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Exchange Rate Policy, Employment and External Balance

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External Balance

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Preface

Most of the present thesis was written in the years 1975—1977. While working on the study, I have benefitted greatly from the privilege of being associated with the Monetary Research Group at the University of Helsinki. My greatest debt of gratitude is to Jouko Paunio, the leader of the research group and one of my examiners. He has encouraged me at all stages of my work and commented upon several manuscripts. My other examiner, Pentti Kouri, made valuable comments which influenced the final version of the thesis. Some of the questions dealt with in the study have been the subject of useful discussions with Jukka Pekkarinen and Paavo Peisa as well as the other members of the research group, my colleagues at the Department of Economics at the University of Helsinki and Hannu Halttunen at the Research Department of the Bank of Finland. The completion of the thesis was made substantially easier by the friendly and encouraging atmosphere prevailing at the Economics Department of the Bank of Finland.

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Sixten Korkman

I. Introduction

International monetary theory is a subject of considerable age. Up to the 1930s, the theory of international monetary adjustment was also characterized by a high degree of consensus of opinion. For nearly two centuries the international monetary system was looked upon by economists in the British tradition as a self-regulating mechanism equilibrating international payments through changes in relative price levels caused by flows of specie. Hence Viner could write as late as 1937: "The 'classical' theory of the mechanism of international trade, as developed from Hume to J. S. Mill, is still, in its general lines, the predominant theory. No strikingly different mechanism, moreover, has yet been convincingly suggested, ..."¹

Since the 1930s, however, balance of payments theory has gone through many changes. Some of the various phases of the development will be briefly touched upon in the following in a roughly chronological order. This should not hide the fact that developments in balance of payments theory — here understood as the macroeconomic theory of open economies — may be seen as going from partial equilibrium approaches in the direction of more general equilibrium analysis. In this respect the development of balance of payments theory exhibits much the same characteristics as other macroeconomic theory. Obviously, balance of payments theory has also responded to changes in institutional and other aspects of the reality to be explained.

As observed by Metzler (1968, p. 465), "contemporary ideas about the way in which an even balance of payments is achieved have always been closely related to the prevailing theories of money and prices". Since the "Keynesian revolution" of the 1930s was associated with a reconsideration of traditional views on monetary phenomena, it is therefore only natural that it should also lead to a reappraisal of the views on the causes and effects of changes in the balance of payments.² The essential contribution of the Keynesian theory, as

¹ VINER (1937, p. 291).

² As is well known, Keynes' General Theory was almost exclusively devoted to the study of the determinants of employment in a closed economy, an exception being the chapter on mercantilism. Nevertheless, Keynes probably devoted more time to the problems of international monetary economics than to any other subject. See the assessment of HARRIS (1949, p. 245).

applied to the balance of payments, was the integration of international transactions into the theory of income determination, thereby emphasizing the direct links between exports, imports and the domestic level of income. Equally important was the consequential shift of emphasis by which equilibrium in the balance of payments came to be regarded as a policy target or restriction rather than as an automatically guaranteed state of affairs.¹

One reflection of this was the emergence of the "export multiplier approach", which was well suited for the analysis of the international transmission of the business cycle and the conflict between the level of income and the balance of payments likely to be prevalent under a system of fixed exchange rates.² Another outcome of the shift of emphasis towards policy questions — as well as of the collapse of the regime of fixed exchange rates and the subsequent competitive depreciations of the 1930s — was the elasticities approach, which investigates the conditions under which a devaluation would improve the balance of payments. While focusing upon price effects, early writers in the elasticities approach also emphasized the probable expansionary effects of a devaluation on income and employment in the devaluing country as well as the corresponding negative effects on employment in the rest of the world.³

Starting with the elasticities approach, every period of major international monetary disorder has been associated with the emergence of a new approach to devaluation analysis and to the theory of the balance of payments. In the 1940s and early 1950s, a revival of interest in devaluation analysis was caused by concern with the postwar problems of restoration of currency convertibility, the associated need for a re-evaluation of prevailing exchange rates as well as the institutionalization of exchange rate changes in the Articles of Agreement of the International Monetary Fund. By now the position of Keynesian macroeconomics was well established, and it was only natural for devaluation analysis to be presented in explicitly Keynesian terms.

For a number of reasons, but primarily because of the difficulties of applying the elasticities approach in conditions of full employment, the new absorption approach was strongly contrasted by its leading proponent (Alexander) with the earlier elasticities approach, leading to a long controversy between the two.

¹ The difference between the Keynesian and the earlier theory need not be overstated. As has been explained by MUNDELL (1968), the difference may be viewed as a replacement of the price-specie-flow mechanism by the income-specie-flow mechanism. On the other hand, the simultaneous shift of emphasis towards analysis of short-run "equilibrium" (which allows unemployment and balance of payments imbalances) was certainly important.

² See, e.g., HARROD (1939) and MACHLUP (1943).

³ See ROBINSON (1937 a, b), MACHLUP (1940).

Gradually, however, a "synthesis" of the absorption and elasticities approaches was achieved through an integration of the analysis of price and income effects. Like much of modern balance of payments theory, this integration emanated from the basic contribution of Meade.¹ Other postwar developments in the same tradition (also largely traceable to Meade) include the following: First, problems of stabilization policy in open economies have been more systematically investigated than before. The questions dealt with include not only the macroeconomic effects of changes in exchange rates and financial conditions but also the possibilities of achieving multiple targets by the use of available policy instruments and/or market mechanisms.² Second, increasing attention has been paid to the importance for the balance of payments of the supply of money and other stocks of financial assets.

In recent years, devaluation analysis has once more become an active field of research. Rapid changes in the international monetary system and concomitant exchange rate changes again constitute some of the major reasons for this. Once more the revival of interest in devaluation analysis is also connected with the emergence of new approaches to devaluation and the balance of payments.

The monetary approach may, on the one hand, be considered as a modification of earlier standard theory extending the consideration of monetary variables for adjustment into the longer run.³ On the other hand, the monetary approach is naturally enough related to the renaissance of the quantity theory and the rise of monetarism; the quantity theory of money was, after all, originally developed in the context of the classical theory of the international mechanism of adjustment.

The related asset market approach has focused upon the determination of exchange rates and on the role of speculative expectations and other determinants of asset behaviour rather than on variations in trade flows.⁴ It may be viewed as an open economy application of Tobin's general equilibrium framework. The important feature of the asset market approach is the treatment of the exchange rate as one of the prices determined by stock demands and supplies on interconnected financial markets. By employing

¹ See MEADE (1951 a, b), JOHNSON (1961) and TSIANG (1961). A recent and thoroughly integrated treatment of income and price effects in the spirit of Meade is the treatise of KYLE (1976).

² For references to the (extensive) literature, see, e.g., TAKAYAMA (1978). The essentials of the so-called assignment problem will be surveyed in chapter 3.

³ A useful collection of readings is the book edited by FRENKEL & JOHNSON (1976).

⁴ See, e.g., the articles in the *Scandinavian Journal of Economics*, vol. 78 (1976).

the portfolio framework, it has been possible to develop substantially the analysis of the effects of expectations and speculative behaviour.

Another distinguishing characteristic of the asset market approach is the explicit attention given to various equilibrium concepts (short run, long run) and the dynamic time path of the variables studied. In the short-run analysis of exchange rates the asset market approach abstracts from the currency flows related to foreign trade and concentrates on capital account transactions. In the long run the current account is equilibrated through dynamic repercussions of the changes in stocks of assets which the current account surplus or deficit entails. At present the asset market approach is being integrated into more fully articulated (general equilibrium) macroeconomic models, which endogenously determine not only a number of asset returns and prices (including exchange rates) but also output, inflation and other central macroeconomic variables.¹

1.1. Aim and Outline of the Study

As a consequence of the break-down of the Bretton-Woods system, foreign exchange policy has in recent years been conducted in a new institutional environment. Since the freedom of choice concerning the implementation of exchange rate policy is far greater than before, the potential macroeconomic role of exchange rate changes has emerged as an important subject for analysis. This would seem to be the case particularly for small and open economies, the currencies of which are not used as "vehicle currencies" in international trade. For such countries, exchange rate changes are bound to have important macroeconomic effects, and at the same time the scope for independent actions is likely to be considerable, since, e.g., international retaliations against "beggar thy neighbour" policies are unlikely. The scope for independent exchange rate policy is further enhanced if — as in the case of Finland — capital flows are subject to extensive direct control by the monetary authorities.

It is, of course, true that a major question dealt with by all the approaches touched upon above has been the macroeconomic effects of exchange rate changes. But analysis of exchange rate policy in the literature has mainly been based on the institutional assumptions of freely fluctuating exchange rates or pegged but adjustable exchange rates. In both cases exchange rates have been considered only or primarily as responses to balance of payments

¹ See KOURI & MACEDO (1978).

imbalances; in the former case by the definition of a system of free exchange rates as one where the currency market is continuously cleared by a variable price of foreign exchange; in the latter case by the implicit "institutional prescription" of the Bretton-Woods system, according to which de- or revaluations of exchange rates were allowed only in case of so called "fundamental disequilibria" in international payments.

In the present study, by contrast, the exchange rate is viewed as just one of the instruments of general macroeconomic policy. Thus there is no necessary presumption that exchange rate changes should be related to the state of the balance of payments rather than to the rate of inflation or the level of employment. Instead, whether such an assignment is desirable is one of the questions to be discussed.

The potential role of exchange rate policy is discussed in this study both from the point of view of short-run stabilization as well as in relation to some long-run problems of growth and structure. While dealing with broad issues, the aims of the study are in other respects quite narrowly restricted. First, only macroeconomic problems are discussed. Second, no attention is paid to the capital account. This omission may be partly justified if the current account is an important target variable on its own and if capital flows are strictly regulated. Essentially, this simplification makes it possible to focus on employment and current account problems which are highly relevant for countries like Finland, while avoiding the difficulties associated with a proper modelling of the capital account. By the same token, this study is related much more to the traditional Keynesian literature on internal and external balance than to the recent monetary and asset approaches.

The plan of the study is as follows. Chapter 2 is a selective survey of devaluation analysis. In section 2.1 the general equilibrium or Walrasian variety of the monetary approach is first briefly outlined. This is mainly in order to establish a convenient reference point, since, as is well known, the monetary general equilibrium approach is of only limited usefulness from the point of view of policy analysis. In particular, it assumes that all prices and wages are perfectly flexible and therefore that full employment always prevails. A devaluation will then induce a temporary inflow of foreign exchange by reducing the real value of money balances, while the only long-run effect will be an equi-proportionate increase in all nominal magnitudes (in domestic currency).

Section 2.2 turns to the various versions of Keynesian devaluation analysis. After a brief characterization of the elasticities and absorption approaches,

the standard open economy IS-LM model is used to demonstrate the devaluation analyses of Meade and Tsiang. The section ends by pointing out some important aspects of the devaluation problem — related primarily to the effects on and via the distribution of income and to be returned to in chapter 4 — which have been almost entirely neglected in conventional analysis.

In the Keynesian analysis a devaluation is generally concluded to be expansionary and to improve the balance of payments on current account. Thus expenditure “switching” policies differ from expenditure “changing” policies, which increase domestic employment only at the cost of worsening the balance of payments. These differing effects of policies operating on relative prices and expenditure levels respectively constitute the basis for the recommendation, developed by Meade in the Balance of Payments, that “price policy” and “financial policy” be combined to reconcile internal and external balance.

Meade’s analysis of the problem of internal and external balance gave rise to an extensive literature applying the so called “fixed target approach” to policy issues. Chapter 3 is a critical discussion of the conclusions with respect to exchange rate policy which have been advanced within this approach. After a brief outline of the general characteristics of the fixed target approach, the original analysis of Meade as well as its dynamic extension by Mundell is reviewed in sections 3.2 and 3.3. As will be seen, there has been a tendency to confuse the distinction between market arrangements for exchange rate determination and policy assignment of instruments. As a consequence, it does not seem to have been realized that a consistent application of the “assignment principle” might well imply that exchange rate policy should be used as an instrument of domestically oriented stabilization policy with general demand management policy geared to the external target. This conclusion is set out in section 3.4. Section 3.5 puts the conclusion in perspective by investigating the applicability of the assignment principle and shows, in particular, that it may be a seriously misleading guide to policy if short and long-run effects of policy actions are markedly different.

