export good and a nontraded good, and it consumes in addition an

Portfolio Balance," *Journal of Monetary Economics*, 2 (January 1976), pp. 33–61; also R. Dornbusch, "Capital Mobility and Portfolio Balance," in R. Z. Aliber, ed., *The Political Economy of Monetary Reform*, Allanheld, Osmun and Co., Montclair, N.J., 1977, pp. 106–25, H. Genberg and H. Kierzkowski, "Short Run, Long Run, and Dynamics of Adjustment Under Flexible Exchange Rates," Graduate Institute of International Studies, Geneva, 1975 (mimeo), and R. S. Boyer, "Commodity Markets and Bond Markets in a Small Fixed-Exchange-Rate Economy," *Canadian Journal of Economics*, 8 (February 1975), pp. 1–23, and "Devaluation and Portfolio Balance," *American Economic Review*, 67 (March 1977), pp. 54–63. The models used by Genberg and Kierzkowski and by Boyer are much like our own, and anticipate many of our findings. Some of those findings are also anticipated by models that contain no bonds but make wealth holders choose between home and foreign currencies. See, e.g., C. Chen, "Diversified Currency Holdings and Flexible Exchange Rates," *Quarterly Journal of Economics*, 87 (February 1973), pp. 96–111, P. J. K. Kouri, "The Exchange Rate and the Balance of Payments in the Short Run and in the Long Run: A Monetary Approach," *Scandinavian Journal of Economics*, 78, 1976(2), pp. 280–304, and G. Calvo and C. A. Rodriguez, "A Model of Exchange Rate Determination Under Currency Substitution and Rational Expectations," *Journal of Political Economy*, 85 (June 1977), pp. 617–25.

import good that can be purchased in unlimited quantities at a fixed (exogenous) foreign-currency price. Thus, our model differs from some others, in that our country is not small in all foreign markets. It is, we said, a price taker in the market for the foreign bond and also in the market for the foreign (import) good. But it is not a price taker in the market for its export good; it faces a downward-sloping foreign demand curve, and its terms of trade are not exogenous. (It is for this reason, incidentally, that we are able sometimes to delete the nontraded good. We do not need it to produce endogenous changes in relative prices. The home-currency price of the export good is endogenous, and the process of adjustment to exogenous disturbances can therefore involve endogenous price changes even when there is no nontraded good.)

The model is set out algebraically in Chapter 2 and is solved in Chapter 3. Thereafter, we interpret the results, stressing the effects of asset-market integration and exchange-rate behavior on the way in which the economy adjusts to exogenous disturbances and changes in domestic policies. In Chapters 4 and 5 we deal with comparative statics, looking first at impact or short-run effects, before saving has had time to affect the stock of wealth, and then at steady-state or long-run effects, when saving has been driven to zero. In Chapter 6 we deal with dynamics, focusing on connections among the basic wealth-saving relationship, portfolio effects on capital flows, and expenditure (absorption) effects on the trade balance.

The solutions in Chapter 3 and discussions in subsequent chapters deal with responses to goods-market disturbances, including shifts in aggregate domestic demand between domestic goods (the export and nontraded goods), shifts in domestic and foreign demand between traded goods, and changes in the foreign-currency price of the foreign (import) good. We deal also with asset-market disturbances, represented by an exogenous increase in the foreign interest rate. We concentrate, however, on policy changes–on balanced-budget changes in government spending, on cuts in lump-sum taxes that cause budget deficits and add to the supply of domestic bonds, and on open-market operations by the central bank.

In Chapter 4, dealing with goods-market disturbances, and Chapter 5, dealing with other disturbances, we analyze disturbances and policies one at a time, examining impact and steady-state effects and asking in each instance how outcomes are affected by the exchange-rate regime. We also pause to comment on differences between the *form* in which results are cast in our model, where most things are measured in nominal terms, and the form in which results are cast in monetarist models, where most things are measured in real terms. In Chapter 6, dealing with dynamics, we look first at the process of adjustment with a pegged exchange rate, concentrating on a handful of disturbances, then look at the process with a flexible rate. We organize this chapter differently because of our finding in earlier chapters that the nature of the process of adjustment depends primarily on the exchange-rate regime, not on the disturbance or policy change.

It is, of course, the main aim of these chapters to explain in economic terms the formal solutions supplied in Chapter 3, but that is not the only aim. We pause to comment on a number of issues germane to the choice between exchange-rate regimes. Is it true, for example, that a flexible exchange rate can insulate a single national economy from disturbances coming from abroad? If so, how rapidly and how completely? Is it true that a flexible exchange rate enhances the effectiveness of monetary policy and reduces the effectiveness of fiscal policy? If so, for what reasons and to what extent? In this same vein, we ask how asset-market integration affects the way in which an economy responds to disturbances and policy changes.

Although the domestic bond is not traded in our model, and the domestic interest rate is determined endogenously, it is not hard to measure asset-market integration–the degree to which the domestic bond market is connected with the foreign bond market. Scitovsky defines asset-market integration as a function of the transferability of bonds between asset holders in various places:[22]

> Indeed, the unresponsiveness of an asset's price to selling in one and buying in another region is the best index of the degree to which its market is integrated. The unresponsiveness of asset prices as a whole to asset transfers and attempted asset transfers of this sort indicates the extent of integration of asset markets in general.

But assets can be transferred without changing their prices only when they are perfect substitutes. If wealth holders in one region want to hold more of one asset and wealth holders in a second want to hold less of another, there will be changes in the prices of both assets unless the excess demand for the first can be satisfied by the excess supply of the second. Transferability and thus integration, as Scitovsky defines it, are functions of substitutability. There must, of course, be at least one tradable asset for markets to be integrated; when there are prohibitive barriers to trade in each and every asset, the prices of assets are not connected, and the

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[22] Scitovsky, *Money and the Balance of Payments*, p. 90.