Chapter 4 focuses on issues raised in the preceding chapters and argued to be important though generally overlooked in traditional analysis. The chapter contains an analysis of some dynamic interrelationships between competitiveness, the distribution of income, and employment. For this purpose, a demand-oriented model with imports disaggregated by use is combined with two dynamic relationships between exports and competitiveness and wage inflation and its determinants respectively. Income distribution effects in combination with dynamic inflation and export relations imply that exchange rate changes have different short and long-run effects, and, in particular,

that a devaluation may be deflationary in the short run irrespective of whether it improves the balance of payments or not. The various effects are analyzed and their consequences for demand management cum exchange rate policy assignment are discussed.

The chapter also makes a comparison of some selected "norms" for exchange rate policy. The alternatives considered are: 1) stabilizing the price of foreign exchange (fixed exchange rates), 2) stabilizing the price level of traded goods or their rate of inflation (a "commodity standard") and 3) stabilizing international competitiveness (a "purchasing-power-parity rule"). The comparison of the alternative norms is primarily concerned with the automatic consequences of various macroeconomic disturbances.

One argument put forward in chapter 4 is that it may be useful to view external balance as a long-run problem rather than as a target of stabilization policy symmetrical to internal balance. Chapter 5 therefore extends a model based on the tradeables-nontradeables distinction into the domain of long-run analysis by making explicit the process of capital accumulation and its intersectoral allocation. A concept of structural balance is introduced and some issues related to the process of structural adjustment are discussed. The chapter also employs the framework to investigate the dynamic relationship between devaluation and accumulation as well as to interpret the well-known EFO-model as a normative model concerned with conditions for balanced growth. Chapter 6 summarizes the conclusions and discusses some of the limitations of the study.

The starting point for this study is that the exchange rate may be viewed as a policy instrument which is both available to the authorities and which also has powerful effects on central macroeconomic variables. The questions arising then are: should this instrument be used and, if so, how? While the complexity of the issues excludes simple and unconditional propositions, it would nevertheless seem that the view of exchange rate policy emerging from this study differs in some important respects from the traditional view embedded in the literature on internal and external balance.

First, a devaluation may affect the balance of payments and/or the level of output either way even if relative prices change and the real wage is permitted to fall. The possibility of weak or even "perverse" short-run effects of changes in competitiveness is particularly relevant if there is a long lag in price effects on exports, if imports are inelastic, and if an income redistribution from wages to profits leads to a decline in the demand for domestic output.

On these grounds it may be argued that exchange rate changes are unlikely to be appropriate or beneficial as a means for countering cyclical fluctuations in the current account.

Second, on the same grounds (low short-run trade elasticities and investment demand more strongly import-oriented as compared to consumption) there is likely to be a considerable difference between the short and long-run employment effects of changes in the exchange rate. This will be argued to mean that exchange rate changes should not be used as an instrument of short-run employment policy.

Third, weak short-run effects are of course fully compatible with the view that competitiveness is a central determinant of exports in the long run. Since external balance must prevail in the long run, this means that competitiveness is indirectly crucial for employment, even if not directly and not in the short run. The outcome is that a country should devalue if its competitiveness is insufficient to support the level of exports deemed appropriate in the long run. However, particularly if the devaluation is deflationary in the short run, it may be desirable to combine the devaluation with expansionary demand management policy during the period required for market shares to adjust. (Observe that this conclusion is precisely opposite to the traditional recommendation that devaluation be combined with demand restriction.)

Fourth, exchange rate changes are the obvious way of neutralizing the effects of general international price disturbances. This (well-recognized) aspect of exchange rate policy is very important in an economy in which raw materials loom large in both exports and imports. Indeed, given certain provisos, fixed exchange rates might usefully be replaced by an inflation norm for exchange rate policy.

Finally, in an open economy it is crucially important that domestic wages and prices develop in such a way as to maintain the relative profitability of investment in the sector producing tradeable goods at an appropriate level. Such a development cannot be ensured by exchange rate policy as such, but requires instead a coordination of policies with respect to prices, wages and exchange rates. Emphasizing investment thus brings the intersectoral and functional distribution of income to the forefront of the analysis and highlights the fact that long-run growth with external (structural) balance is conditional on the possibilities for reconciling conflicting claims on income shares.

2. Devaluation Analysis: A Selective Survey

Starting with the elasticities approach, an extensive literature on the effects of a devaluation has evolved. Selected parts of this literature will be surveyed in sections 2.1 and 2.2 below, which deal with the "monetary general equilibrium approach" and "Keynesian devaluation analysis" respectively. These two approaches are clearly related to two different analytical traditions in macroeconomic and monetary theory in general. The first has grown out of the framework of monetary general equilibrium analysis of the kind propagated in the closed economy context by Don Patinkin; it may also be called "Neo-Walrasian equilibrium analysis".¹ The second includes the elasticities and absorption approaches as well as the analysis of, e.g., Meade and Tsiang. It is essentially an exercise within an open economy version of standard Keynesian theory. The monetary approach to devaluation is not treated separately but only in relation to the general equilibrium model of section 2.1 as well as the Keynesian model of section 2.2. The chapter ends by discussing the reasons for and some of the consequences of the almost total neglect of the role of the distribution of income in traditional devaluation analysis.

2.1. The Monetary General Equilibrium Approach

The open economy version of Patinkin-type analysis dealt with in this section has never constituted the dominating approach to balance of payments theory. The continuing interest in the approach seems to be related to two circumstances.² First, it retains a close relationship to barter theory: under the assumption that the marginal rate of substitution of goods is independent of the demand for money (the "separability hypothesis"), it may be shown that the traditional barter trade models remain valid for monetary models under

¹ Cf. CLOWER (1969).

² Writers who have used versions of the monetary general equilibrium approach include HAHN (1959), KEMP (1962, 1969, 1970), PEARCE (1961), KOMIYA (1966), NEGISHI (1972), KUSKA (1972), DORNBUSCH (1973 a, b), MUNDELL (1971), KRÜEGER (1974), MEINICH (1971), AMANO (1972), TAKAYAMA (1972), ANDERSON & TAKAYAMA (1977). The list is far from exhaustive.

flexible exchange rates and for the steady state under fixed exchange rates.¹ This is, in a sense, reassuring from the point of view of the pure theory of international trade. Second, due to its simplicity, the approach has in recent years become an increasingly popular vehicle of communication for proponents of the monetary approach.

Although the approach has been applied extensively to investigations of the effects of exchange rate and monetary changes, merely an enumeration of its assumptions will indicate that there are many policy problems which are beyond its scope. The primary purpose of the approach should probably be seen as clarifying the relationships between real and monetary phenomena under certain strongly idealized circumstances, in which, e.g., the role of the exchange rate is relatively limited and easily delineated. This section will proceed as follows. First, the assumptions of the approach are specified. Second, some (familiar) results for the effects of a devaluation are derived. Third, the conditions for stability of freely fluctuating exchange rates are investigated, and the relation between the "exchange devaluation" and the "exchange stability" problem is discussed. Fourth, the stability and comparative statics of the "long-run" equilibrium is analyzed. Finally, the relevance of the results is assessed.²

2.1.1. Assumptions

Two countries trade in two commodities, both of which are tradeables. Free trade is assumed, costs of transport are neglected and full employment is maintained everywhere by price flexibility. All commodity excess demand functions are homogeneous of degree zero in money prices and the nominal stock of money, while the two excess demands for money are homogeneous of degree one in the same arguments. For the home country we therefore have

$$Z_i = Z_i(p_1, p_2; M), \quad i = 1, 2, M,$$

with the restrictions

$$MZ_{1M} + p_1 Z_{11} + p_2 Z_{12} = MZ_{2M} + p_1 Z_{21} + p_2 Z_{22} = 0,$$

$$MZ_{MM} + p_1 Z_{M1} + p_2 Z_{M2} = Z_M,$$

where Z_i is the excess (import) demand for the i th commodity, p_i the domes-

¹ See, e.g., TAKAYAMA (1972) or NEGISHI (1972).

² No exhaustive list of the results of the monetary general equilibrium approach is aimed at. For a recent, rigorous and thorough treatment, see ANDERSON & TAKAYAMA (1977).

tic currency price of the i th commodity, M the nominal stock of money, and where Z_{ij} and Z_{iM} denote partial derivatives.

An asterisk relates a variable to the foreign country; thus Z_i^* is the foreign excess demand for the i th commodity, p_i^* the foreign currency price of the i th commodity and M^* the foreign nominal stock of money. Relations analogous to those given above are assumed to hold for the foreign country. Commodity and currency units are so chosen that $p_i = e = 1$ in an initial equilibrium (static analysis) or a final equilibrium (dynamic analysis).

The balance of payments (trade) of the home country in foreign currency is defined as

$$B = -\frac{1}{e} (p_1 Z_1 + p_2 Z_2),$$

where e is the exchange rate or the price of foreign currency in terms of domestic money. In view of the national budget constraint

$$Z_M + p_1 Z_1 + p_2 Z_2 = 0,$$

the balance of payments may also be written as

$$B = Z_M/e.$$

The money supply is assumed to be either exogenous (flexible exchange rates) or determined by the balance of payments (fixed exchange rates).¹

2.1.2. Exchange Devaluation

Since domestic money is the only asset privately held and since the balance of trade is a flow, the stock of money in each country is a given constant in the short run (though changing over time through payments deficits and surpluses) unless deliberately changed through policy actions (government transfers). Equations (2.1) and (2.2), characterizing the short-run or instantaneous equilibrium under fixed exchange rates, therefore determine p_i and B , given M , M^* and e :

¹ The format of the general equilibrium model given above is the one used by HAHN (1959), KEMP (1969, 1970) and ANDERSON & TAKAYAMA (1977). The model has been generalized by the introduction of nontradeables by KEMP (1970) and by introducing n goods by KUSKA (1972), and it has been simplified by many authors who concentrate on the small-country case, possibly in combination with nontraded goods (see references on p. 15 above).

$$(2.1) \quad Z_i(p_1, p_2; M) + Z_i^*(p_1/e, p_2/e; M^*) = 0, \quad i = 1, 2,$$

$$(2.2) \quad B - \frac{1}{e} Z_M(p_1, p_2; M) = 0,$$

where the first two equations are the equilibrium conditions for the goods markets and where use has been made of the arbitrage law of one price, $p_i = ep_i^*$ ($i = 1, 2$).

Differentiating equations (2.1) and (2.2), using homogeneity and assuming that initially $B = 0$, we obtain

$$(2.3) \quad \begin{bmatrix} Z_{11} + Z_{11}^* & Z_{12} + Z_{12}^* & 0 \\ Z_{21} + Z_{21}^* & Z_{22} + Z_{22}^* & 0 \\ -Z_{M1} & -Z_{M2} & 1 \end{bmatrix} \begin{bmatrix} dp_1 \\ dp_2 \\ dB \end{bmatrix} = -M^* \begin{bmatrix} Z_{1M}^* \\ Z_{2M}^* \\ 0 \end{bmatrix} de.$$

The impact effect of a devaluation on the balance of payments is therefore given by

$$(2.4) \quad \delta B / \delta e = \Delta' / \Delta,$$

where

$$\Delta = \begin{vmatrix} Z_{11} + Z_{11}^* & Z_{12} + Z_{12}^* \\ Z_{21} + Z_{21}^* & Z_{22} + Z_{22}^* \end{vmatrix} \quad \text{and} \quad \Delta' = \begin{vmatrix} Z_{11} + Z_{11}^* & Z_{12} + Z_{12}^* & Z_{1M}^* \\ Z_{21} + Z_{21}^* & Z_{22} + Z_{22}^* & Z_{2M}^* \\ Z_{M1} & Z_{M2} & 0 \end{vmatrix} M^*.$$

Hence, a devaluation has a positive impact effect on the balance of payments if and only if the following "devaluation condition" holds:

$$(2.5) \quad \Delta' / \Delta > 0.$$

Sufficient conditions for (2.5) to hold have been extensively discussed in the literature. Two sets of conditions have attracted particular interest. In the first case it is assumed that the commodities are weak gross substitutes ($Z_{ij}, Z_{ij}^* \geq 0$; $i, j = 1, 2$; $i \neq j$), that all marginal propensities to consume are positive ($Z_{iM}, Z_{iM}^* > 0$; $i = 1, 2$) and that both commodities are gross

substitutes for money (Z_{Mj} , $Z_{Mj}^* > 0$; $j = 1, 2$).¹ In the other case it is assumed that "cross price slopes" are zero ($Z_{ij} = Z_{ij}^* = 0$; $i, j = 1, 2$; $i \neq j$) and that a condition formally identical to one associated with Robinson, Metzler and Bickerdike holds.² The condition is easily derived by using the relations $Z_{ii} + MZ_{iM} = Z_{ii}^* + M^*Z_{iM}^* = 0$ (homogeneity) and $Z_i + Z_{ii} + Z_{Mi} = 0$; $i = 1, 2$ (from the budget restriction), and may be written (assuming trade to be initially balanced):

$$(2.6) \quad \frac{\varepsilon_m \varepsilon_m^* (1 + \varepsilon_x + \varepsilon_x^*) + \varepsilon_x \varepsilon_x^* (\varepsilon_m + \varepsilon_m^* - 1)}{(\varepsilon_x + \varepsilon_m^*) (\varepsilon_m + \varepsilon_x^*)} > 0,$$

where

$$\begin{aligned} \varepsilon_m &= -Z_{11}/Z_1 & \varepsilon_x &= Z_{22}/Z_2 \\ \varepsilon_m^* &= -Z_{22}^*/Z_2^* & \varepsilon_x^* &= Z_{11}^*/Z_1^*, \end{aligned}$$

are definitions of import demand and export supply when country 1 (the home country) is assumed to import commodity 1. From (2.6) it is immediately clear that the so-called "Marshall-Lerner condition", $\varepsilon_m + \varepsilon_m^* - 1 > 0$, will normally be sufficient to ensure that a devaluation improves the balance of payments.

The effects of a devaluation in the present framework are clearly in the nature of real balance effects,³ and are nullified if expenditure is independent of the money stock ($Z_{iM} = Z_{iM}^* = 0$; $i = 1, 2$). It is revealing to observe that a devaluation under the assumptions made will improve the balance of payments if and only if the balance of payments is improved by a contraction in the domestic nominal supply of money. This follows from a proposition according to which the balance of payments of the home country (in foreign

¹ Cf. KEMP (1970), NEGISHI (1972), TAKAYAMA (1972). That (2.5) is bound to hold under these assumptions is most easily seen from the fact that every term in $\Delta' = -Z_{M2}Z_{2M}^* (Z_{11} + Z_{11}^*) + Z_{M1}Z_{2M}^* (Z_{12} + Z_{12}^*) + Z_{1M}^* [Z_{2M} (Z_{21} + Z_{21}^*) - Z_{M1} (Z_{22} + Z_{22}^*)]$ is now positive, while $\Delta = (Z_{41} + Z_{41}^*) (Z_{22} + Z_{22}^*) - (Z_{12} + Z_{12}^*) (Z_{21} + Z_{21}^*)$ must also be positive since (in absolute value) $Z_{11} > Z_{12}$, $Z_{11}^* > Z_{12}^*$, etc. in view of the above assumptions in combination with homogeneity.

² For this reason KEMP uses the term "historically interesting special case" (the case of the elasticities approach) in this context. The exegetical error involved is pointed out on p. 27 below.

³ The wealth effects of a devaluation are more complicated if assets additional to money are introduced and in particular if residents of the home country hold assets denominated in foreign currency and vice versa. On this see LAPAN & ENDERS (1978).

currency) as well as the real variables of the system are equivalently affected by an equal percentage devaluation and decrease in the domestic supply of money.¹

To see this, observe that homogeneity permits equations (2.1) and (2.2) to be written as

$$(2.1)^a \quad Z_i(q; M/ep_2^*) + Z_i^*(q; M^*/p_2^*) = 0, \quad i = 1, 2,$$

$$(2.2)^a \quad B - p_2^* Z_M(q; M/ep_2^*) = 0,$$

where $q = p_1/p_2 = p_1^*/p_2^*$, i.e., q is the terms of trade.

Equations (2.1)^a – (2.2)^a constitute a system of three equations in the unknowns q , p_2^* and B . From the fact that M and e enter the model only in the ratio form, it is immediately clear that an equal relative increase in e and decrease in M have the same effects on q and B . Thus B may actually be written

$$(2.7) \quad B = h(M/e, M^*).$$

Similarly we may write

$$(2.1)^b \quad Z_i(q; M/p_2) + Z_i^*(q; eM^*/p_2) = 0, \quad i = 1, 2,$$

$$(2.2)^b \quad eB - p_2 Z_M(q; M/p_2) = 0.$$

Equations (2.1)^b – (2.2)^b may be understood as a system of three equations in the unknowns q , p_2 and eB , and in this case the exogenous variables e and M^* enter only multiplicatively. Thus the balance of payments in domestic currency, eB , may be written as

$$(2.8) \quad eB = g(M, eM^*),$$

i.e., the balance of payments in domestic currency (as well as the real variables) are equivalently affected by an equal relative devaluation and increase in the foreign supply of money.

Finally, it may be observed that the stability of short-run equilibrium under fixed exchange rates under conventional tatonnement assumptions requires

¹ Cf. KEMP (1970), KUSKA (1972), KRÜEGER (1974). This “dual relationship” is also discussed in ANDERSON & TAKAYAMA (1977).

$\Delta > 0$.¹ This assumption — which is employed in the rest of this section — may therefore be “justified” by referring to the correspondence principle.

2.1.3. Exchange Stability

In the theory of foreign exchange the two terms “the exchange devaluation problem” and “the exchange stability problem” are almost invariably used interchangeably.² This is an expression of the confusing tradition of treating the analysis of the effects of a devaluation on the balance of payments under fixed exchange rates and the analysis of the stability of a system of freely fluctuating exchange rates as equivalent problems. In most instances the reasons for this procedure are left implicit; in other cases it is explicitly pointed out that a devaluation will improve the balance of payments if and only if the currency market is stable in the Hicksian sense. Except for a special case to be considered later, imperfect (static) stability is not, however, the same as “true” dynamic stability in the sense of Samuelson, which is generally considered a superior concept and widely used in other areas of economics.

We now turn to the problem of the stability of a system of freely fluctuating exchange rates, i.e., we ask the question whether or not the exchange rate, when it is out of equilibrium, will eventually return to equilibrium. The dynamic adjustment equations are:

$$(2.9) \quad \dot{p}_i = \lambda_i [Z_i(p_1, p_2; M) + Z_i^*(p_1/e, p_2/e; M^*)], \quad i = 1, 2,$$

¹ To investigate the (local) stability conditions of the short-run equilibrium under fixed exchange rates, assume the following dynamic adjustment equations:

$$\dot{p}_i = \lambda_i [Z_i(p_1, p_2; M) + Z_i^*(p_1/e, p_2/e; M^*)], \quad i = 1, 2,$$

where $\dot{p}_i = dp_i/dt$ is the time derivative of p_i and where $\lambda_i > 0$ denotes the speed of adjustment in the i th market. Linearizing about an equilibrium point, the stability conditions are found to be

$$\lambda_1 (Z_{11} + Z_{11}^*) + \lambda_2 (Z_{22} + Z_{22}^*) < 0 \text{ and } \Delta > 0.$$

These conditions are necessary and sufficient for the linearized version, but, in fact, only sufficient for the original system.

² For exceptions, see TAKAYAMA (1972) and ANDERSON & TAKAYAMA (1977). The widespread use of confusing terminology is exemplified by the fact that Negishi, when reprinting an earlier article, took the opportunity to change the title from “Approaches to the Analysis of Devaluation” to “The Stability of Foreign Exchange”. Cf. NEGISHI (1968) and (1972, ch. 15).

$$(2.10) \quad \dot{e} = -\lambda_e B = -\lambda_e \frac{1}{e} Z_M(p_1, p_2; M),$$

where $\lambda_e > 0$ is the speed of adjustment in the currency market. Linearizing equations (2.9) and (2.10) about an equilibrium point we obtain

$$(2.11) \quad \begin{bmatrix} \dot{p}_1 \\ \dot{p}_2 \\ \dot{e} \end{bmatrix} + \begin{bmatrix} \lambda_1(Z_{11} + Z_{11}^*) & \lambda_1(Z_{12} + Z_{12}^*) & \lambda_1 M^* Z_{1M}^* \\ \lambda_2(Z_{21} + Z_{21}^*) & \lambda_2(Z_{22} + Z_{22}^*) & \lambda_2 M^* Z_{2M}^* \\ -\lambda_e Z_{M1} & -\lambda_e Z_{M2} & 0 \end{bmatrix} \begin{bmatrix} p_1 - p_1^0 \\ p_2 - p_2^0 \\ e - e^0 \end{bmatrix}$$

A necessary condition for stability is that the determinant of the coefficient matrix A of equation (2.11) is negative. This condition may be written

$$(2.12) \quad |\Lambda| = \lambda_1 \lambda_2 \lambda_e \Delta' > 0.$$

Combining (2.12) with (2.5), we thus find that fluctuating exchange rates are stable only if the devaluation condition holds, and, on the other hand, that exchange stability is sufficient to ensure a positive devaluation effect.

We also note that if the speed of adjustment in the commodity markets is assumed to be infinite (Hicksian imperfect stability of the currency market is considered), then a necessary and sufficient condition for dynamic exchange stability can be shown to be that

$$(2.5) \quad \Delta' / \Delta > 0,$$

i.e., the exchange stability condition and the devaluation condition become equivalent. This would seem to be the assumption behind the conventional identification of the exchange stability and exchange devaluation problems.

2.1.4. The Monetary Mechanism of Adjustment

At any given point in time, the nominal stock of money in the home country is given and the instantaneous equilibrium under fixed exchange rates is determined by equations (2.1) and (2.2). As a consequence of balance of payments surpluses and deficits, however, the supply of money is changing, and the successive short-run equilibria will therefore generally differ from each other. The problem of stability over time is concerned with the question of whether the sequence of short-run equilibria will converge to a stationary solution as time extends without limit. Since money is the adjusting variable,

stability over time in the present context is closely related to the stability of the classical price-specie-flow mechanism of the gold standard.

Specifying the equations determining the moving equilibrium and investigating the stability conditions, it may be shown that the monetary mechanism of adjustment under fixed exchange rates is stable in the sense that the short-run or instantaneous equilibria associated with a changing money supply converge to the stationary or long-run equilibrium if and only if the condition for a devaluation to have a positive impact effect on the balance of payments holds.¹ More directly this conclusion may be demonstrated by observing that the assumption that money supply in each country changes only through the balance of payments (the world money supply being given),

$$(2.13) \quad \dot{M} = eB = eM^*,$$

in combination with the result derived on p. 20 above, implies that

$$(2.14) \quad \dot{M} = eB = eh(M/e, M^*),$$

i.e., that M is stable if and only if the devaluation condition holds.

Further, in combination with (2.12) this result implies that stability of the monetary mechanism of adjustment is necessary for fluctuating exchange rates to be dynamically stable; conversely, exchange stability is sufficient to ensure stability over time of fixed exchange rates. This conclusion appears to agree fairly well with a common view according to which: "If internal prices were as flexible as exchange rates, it would make little economic difference whether adjustment were brought about by changes in exchange rates or by equivalent changes in internal prices".²

Finally, the comparative statics of the long-run equilibrium, i.e., the effects on the equilibrium prevailing after the balance of payments has tapered off to zero (the case typically focused upon in the monetary approach), may be considered.³ The effects of a devaluation are easily established by using homogeneity and writing the long-run equilibrium conditions for the supply of and demand for money in the two countries as

¹ Cf. KUSKA (1972, p. 313) and ANDERSON & TAKAYAMA (1977, p. 356).

² FRIEDMAN (1953, p. 165). Cf. also MEADE (1951, p. 190). For a different view based on a different set of assumptions, see MUNDELL (1968, ch. 11) and below pp. 49—52.

³ See DORNBUSCH (1973 b) for an analysis in terms of a model essentially equivalent to the one used in this section.

$$(2.15) \quad Z_M(q; M/p_2) = 0,$$

$$(2.16) \quad Z_M^*(q; M^*/p_2^*) = 0,$$

implying that equilibria M/p_2 and M^*/p_2^* may both be expressed as functions of q alone. The equilibrium condition for the goods markets may then be written¹

$$(2.17) \quad \tilde{Z}_1(q) + \tilde{Z}_1^*(q) = 0.$$

A devaluation will thus leave the long-run equilibrium terms of trade and real supply of money in both countries unaffected, i.e., a devaluation will have only temporary effects on the balance of payments and on the real variables of the system.² Since stability requires a devaluation to be followed by an increase in the nominal stock of money in the home country and a fall in the foreign country, prices must rise in the home country and fall in the foreign country. The arbitrage condition written as

$$dp_i/p_i - dp_i^*/p_i^* = de/e,$$

additionally implies that prices rise less than in proportion to the increase in the price of foreign exchange in the home country and fall less than in proportion in the foreign country.³

2.1.5. Concluding Comments

The monetary general equilibrium approach employed in this section is attractively simple and seems to yield strong results. There are three different reasons for this. First, analysis may be conveniently divided into the study of "impact effects" — effects on the short-run or instantaneous equilibrium — and "long-run effects" — effects on the long-run equilibrium. Second, the homogeneity properties of the system lead to considerable simplifications and yield "neutrality" results. Third, only a few markets and commodities are explicitly considered.

¹ Since excess demands for money are identically zero, Say's law holds and the equilibrium condition for the second good is therefore omitted.

² These conclusions have recently been challenged by Hahn on the grounds that they presuppose uniqueness of equilibrium. See HAHN (1977).

³ For a more elaborate analysis of the long run, see KEMP (1970) or DORNBUSCH (1973 b).

However, these features of the analysis are not only convenient, but also restrict its generality. First, the separation of the analysis of short-run and long-run equilibria hinges on the tatonnement assumption which makes it possible to treat money stocks as constant while the short-run adjustment process works itself out — since no actual transactions are assumed to occur out of equilibrium. Second, homogeneity excludes the case with fixed money wages — full employment prevails at each and every instant. Third, since labour, capital, bonds, etc. are left out of the analysis, it must be interpreted to be applicable only to a very simple form of an exchange economy.

Alternatively, the functions incorporated must be interpreted as indicating the relations between a restricted set of variables under the assumption that money wages, interest rates, etc. are allowed to vary as required to equilibrate the respective markets. Under the first assumption the simplicity of the analysis amounts to triviality; under the second interpretation it is a consequence of a kind of implicit theorizing which makes the generality of the analysis more apparent than real and which implies considerable ambiguity as to the interpretation of the results.¹

2.2. Keynesian Devaluation Analysis

The dominant frameworks of devaluation analysis have been Keynesian in orientation. This is a consequence of the temporal coincidence of international monetary disorder (and thereby conditioned interest in devaluation analysis), on the one hand, and the emergence and increasingly important position of Keynesian economics on the other. However, Keynesian devaluation analysis came in various approaches, causing a prolonged process of reconciliation between the elasticities and absorption approaches until they were finally found to be more or less complementary. In the hands of Meade, Alexander, Johnson and Tsiang they were then integrated into a formulation which might by now be considered to constitute the standard Keynesian model of devaluation.

¹ The second interpretation is probably the correct one as far as the intentions of the writers in the general equilibrium tradition are concerned; cf., for instance, NEGISHI (1972, p. 233): "However, the amount of foreign currency and the number of government bonds are fixed and the possibility of international lending and borrowing is assumed away; hence the rate of interest is eliminated by the assumed equality of the demand for and supply of bonds within a country, just as, e.g., the wage is eliminated by the equality of the demand for and the supply of labour." KEMP (1970) provides a partial exception by showing explicitly how nontradeables affect the analysis. The bond market is explicitly treated in KYLE (1977).

The elasticities approach had presupposed the existence of unemployment. By contrast, one of the most important contributions of the absorption approach was to specify conditions for a devaluation to be successful in situations of full employment. Recently, the monetary approach has also stressed the role of monetary factors in conditions of full employment. As a matter of fact, the relation between the monetary approach and the earlier Keynesian analysis has tended to be somewhat unclear. The crucial difference between the Keynesian and monetary approaches is here taken to be one of assumptions about money supply behaviour. The Keynesian theoretical literature assumes that the direct effect of the balance of payments on the domestic money supply is either automatically neutralized or otherwise inconsequential. The monetary approach, on the other hand, assumes that neutralization is less than complete and concentrates on the supply of and demand for money.¹

The purpose of this section is as follows. First, the elasticities and absorption approaches are briefly characterized. Second, the standard Keynesian analysis of the effects of a devaluation for the case of a small economy is expounded within the framework used by Mundell and others in the analysis of monetary and fiscal policy. This should be useful in the sense that the technique is well known and as a pedagogical device has much to recommend it as compared to alternative formulations.² Third, the assumptions about money supply are modified so as to pay due respect to the distinction between impact and long-run effects of a devaluation in the manner prescribed by the monetary approach. This makes a comparison of the Keynesian and monetary approaches possible. Finally, the determination of investment and the role of the distribution of income is discussed.

2.2.1. The Elasticities Approach

According to the elasticities approach, the effects of a devaluation on the balance of trade depend on how the short-run equilibria of the markets for

¹ From the point of view of the monetary approach, this is done not only for the purpose of emphasizing that the stock of money affects total demand and therefore the balance of payments, but also and above all because financial flows affect stocks and are therefore self-eliminating in the longer run when stock equilibrium is approached. The view taken by the monetary approach is that imbalances in the balance of payments reflect disequilibria between the supply of and demand for money and are intrinsically temporary since the size of the actual stock of money changes through imbalances in the balance of payments. The claim of the monetary approach — that it represents a return to a “long historical tradition of international monetary theory” (Johnson) — is clearly justified.

² Cf., in particular, the complicated formulations by MEADE (1951 b), TSIANG (1961) and KYLE (1977).

exports and imports are affected. In the simplest case — when supply elasticities are assumed to be infinite and trade is initially balanced — a devaluation will improve the balance of trade of the home country if the sum of the demand elasticities for exports and imports is greater than one (the “Marshall—Lerner condition”). In the more general case when supply elasticities are finite, the condition is more complicated and depends on four elasticities, i.e., the export supply and the import demand elasticities of the home as well as the foreign country (the “Robinson—Metzler—Bickerdike condition” already given).

Many views have been presented as to how the elasticities approach should be interpreted. The most common interpretation of the elasticities approach is that it constitutes an application of Marshallian partial equilibrium analysis, and that it is thus based on the assumption that the markets for exports and imports may legitimately be analyzed separately from the rest of the economy and, in particular, without regard to the effects of the devaluation on the level of income, the real supply of money, the markets for labour, bonds etc.¹

More recently, Negishi and, following him, Kemp have interpreted the elasticities approach as that special case of “general equilibrium” in which cross price effects are zero (cf. pp. 18—19 above). It should be observed, though, that the general equilibrium interpretation, while, of course, valid in the sense that a special case of the general condition (2.5) is formally equivalent to the Robinson—Metzler—Bickerdike condition, is exegetically unfounded (as even a cursory reading of, e.g., Robinson (1937 a) makes clear). In the elasticities approach it is not assumed that full employment is continuously maintained by price and wage flexibility; instead, it is assumed that nominal wages are constant and that any amount of labour demanded is supplied at the going wage rate. Also, it is not the case that the elasticities approach assumed that the real cash balance effects of a devaluation precisely counteract the income and substitution effects so that cross effects are zero. Rather, real cash balance effects are abstracted from, i.e., total demand is taken to depend on the real supply of money only via the rate of interest (which is

¹ Thus, for instance, KEMP (1962, p. 323) finds the Robinson—Metzler—Bickerdike condition perfectly acceptable “(a) if in each country there were a nontraded commodity; (b) if the nontraded commodity dominated the budgets of consumers; (c) if the objective of monetary policy in each country were to hold constant the price of the nontraded commodity; and (d) if in each country both the cross-elasticity of excess demand for imports with respect to the price of the exported commodity, and the cross-elasticity of excess demand for the exported commodity with respect to the price of the imported commodity, were zero. These are rather special assumptions with a marked partial equilibrium flavor, but they may sometimes be ‘sufficiently’ realistic.” Cf. also NEGISHI (1972), KEMP (1970) and DORNBUSCH (1973 b).

constant because of the monetary policy pursued or possibly because of speculation).

According to a third interpretation, the elasticities approach gives the impact or "initial" effect of a devaluation while the "total" or "final" effect is derived only by also considering the induced income effects. This interpretation seems valid as far as the intentions of the proponents of the elasticities approach are concerned; cf. Robinson (1937 a, p. 88) or Haberler (1949, pp. 128–9). Even under this assumption, it must be observed that cross effects in demand functions are abstracted from, nominal wages assumed to be constant throughout, etc. Thus, there is undoubtedly a conflict between the macro-economic view of the devaluation problem taken (by at least some writers of the elasticities approach), on the one hand, and the partial equilibrium character of the method of analysis applied, on the other hand.

2.2.2. The Absorption Approach

The essence of Alexander's absorption approach is to focus upon the relationships between total income and expenditure, on the one hand, and the balance of trade (or, depending on the definition of total income employed, the current account), on the other. Defining the sum of consumption, investment and government expenditure (total domestic demand) as absorption, the identity which constitutes the starting point of the absorption approach may be written as

$$\text{trade balance surplus} = \text{total production} - \text{absorption.}$$

This "fundamental identity" (which clearly is nothing but the national income identity of an open economy written in a particular way¹) has been applied to devaluation analysis as follows.

First, for the trade balance to improve when there is unemployment, it is necessary that the increase in the value of total production caused by the devaluation is greater than the associated increase in total domestic demand for goods and services, i.e., that the marginal propensity to absorb is smaller than one. In this context, Alexander also discussed the so-called "terms-of-trade effect", which had already been emphasized by Harberger (1950) and Metzler and Laursen (1950). This effect refers to the fact that a deterioration in the terms of trade induced by, e.g., a devaluation as such will cause a fall

¹ For criticism of Alexander's (1952) analysis as being mere implicit theorizing based on tautologies, see MACHLUP (1955, 1956).

in real incomes because the prices of the goods absorbed rise by more than the prices of the goods produced. It was concluded that the terms-of-trade effect diminishes the expansionary effect of a devaluation.

Second, a devaluation undertaken in conditions of full employment will not improve the trade balance unless there are "direct effects" on absorption, i.e., effects which occur independently from any effects on output. According to Alexander's view, one of the most important direct effects is likely to be the cash balance effect, i.e., the effect on expenditure of the fall in the real value of the money supply consequent upon the devaluation-induced rise in the general price level.¹ Another direct effect mentioned is the redistributive effect: to the extent that the redistribution of income occurs in favour of income categories (e.g., profits or government incomes) for which the propensity to absorb is below the average, the foreign balance may improve.

Already before Alexander's article, Meade had published his study on international economic policy, which, *inter alia*, contained an analysis of the effects of a devaluation similar to that of Alexander. The analysis of Meade was arguably inferior, though, since his particular assumptions about monetary policy implied that the effects of a devaluation *per se*, in contrast to the effects of a certain policy "package", were not clearly identified. However, probably due to the fact that it was based on a formal model, Meade's analysis has still come to constitute the starting point for later devaluation analysts.

2.2.3. The Standard Open Economy Model

The framework employed by Meade was the Keynesian (or Hicksian) macro-economic model extended to include international transactions, and the expressed aim was to integrate the "Keynesian" analysis of the effects of

¹ "If the money supply is inflexible, and if money holders desire to maintain cash holdings of a certain real value, they must, as prices rise, accumulate more cash. This will require a reduction in their real expenditures relative to their real incomes... One result of the attempt to maintain real cash balances by increasing their money amounts while prices rise may be to drive down the prices of assets, i.e., to increase the rate of interest. This in turn might have some effect on real consumption or investment relative to real income: thus the cash balance effect may operate directly on the income-expenditure relationship through the foregoing of expenditures in order to build up cash, or indirectly through the rate of interest as the result of an attempt to shift from other assets into cash — an attempt that can be discouraged only by a rise in the rate of interest. Clearly, one of the most important components of the direct absorption effect would be the cash balance effect." ALEXANDER (1952, p. 367). Alexander also observes that the rate of interest might fail to rise if domestic and foreign assets are close substitutes in the portfolios of wealth holders; cf.: "Capital movements are ruled out here; if they were allowed they might change or eliminate the cash balance effect."

income changes on the balance of payments based on foreign trade multipliers with the "classical" analysis of the effects of changes in relative prices. The model to be employed in the following is a simple one-country version of Meade's model. For the present purposes it is most conveniently written as

$$(2.17) \quad Y = E(Y, r) + \frac{1}{q} B,$$

$$(2.18) \quad B = qX(q) - F(Y, q),$$

$$(2.19) \quad M/p = L(Y, r),$$

$$(2.20) \quad q = p/e,$$

$$(2.21) \quad \tilde{Y} = pY,$$

where

Y = output,

E = domestic expenditure in domestic output terms,

r = rate of interest,

e = the exchange rate expressed in units of domestic currency per unit of foreign currency = the price of imports in domestic currency (the price of imports in foreign currency is assumed constant and by choice of unit set equal to one),

p = price of domestically produced good in local currency,

B = balance of trade in foreign currency,

X = exports,

F = imports,

\tilde{Y} = nominal income in domestic currency,

M = nominal supply of money in domestic currency,

q = terms of trade,

L = nominal demand for money in domestic currency.

Equation (2.17) is the equilibrium condition for the goods market stating that supply of the domestically produced good equals the sum of domestic expenditure and the balance of trade, all in domestic output terms. Real expenditure is assumed to be a function of the rate of interest and real income in terms of the domestic good, implying that the "terms-of-trade-effect" of a devaluation as well as wealth effects are neglected. Equation (2.18) defines the balance of trade (or the balance of payments since capital flows are abstracted from) in foreign currency as the terms of trade times exports less imports. Exports are assumed to be a function of the price of the export

good in foreign currency (foreign income and prices being constant). Imports are a function of real income and the terms of trade (being zero homogeneous in nominal income and prices in domestic currency).¹ Equation (2.19) is the equilibrium condition for the money market according to which the real supply of money equals demand, assumed to be a function of the rate of interest and real income. Finally, equations (2.20) and (2.21) define the terms of trade as the ratio of export and import prices and nominal income as the domestic price level times output. It will be assumed that initially $e = p = 1$ implying $q = 1$ and $B = 0$.

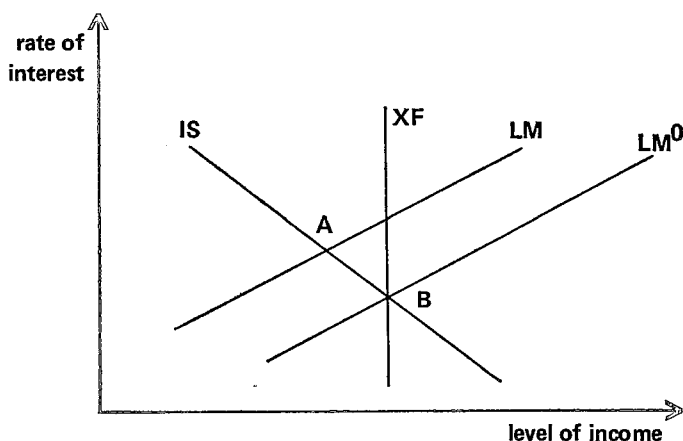
In the following it will also be assumed that either p or Y is fixed, i.e., attention is restricted to the cases of unemployment (infinite elasticity of supply) and full employment (zero elasticity of supply).² Distinction will also be made between the "short-run" or "impact" and long-run effects of a devaluation. The impact effect is derived by assuming that the effects of the balance of payments on the supply of money are neutralized by operations of the monetary authorities. Thus the nominal stock of money is treated as exogenous, and the model is then solved for the effects on the rate of interest, the level of income and the balance of payments.³ The long-run effect, on the other hand, is derived by restricting the balance of payments to zero, since, if neutralization operations of the monetary authorities are less than complete, the stock of money cannot otherwise be constant. The model may then be solved

¹ This specification is conventional but rather special. In particular, the absence of the interest rate as an argument in F implies that no investment goods are imported. This matter is returned to in chapter 4 below.

² The implicit assumption in the latter case is that the supply of labour is a function of the real wage defined as the nominal wage rate divided by the domestic price level. It could be argued that the "real wage" in the labour supply function should instead be defined as the money wage deflated by a general price index depending on the price of imports as well (the same argument holds for the definition of "real" income and of the real stock of money). This is actually done by SALOP (1974) and PURVIS (1976). Like the (analogous) terms-of-trade effect in the expenditure function, however, this modification is of no particular relevance for the main features of the Keynesian devaluation analysis or for a comparison of the Keynesian and monetary approaches. For an elaboration of the terms-of-trade effects, see KYLE (1976) and TOWER (1975).

³ The justification for the dichotomization of the analysis into the short and long run is thus different from the tatonnement assumption employed in the previous section. Actually, the distinction is now between two assumptions on monetary policy (neutralization versus non-neutralization). One could argue that neutralization is possible in the short run but not in the long run. In the present model, however, neutralization by open market operations is, in fact, always possible. This is a consequence of the neglect of the wealth effects of current account imbalances and of reserve constraints on central bank policy as well as of the fact that changes in the supply of bonds only affect the demand for bonds, i.e., some rather special assumptions are implicitly being made about behaviour with respect to the bond market (which is eliminated from explicit consideration by use of Walras' law). On this, see HANSEN (1970, pp. 134—137). For a highly critical discussion of the financial specifications implicit in Keynesian balance of payments theory, see KUSKA (1978).

Fig. 2.1



for the effects of a devaluation on the rate of interest, the level of income, and the stock of money. (If the stock of domestic assets of the monetary authorities is assumed to be constant throughout, the change in the supply of money will equal the cumulative effect on the balance of payments, i.e., the change in the stock of international reserves.)

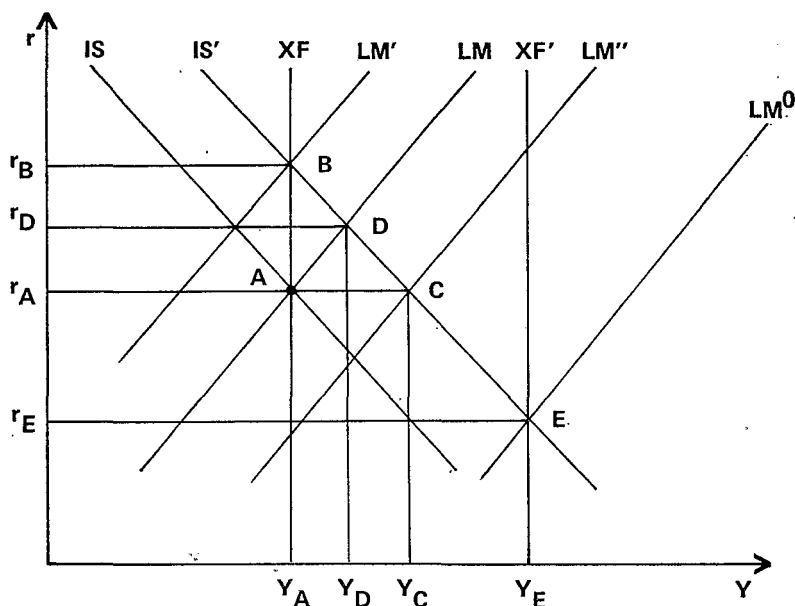
Graphically the model is analyzed by drawing the schedules representing equilibrium in the goods market (IS), the money market (LM), and zero balance of trade (XF) in a diagram with the rate of interest and either real or nominal income on the axes. As will be seen, the slopes of the IS and LM schedules will normally be as indicated in fig. 2.1 in the cases of full employment and unemployment provided that the Marshall-Lerner condition is fulfilled; at the same time, the slope of the XF schedule is zero under the assumptions made (zero capital flows, zero interest sensitivity of imports).

Short-run equilibrium is given by point A, which satisfies both equilibrium conditions. The balance of payments is in surplus, however, since at A either real income or the price level is lower than required for external balance. Assuming neutralization to be less than complete, this then implies that the supply of money is increasing, shifting the LM-curve to the right until long-run equilibrium is reached at point B.

2.2.4. Effects of a Devaluation: Unemployment

Treating p , M and e as exogenous and differentiating, the model may be written

Fig. 2.2



$$(2.22) \quad s dY - E_r dr - dB = 0,$$

$$(2.23) \quad m dY + dB = \varepsilon de,$$

$$(2.24) \quad L_Y dY + L_r dr = dM,$$

where $s = 1 - E_Y$ is the marginal propensity to save (actually “not to absorb”), $m = F_Y$ the marginal propensity to import and $\varepsilon = -X(1 + X_q/X - F_q/F)$, which is positive provided that the Marshall-Lerner condition is fulfilled (that the sum of the import elasticities is numerically greater than one). The slopes of the schedules as well as the effects on their positions of changes in the exchange rate and the supply of money are given by

$$\left(\frac{\partial Y}{\partial r}\right)_{IS} = \frac{E_r}{s + m} < 0 \qquad \left(\frac{\partial Y}{\partial e}\right)_{IS} = \frac{\varepsilon}{s + m} > 0$$

$$\left(\frac{\partial Y}{\partial r}\right)_{XF} = 0 \qquad \left(\frac{\partial Y}{\partial e}\right)_{XF} = \frac{\varepsilon}{m} > 0$$

$$\left(\frac{\partial Y}{\partial r}\right)_{LM} = -\frac{L_r}{L_Y} > 0 \qquad \left(\frac{\partial Y}{\partial M}\right)_{LM} = 1/L_Y > 0,$$

assuming $s, m, \varepsilon, L_Y > 0$ and $E_r, L_r < 0$.

Assume that initial equilibrium prevails at point A in fig. 2.2 with rate of

interest r_A and the level of income Y_A , and that the exchange rate is then devalued shifting XF to XF' and IS to IS' . As is seen from the expressions above, the former shift is greater than the latter provided that the marginal propensity to save (hoard) is positive and the Marshall—Lerner condition fulfilled. The effects of the devaluation now depend crucially on what is assumed about the supply of money (in addition to the neutralization assumption).

Meade dealt with two cases. First, he assumed that monetary policy ensures “internal balance”, i.e., a constant level of income. This requires the devaluation to be accompanied by a decrease in the money supply that shifts the LM curve to LM' giving instantaneous equilibrium at point B with interest rate r_B . The effect on the balance of trade (graphically represented by the horizontal distance between XF' and XF) is

$$(2.25) \quad \delta B/\delta e = \varepsilon$$

(as is seen by setting $dY = 0$ in equation (2.23)). Thus the effect of a devaluation on the balance of trade in the case where monetary policy is used to ensure internal balance is the same as would be derived by a straightforward application of the elasticities approach.

Second, Meade assumed “neutral” monetary policy, interpreted as the case where the monetary authorities keep the rate of interest constant. This requires the devaluation to be accompanied by an increase in the supply of money that shifts the LM curve to LM'' giving short-run equilibrium at point C with income level Y_C . The effect on the balance of trade is clearly smaller, being given by

$$(2.26) \quad \delta B/\delta e = s\varepsilon/(s + m).$$

Since the marginal propensity to save (not to absorb) might well be zero or even negative, a devaluation does not necessarily improve the balance of trade even if the Marshall—Lerner condition is fulfilled (it does, however, ensure a positive effect on the level of income). This is the case that has been presented as a “synthesis” of the elasticities and absorption approaches, since the total effect of the devaluation can be thought of as being obtained by applying a “multiplier” depending on spending propensities on an “initial effect” depending on elasticities.¹

¹ See ALEXANDER (1959).

Thus far, sufficient conditions for a devaluation to be successful in terms of the balance of trade are seen to be that the Marshall—Lerner condition is fulfilled and the marginal propensity to save positive. Tsiang (1961), approving of Meade because of his explicit inclusion of money and the rate of interest while at the same time disapproving of his special assumptions about the supply of money, dealt with the case of “orthodox (as opposed to Keynesian) neutral monetary policy”, interpreted as the case where the monetary authorities keep the supply of money constant. In this case the devaluation is not accompanied by any change in the stock of money, giving short-run equilibrium at point D with interest rate r_D and income level Y_D . As is seen, the effect on the balance of trade is greater than in the preceding case since the rise in the rate of interest accompanying the increase in the level of income diminishes domestic expenditure

$$(2.27) \quad \delta B/\delta e = \frac{(s + E_r L_Y/L_r) \varepsilon}{s + m + E_r L_Y/L_r}$$

A devaluation might now be effective (improve the balance of trade) even if s is zero or negative, provided that the interest rate effect is strong enough.

All the previous cases must be interpreted as giving the short-run equilibrium following a devaluation accompanied by a specified monetary policy in combination with complete neutralization. Assume alternatively that neutralization is less than complete. Then the surplus in the balance of payments, given that the devaluation is successful, or the consequential increase in the supply of money will gradually shift the LM curve to the right until the “long-run” equilibrium is reached at point E with interest rate r_E and real income Y_E .

In the long run the level of income depends only on the exchange rate while the rate of interest adjusts to clear the goods market (as is seen by setting $dB = 0$ in equations (2.22) and (2.23)). For the unemployment case, the application of the assumptions of the monetary approach thus produces the conclusion that the long-run effect of a devaluation on the level of income is greater than the impact effect, being

$$(2.28) \quad \delta Y/\delta e = \varepsilon/m,$$

while the effect on the rate of interest even changes sign as between the short and the long run, being first positive and then negative.

The total change in the amount of money in the system, as between the original and emerging long-run equilibrium is given by

$$(2.29) \quad \delta M / \delta e = \left(\frac{sL_r}{E_r} + L_Y \right) \frac{\varepsilon}{m}$$

(as is seen by setting $dB = 0$ in equations (2.22) and (2.23) and then substituting dY and dr into equation (2.24)).

If the monetary authorities keep the stock of domestic assets constant throughout, this will also be the effect of the devaluation on the level of international reserves. (An alternative interpretation is that expression (2.29) gives the maximum increase in the domestic assets of the monetary authorities that can be allowed to accompany the devaluation without creating a deficit in the balance of payments.)¹

2.2.5. Effects of a Devaluation: Full Employment

Treating Y , M and e as exogenous and differentiating, the model may be written

$$(2.22)' \quad E_r dr + dB = 0$$

$$(2.23)' \quad \varepsilon d\tilde{Y}/\tilde{Y} + dB = \varepsilon de$$

$$(2.24)' \quad L_r dr + M d\tilde{Y}/\tilde{Y} = dM.$$

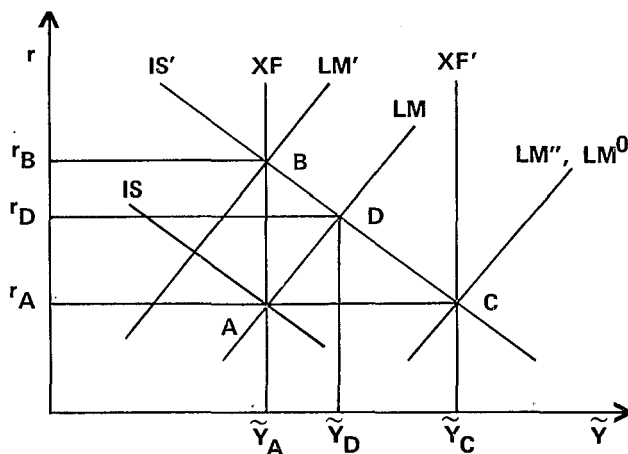
The slopes of the schedules as well as the effects on their positions of changes in the exchange rate and the supply of money are now given by

$$\begin{aligned} \left(\frac{\partial \tilde{Y}}{\partial r} \right)_{IS} &= \tilde{Y} E_r / \varepsilon < 0 & \left(\frac{\partial \tilde{Y}}{\partial e} \right)_{IS} &= \tilde{Y} > 0 \\ \left(\frac{\partial \tilde{Y}}{\partial r} \right)_{XF} &= 0 & \left(\frac{\partial \tilde{Y}}{\partial e} \right)_{XF} &= \tilde{Y} > 0 \\ \left(\frac{\partial \tilde{Y}}{\partial r} \right)_{LM} &= -\tilde{Y} L_r / M > 0 & \left(\frac{\partial \tilde{Y}}{\partial M} \right)_{LM} &= \tilde{Y} / M > 0 \end{aligned}$$

assuming $\varepsilon > 0$ and $E_r, L_r < 0$.

¹ It should be observed that the long-run effect is determined very differently from the impact effect. For instance, the impact effect on the balance of trade is a growing function of s because the marginal propensity to save indicates the size of the discrepancy between income and absorption emerging as a consequence of the devaluation. The long-run effect is also a growing function of s , but now the reason is that a greater s for a given dY implies that the rate of interest will have to fall more to re-establish equality between income and absorption; the fall in the rate of interest, in turn, increasing the demand for money.

Fig. 2.3



Assume that initial equilibrium prevails at point A with rate of interest r_A and nominal income \tilde{Y}_A , and that the exchange rate is then devalued shifting the XF curve to XF' and IS to IS'. As is seen from the expressions above, the two shifts are of equal size.

Short-run equilibrium in the first case analyzed by Meade (monetary policy that ensures internal balance, i.e., a constant level of income) is given by point B, and the effect of the devaluation on the balance of trade is again

$$(2.25) \quad \delta B / \delta e = \varepsilon.$$

In the case of "Keynesian neutral monetary policy" (constant rate of interest), however, the effect on the balance of trade is clearly zero (as is seen by considering point C)

$$(2.26)' \quad \delta B / \delta e = 0,$$

the only effect of the devaluation being an equal percentage rise in the domestic price level.

This feature of Meade's analysis made Tsiang accuse him of exaggerating the risks of "instability" of the exchange rate.¹ Under Tsiang's alternative

¹ Cf. below p. 51.

assumption of "orthodox neutral monetary policy", short-run equilibrium is given by point D, and the effect of the devaluation on the trade balance is again positive

$$(2.27)' \quad \frac{\delta B}{\delta e} = \frac{ME_r \varepsilon}{ME_r + \varepsilon L_r} > 0,$$

the source of the surplus being the reduction in expenditure following the rise in the rate of interest caused by the reduction in the real stock of money (nominal supply of money being constant and the price level having risen).¹

Though it was not pointed out by Tsiang, the impact effects of the devaluation on the balance of trade — as well as on the real variables — are equivalent to the effects of an equal percentage reduction in the supply of money. This is easily seen from the fact that the reduced form for the balance of trade under full employment assumptions may be written as

$$(2.30) \quad dB = \frac{ME_r \varepsilon}{ME_r + \varepsilon L_r} \left(\frac{de}{e} - \frac{dM}{M} \right).$$

Thus it may be concluded that: "An increase in the price of foreign exchange will result in a deterioration in the trade balance if and only if an increase in the money supply will lead to an improvement in the trade balance."² It should be emphasized that this conclusion about the equivalence of exchange rate and monetary changes, while often being put forward by writers in the monetary tradition, quite obviously has nothing to do with the monetary assumptions as such, but is a simple consequence of homogeneity properties connected with classical full employment assumptions.

The long-run effects of the devaluation — the investigation of which is the distinguishing feature of the monetary approach — are again derived by assuming neutralization to be less than complete and permitting the LM curve to shift to the right until external equilibrium is re-established at point C. This clearly implies that the supply of money (as well as prices and nominal income) increases in the same proportion as the price of foreign exchange

$$(2.31) \quad dM/M = de/e,$$

the degree to which the increase in the stock of money is caused by increasing

¹ This effect had, in fact, already been considered by ALEXANDER (1952); cf. above p. 29.

² KRÜEGER (1974, p. 159). Cf. above p. 20.

international reserves depending on the monetary policy pursued. Thus, under the assumptions of the monetary approach, the effects of a devaluation on flow variables are the same as in the second case analyzed by Meade, the difference in analysis being that Meade assumed the devaluation to be accompanied by an equal relative increase in the supply of money while the monetary approach shows that this will indeed be the case in the end.

Summarizing the above comparison, it might be said that the monetary approach to devaluation is properly considered as extending the consideration of monetary factors into the long-run¹ (the usefulness of the analysis depending on the relevance of the particular definition of long run employed), while other claims sometimes put forward are debatable. Consider, for instance, the statement according to which: "If it is believed that the effects of a reduction of real balances on expenditure, by whatever transmission mechanism, are negligible then it may stand to reason that the effects of a devaluation are negligible not that there must be other powerful avenues through which it exerts its effects."² This conclusion again follows from the assumption of full employment. As such it was implicit in the analysis of Meade and fully treated by Alexander and Tsiang.

2.2.6. Concluding Comments

In the present section the main features of Keynesian devaluation analysis have been set out. As compared to the monetary general equilibrium approach, the analysis is clearly more "general", since explicit attention is given to unemployment as well as full employment, the role of the monetary policy assumptions, etc. Still, many effects and factors are conspicuous by their absence. Among the more important of these are some considerations related to the determination of investment and the role of the distribution of income.

One may start by observing that the analysis may easily give the impression that a devaluation is likely to depress real investment. This conclusion will

¹ Cf. BRANSON (1975). Even this difference between the approaches is ambiguous. It implies, for instance, that Metzler's article "The Process of International Adjustment Under Conditions of Full Employment: A Keynesian View" should be considered as belonging to the monetary approach, since it contains a good analysis of the long-run equilibrium in the above sense, including the effects of exogenous changes on stocks of reserves. For a reformulation of Metzler's analysis, see HOLMES (1972).

² DORNBUSCH (1973 a, p. 880). For a recent and strongly worded delineation of the "real" contributions of the monetary approach, see HAHN (1977).

follow, if, as is often done, investment is written as a function of the rate of interest only (and the given stock of capital), and if a devaluation is expansionary and thereby drives up the rate of interest.¹ In reality, by contrast, it is quite obvious that one of the motivations for devaluations has in many instances been to raise the marginal efficiency of capital and thereby to stimulate investment. Of course, this aspect can, at least to some extent, be given a more satisfactory treatment by simply specifying the investment function more fully.

Somewhat more difficult problems are related to the neglect of any effects of a devaluation on and via the distribution of income. This is an unfortunate but well-established practice within devaluation analysis; distribution effects are mostly relegated to brief footnotes, if mentioned at all.² In policy debates, by contrast, the impact of exchange rate changes on the distribution of income between various groups and income categories invariably figure prominently.

It may be observed, though, that the neglect of the distribution effect in the above analysis was actually justifiable in the sense that the distribution of income between wage income and profits under the assumptions made may be taken to be invariant to exchange rate changes. In the first case domestic prices were assumed to be constant because of constant labour productivity, which in combination with constant money wages amounts to a constant distribution of income. In the second case the level of output (and therefore productivity) as well as the ratio between money wages and domestic prices were taken to be constant, again amounting to an unchanging distribution of income. In the second case the international distribution of income between the home country and the rest of the world is also unaffected. More generally, however, a devaluation is likely to change not only the international income distribution (via the terms of trade), but also the income share of labour or households (by the fall in the real wage).³ These changes will have consequences for the level as well as the distribution of expenditure. As will be seen in chapter 4 below, income distribution effects imply that the employment and balance of payments consequences of exchange rate changes are much more ambiguous than is usually recognized in the literature.

¹ See the specifications in, e.g., BRANSON (1976) or ISHYAMA (1976).

² Some notable exceptions are DIAZ (1963), KNIGHT (1976), COOPER (1971) and KRUGMAN & TAYLOR (1978).

³ In the "tradeables-nontradeables" model, by contrast, a devaluation at constant money wages will always reduce real wages and is therefore likely to affect internal income distributions (see ch. 5 below), but at the same time the exogeneity of the prices of traded goods implies the lack of any terms-of-trade induced change in the international income distribution.

There is, however, probably a more fundamental reason for the neglect of income distribution effects. The reason is that the distribution of income between the household and the corporate sectors is indeed irrelevant if capital (credit) markets are perfect and if firms are maximizing the wealth of their owners.¹ To make the income distribution relevant (as it is assumed to be in chapter 4) thus presupposes either that capital markets are assumed to be imperfect² or that a distinction is made between wage earners (consumers) and owner households or capitalists (investors).³

Another weakness of the analysis reviewed above pertains to the static character of conventional analyses of the effects of a devaluation. In most cases it is, for instance, quite unrealistic to assume that money wages are wholly unaffected by a devaluation for any considerable time period. On the other hand, it would be at least equally unrealistic to assume that money wages adjust fully as an immediate consequence of a devaluation. Similarly, exports may quite possibly be both very inelastic and highly elastic depending on the length of the time period assumed. These observations point strongly to the need for dynamic analysis and are taken up anew in chapter 4 below.

¹ See, e.g., BROMWICH (1977).

² Assume, for instance, that the households (owners) are rationed in the credit market (or possibly not able to borrow at all) while firms are not. Then the retention of profits by firms will necessarily affect the spending power of households (income distribution and dividend policies will matter).

³ In this case a change in the real wage will obviously affect the purchasing power of consumers even if capital markets were perfect.

3. Internal and External Balance

In the world of the monetary general equilibrium approach there is no essential need for policy. All markets are perfect and the primary effect of a devaluation is to raise the price level by the same proportion as the price of foreign exchange. In addition, spending is temporarily reduced in relation to income in order to rebuild real cash balances (inflation as a tax on money holdings).

Under Keynesian assumptions, by contrast, the functioning of at least some markets is at best imperfect with the consequence that attention is directed to the use of policy instruments as a means of enhancing the achievement of full employment and other targets. Needless to say, not only markets but also policies are notoriously imperfect; timing of policy may be bad, the effects of single actions misjudged, various measures simultaneously undertaken may have unintended combined effects, etc. It is therefore important to investigate the conceivable consequences of various kinds of policy behaviour. The problem at hand is often thought of in terms of how a given set of instruments should be used in order to achieve a certain set of targets or to maximize a postulated objective function. This way of thinking implies, among other things, that the exchange rate as a policy instrument should be considered not only from the point of view of its effects on the balance of payments, but with respect to other target variables as well.

An implicit recognition of this principle is met with in the frequent remarks that exchange rate changes should not only affect the balance of payments positively but also be "effective". By this is meant that the sum of certain elasticities should not only be greater than one but — from the point of view of "practical" policy making — considerably greater than one (e.g., Haberler, 1949, p. 110). Otherwise, it is observed, the correction of imbalances in payments would lead to volatile exchange rate changes causing distressing fluctuations in relative prices and the price level.

The question which arises, however, is just how "effective" should exchange rates be in order to constitute a useful instrument of balance of payments policy? It may also be asked whether the exchange rate could not still be a useful instrument of policy, even though exchange rate changes had no or

negligible (or even perverse) effects on the balance of payments. Indeed, in the standard Keynesian model exchange rate changes have weak effects on the balance of payments expressly if the effects on the level of income or the price level are strong.

To answer these questions, one needs some criteria for evaluating policy actions. One natural framework in which to investigate the potential role of exchange rate changes is the "theory of the balance of payments policy", which for all practical purposes may be equated with its dominant approach, the "fixed target approach". Indeed, the fixed target approach has largely emanated from Meade's and Mundell's analysis of the exchange rate question. The general characteristics of the fixed target approach are therefore outlined in section 3.1, and the analyses of Meade and Mundell on the relative merits of fixed and flexible exchange rates are then critically discussed in sections 3.2 and 3.3. It will be argued that Mundell has tended to confuse the distinction between various policy assignments on the one hand, and various exchange rate regimes on the other. The analysis therefore leads to a reconsideration of the assignment principle as applied to exchange rate policy. Finally, the assignment principle itself is scrutinized, and found to be of limited relevance if long-run effects of policies differ markedly from their short-run effects. The chapter ends with some general comments on the limitations of the fixed target approach to policy issues.

3.1. Tinbergen's Rule and Mundell's Principle

The fixed target approach is characterized by the representation of the policy makers' preferences as "fixed" targets, and generally also by the use of linear (Keynesian) models to describe the relationships between means of policy, or instruments, and "ends", or targets. Instruments are exogenous variables which may be freely manipulated by policy makers while targets are endogenous variables for which given values are desired.¹ In this framework (the simplicity of which goes some way towards accounting for its popularity), two questions are typically raised: First, is it possible to achieve all targets by use of the available set of instruments? Second, how should the instruments be related to the targets; in particular, is it possible to "assign" certain instruments to certain targets?

¹ For the difficulties of distinguishing between instruments and targets, see FLEMING (1968), MUNDELL (1968, ch. 14) and WHITMAN (1970).

The starting point of the fixed target approach is a reduced-form linear system ("irrelevant" endogenous variables having been eliminated) of type

$$y_i = \sum_{j=1}^m a_{ij}x_j + b_i, \quad i = 1, \dots, n,$$

where y_i and x_j refer to target and instrument variables respectively, a_{ij} is the "policy multiplier" indicating the effect of instrument x_j on target y_i , and b_i is a given constant depending on the given values of structural coefficients and exogenous variables.

The answer to the first question posed above may now be given as follows: A unique combination of instruments (values of instrument variables) compatible with the desired values for targets will not exist unless the number of independent instruments equals the number of independent targets ($n = m$).¹ This so-called "Tinbergen's Rule", that the number of targets must equal the number of instruments, reflects the fact that a linear equation system has a unique solution only if the number of equations equals the number of unknowns. It is equally obvious that a situation with more instruments than targets ($m > n$) implies the existence of an infinite number of solutions, and finally that all targets cannot be attained if the number of targets is greater than the number of instruments ($m < n$). This observation may have served the purpose of emphasizing the need for new instruments or the elimination of restrictions on existing ones in order to make it possible to achieve desired targets.

In general, the interdependence between instruments and targets implies that a change in one of the instruments affects several or all of the targets. The determination of the values of instruments necessary to achieve desired target values therefore seems to presuppose a simultaneous solution of the total system, that is, centralized decision making. If different authorities, de facto, control different instruments, or if there is uncertainty concerning actual conditions or the effects of policy changes, the question arises as to how instruments should be changed in response to deviations between actual and desired values of target variables.

One answer to this question is given by Mundell's "principle of effective market classification", according to which each instrument should be directed toward the target on which it has the relatively greatest effect. The basis for this principle is the fact that it ensures that policy responses to deviations from target values lead back to the target values, i.e., that the "groping" is successful

¹ Cf. WHITMAN (1970) for a detailed discussion of sufficient conditions.

(the system is stable). This is necessarily true, however, only when two instruments and two targets are considered¹, and when the only dynamic element relates to the behaviour of the instruments.²

To see the rationale of the principle, assume that two instruments are related to two targets as follows:

$$\dot{x}_i = -\lambda_i (y_i - y_i^0), \quad i = 1, 2,$$

where λ_i is the positive speed of adjustment of instrument x_i and where $y_i - y_i^0$ refers to the deviation of target i from its fixed target value:

$$y_i - y_i^0 = y_{i1} (x_1 - x_1^0) + y_{i2} (x_2 - x_2^0), \quad i = 1, 2.$$

Instruments are defined so that $y_{ii} > 0$. The necessary and sufficient conditions for stability are easily found to be:

$$\begin{aligned} -\lambda_1 y_{11} - \lambda_2 y_{22} &< 0 \\ \lambda_1 \lambda_2 (y_{11} y_{22} - y_{12} y_{21}) &> 0. \end{aligned}$$

Mundell's principle may now be interpreted as the requirement that the instruments be paired to targets so as to ensure that

$$|y_{11}/y_{21}| > |y_{12}/y_{22}|,$$

implying that the stability conditions are met. In addition, it may be shown that cycles (oscillatory approach to equilibrium) are less likely to occur when the principle is applied.³

3.2. Meade on the Exchange Rate Regime

The core of Meade's analysis in his treatise "The Balance of Payments" is concerned with problems related to the attainment of "internal" and "external balance" (full employment or a stable price level and equilibrium in the balance of payments). While Meade's investigations were more systematic and explicit than previous studies, the questions were not novel. Indeed, the likely occurrence of a conflict between internal and external stability under fixed exchange rates has long been recognized, and the possibilities of re-

¹ For the difficulties related to the generalization of Mundell's principle for a greater number of instruments and targets, see FORTIN (1974) and PATRICK (1968, 1973).

² Cf. section 3.5 below.

³ See FORTIN (1974, p. 304).

conciling internal and external balance has been an ever-recurrent theme in the Keynesian literature on the balance of payments. The fixed exchange rate system has also been severely criticized on the grounds that it may well necessitate an economic policy which fosters inflation or unemployment, since the financial conditions required for equilibrium in the balance of payments may well be incompatible with the achievement of internal balance.

Correspondingly, the basic case for flexible exchange rates has always been that it will give the decision makers one instrument more, the exchange rate (in addition to, e.g., domestic demand management), or one target less, the balance of payments. This idea of achieving simultaneous internal and external balance by a combination of "price policy" and "demand policy" was brought out in a particularly forceful way by Meade. To illustrate the idea, consider the standard model discussed in chapter 2 above:

$$Y = E(Y, r) + X(q) - \frac{1}{q} F(Y, q)$$

$$B = qX(q) - F(Y, q),$$

with the price level of domestic output treated as given (determined by given money wages and productivity) and the rate of interest as the monetary instrument. It is illuminating to consider the model graphically in terms of the "full employment commodity market equilibrium" and "balance of payments equilibrium" schedules in a diagram with the terms of trade q on the vertical axis and the rate of interest r on the horizontal. Differentiating the above equations, the slopes of these II ("internal balance") and EE ("external balance") schedules are found to be

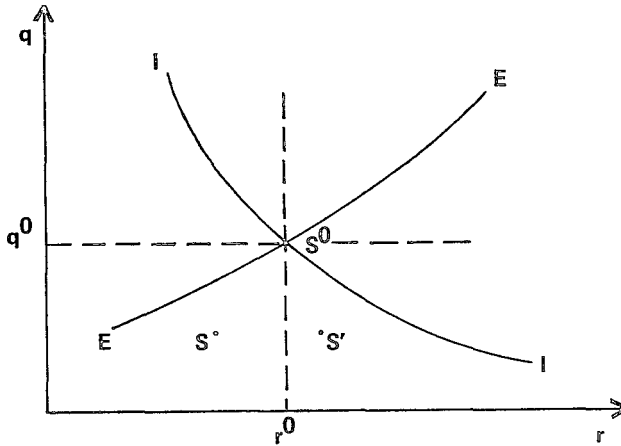
$$\left(\frac{\partial q}{\partial r}\right)_{II} = E_r/\varepsilon < 0, \quad \left(\frac{\partial q}{\partial r}\right)_{EE} = -mE_r/\varepsilon s > 0,$$

assuming $\varepsilon, s, m > 0$ and $E_r < 0$ (cf. above).

Every point to the right (left) of the II curve represents a situation of unemployment ("overfull" employment) and every point to the right (left) of the EE curve represents a surplus (deficit) in the balance of payments. The internal and external balance curves therefore divide this well-known "Swan diagram" into the "four zones of economic unhappiness" (the various combinations of deviations from internal and external balance).¹ The broken lines, on the other hand, divide the diagram into four "sectors" characterized

¹ See SWAN (1955) or CORDEN (1960).

Fig. 3.1



by different policy requirements. If, for instance, the economy is initially located in the sector closest to the origin, both the terms of trade and the rate of interest should be raised in order to attain simultaneous internal and external balance as represented by point S^0 .

Now, if the values of q^0 and r^0 (compatible with S^0) were known and if in addition it is assumed to be possible to affect the terms of trade through exchange rate and/or wage policy, then it would clearly be possible to switch the economy from any initial situation of internal and/or external imbalance to the "point of bliss" (S^0). This is but a straightforward application of Tinbergen's rule. If the values of q^0 and r^0 are not known (if it is not known at which point but possibly only in which zone the economy is situated), however, then one may ask how the instruments should be used so as to ensure that internal and external balance are reached.¹

Meade, when considering this question, compared two principles: (i) assignment of the rate of interest (or, more generally, of financial policy) to internal balance and of "price policy" (exchange rate or wage policy) to external balance; (ii) assignment of the rate of interest to external balance and of price

¹ That knowledge of the zone that the economy is located in is not enough is obvious from considering, e.g., points S and S' (both of which are in the same zone): the achievement of internal and external balance in both cases requires the terms of trade to be raised but the rate of interest to be raised or lowered depending on whether the initial situation is to the left or right of the dotted vertical line from r^0 .

policy to internal balance.¹ (Actually Meade largely concentrated on principle (i) with wage policy and constant exchange rates — the gold standard or the fixed exchange rate system — and principle (ii) with exchange rate changes as the substance of price policy — the flexible exchange rate system.)

The conclusion reached by Meade was that the two alternatives are essentially equivalent since the economy is in both cases likely to end up in the same static equilibrium (i.e., the point S^0): "... both these mechanisms are essentially of the same nature in 'real' terms. Both operate to maintain the two objectives of internal and external balance by the combined use of two means..." Thus the fixed and flexible exchange rate systems are basically equivalent ways of solving the internal-external balance problem — provided that nominal wages and prices are flexible under fixed exchange rates, that real wages are sufficiently flexible under flexible exchange rates, and that the existence of debts fixed in nominal terms as well as speculative capital movements are abstracted from.²

By implication Meade argued that the real importance of exchange rate flexibility is connected with wage and price rigidity: under such circumstances

¹ Cf. MEADE (1951 a, pp. 157—8): "Now there are two ways in which the authorities of a particular country may combine the use of financial policy and price adjustment. (i) First, financial policy may be used for the preservation of internal balance and price adjustment for the preservation of external balance. (ii) Second, financial policy may be used for the preservation of external balance and price adjustment for the preservation of internal balance... Principle i is that of the use of financial policy for the preservation of internal balance and of price adjustment for the preservation of external balance. This means that if there is a domestic depression, the authorities should bring about (through a reduction of taxes, an increase of public expenditure, or an increase in the supply of money and reduction in interest rates) a net inflation of domestic expenditure; and that if there is a domestic boom they should bring about some policy deflation of domestic expenditure. Simultaneously, if there is a deficit in the country's balance of payments, the authorities (either by a reduction in money wage rates or by a depreciation of the exchange rate) should reduce money prices and costs in their own country relatively to those of the rest of the world; and conversely if there is a surplus on the balance of payments, the authorities should take steps to raise relative prices and costs. Principle ii involves the use of financial policy for the preservation of external balance and of price adjustment for the preservation of internal balance. If there is a deficit in the balance of payments, the authorities of the country concerned must adopt a financial policy for the deflation of domestic expenditure, or, if there is a surplus in the balance of payments, they must adopt an inflationary financial policy. At the same time steps must be taken (by adjustment of wage rates or of rates of exchange) to raise or lower the money prices and costs of the country's products relatively to those of the rest of the world according as there is a domestic boom or slump in progress."

² MEADE (1951 a, p. 190). The real wage and the terms of trade are actually unlikely to be flexible at full employment if the rate of interest is the instrument of monetary policy (cf. below p. 51). Observe that Meade's conclusions entail the basic message of the monetary approach, i.e., that the balance of payments is self-equilibrating provided that the "rules of the games" are followed.

internal and external balance are likely to be incompatible unless financial policy is freed from the external constraint through flexible exchange rates.¹

3.3. Mundell on the Exchange Rate Regime

The starting point of Mundell's analysis was the view just stated on the real equivalence of fixed and flexible exchange rates under full employment assumptions. Mundell argued that "although this view, under certain circumstances, may be valid in statics, it is entirely erroneous in dynamics".² He investigated the dynamic adjustment paths under the two regimes and found them to be different, emphasized the importance of the international mobility of capital for the directness of the approach to equilibrium, and, for the first time formulated the principle of effective market classification.

In the present section it will be argued that there are some difficulties with Mundell's analysis which stem from the fact that he blurred the distinction between policy assignments and exchange rate regimes. To see the issues involved, the standard model is again resorted to:³

$$(3.1) \quad \dot{p} = \lambda_p \left[E(Y, r) + X(q) - \frac{1}{q} F(Y, q) - Y \right]$$

$$(3.2) \quad B = qX(q) - F(Y, q)$$

$$(3.3) \quad q = p/e.$$

Equation (3.1) is a dynamic adjustment equation according to which the domestic price level rises in response to excess demand in the goods market; equations (3.2) and (3.3) are the definitions of the balance of payments and the terms of trade. Output Y is assumed to be fixed at the full employment

¹ According to a widely held opinion (shared by Meade), this argument is based on the assumption of "money illusion". As has been pointed out by WILSON (1976, p. 20), the concept of money illusion is ill defined and may easily be misleading. The matter is discussed below on p. 60. It may be observed that Meade has retained his belief in flexible rates; cf. MEADE (1975).

² MUNDELL (1968, p. 152). An expanded version of sections 3.3 and 3.4 has appeared in KORKMAN (1977 a).

³ Mundell's analysis is based on unspecified reduced-form equations. It is clear, though, that his analysis may be set out in terms of the above model; cf., e.g., MUNDELL (1968, p. 154). Mundell's dynamic set-up as well as the dynamic specifications applied in this section may be criticized for being out of place in the context of a Keynesian model (being basically of the *tatonnement* type).

level. Capital flows, though focused upon by Mundell, are abstracted from, since their presence is immaterial to the argument being made here.¹

The dynamic behaviour of the fixed exchange rate system may be analyzed by assuming that the exchange rate is constant, $\dot{e} = 0$, and that the rate of interest falls when there is a surplus in the balance of payments:

$$(3.4) \quad \dot{r} = -\lambda_r B$$

(because of the effects of the balance of payments on the supply of money). This gives (using $\dot{q} = \dot{p} - \dot{e}$) the system:

$$\begin{aligned} \dot{q} &= \lambda_p \left[E(Y, r) + X(q) - \frac{1}{q} F(Y, q) - Y \right] \\ \dot{r} &= -\lambda_r [qX(q) - F(Y, q)], \end{aligned}$$

which, upon linearization, may be written:

$$\begin{bmatrix} \dot{q} \\ \dot{r} \end{bmatrix} = \begin{bmatrix} -\lambda_p \varepsilon & \lambda_p E_r \\ \lambda_r \varepsilon & 0 \end{bmatrix} \begin{bmatrix} q - q^0 \\ r - r^0 \end{bmatrix}.$$

Stability is ensured if $E_r < 0$ and $\varepsilon > 0$. This simple analysis of the dynamics of the fixed exchange rate system is consistent with the treatment of Mundell.

When analyzing the dynamic behaviour of the system of flexible exchange rates, it is assumed that

$$(3.5) \quad \dot{e} = -\lambda_e B.$$

Mundell, however, made two additional assumptions. First, he assumed that the rate of interest rises in proportion to the excess demand for domestic output. Second, he assumed that $\lambda_p = 0$ (implying $\dot{p} = 0$) because of the willingness of some governmental agency to buy and sell domestic goods at a fixed price in terms of local currency.

The former assumption seems questionable and the latter unfounded. Internally oriented interest rate policy is obviously not an integral part of a

¹ Actually, Mundell's substantial points as to the role of capital mobility for the relative merits of fixed and flexible exchange rates may be also criticized on the grounds that they are based on a misspecification of capital flows and the balance of payments. Cf. KORKMAN (1977 a).

flexible exchange rate regime per se. What is more, the assumption of complete domestic price stability under flexible exchange rates seems strange.¹

Assume, therefore, that the dynamic behaviour of flexible exchange rates is governed by equations (3.1) – (3.3) and equation (3.5), and that Mundell's additional assumptions are not made. The system may then be written

$$\dot{p} = \lambda_p \left[E(Y, r) + X(q) - \frac{1}{q} F(Y, q) - Y \right]$$

$$\dot{e} = -\lambda_e [qX(q) - F(Y, q)],$$

which, upon linearization, gives (using $(q - q^0) = (p - p^0) - (e - e^0)$):

$$\begin{bmatrix} \dot{p} \\ \dot{e} \end{bmatrix} = \begin{bmatrix} -\lambda_p \varepsilon & \lambda_p \varepsilon \\ \lambda_e \varepsilon & -\lambda_e \varepsilon \end{bmatrix} \begin{bmatrix} p - p^0 \\ e - e^0 \end{bmatrix}.$$

This system is not stable, since the value of the determinant of the coefficient matrix is zero. On the other hand, it is easily shown that the terms of trade are stable.² This implies that the balance of payments will be in a state of "neutral" equilibrium: if the balance of payments is in equilibrium initially this is a sustainable state as long as no disturbances occur, but, once the balance of payments deviates from zero, the exchange rate will appreciate or depreciate endlessly without affecting either the terms of trade or the balance of payments. This is nothing but the familiar proposition that a system of flexible exchange rates cannot be stable in a full employment economy if the monetary effects of exchange rate changes are disregarded.³

This instability of flexible exchange rates at full employment may be eliminated by assuming, e.g., that the supply of money is the monetary instrument.

¹ By this assumption, Mundell makes the distinction between fixed and flexible exchange rates equivalent to the distinction between two assignments of the terms of trade and the rate of interest. While this may seem convenient, it is actually rather unfortunate, since it obscures important distinctions between assignments of instruments (concerned with discretionary policy) and characteristics of alternative exchange rate regimes (concerned with market arrangements).

² Observe that $\dot{q} = \dot{p} - \dot{e} = \lambda_p (E + X - F/q - Y) + \lambda_e B = -\varepsilon (\lambda_p + \lambda_e) (q - q^0)$, which is stable if $\varepsilon > 0$. Thus the system will approach a state in which $\dot{q} = \lambda_p (E + X - F/q - Y) + \lambda_e B = 0$, but nothing ensures that $E + X - F/q - Y = B = 0$ or $\dot{p} = \dot{e} = 0$.

³ Cf. TSIANG (1961).

Indeed, in this case the dynamic behaviour of fixed and flexible exchange rates will turn out to be very similar,¹ thus confirming the view which Mundell set out to refute in the first place.

In sum, both Meade's and Mundell's analyses of the assignment of "price policy" and "financial policy" may be criticized. Meade did not recognize the relevance of the comparative advantage of instruments, and Mundell's analysis is based on some untenable assumptions. In addition, they both tended to interpret the assignment problem as a comparison of fixed and flexible exchange rates. The question of the appropriate assignment of exchange rate policy is therefore taken up anew in the next section.

3.4. The Assignment of Exchange Rate Policy

Assume for the moment that Mundell's principle of effective market classification is an appropriate guide to policy making. Then the question which needs to be asked is: do exchange rate changes (as compared to demand management policy) have — in relative terms — stronger effects on the balance of payments than on the internal target? If the answer is affirmative, then exchange rate policy has a comparative advantage with respect to the balance of payments and should be assigned to the target of external balance while demand management policy is directed towards the target of internal balance. If the answer is negative, exchange rate policy has a comparative advantage with respect to the internal target and the assignment of the policies should be reversed.

Irrespective of the pervasive influence of Mundell's principle, it would seem that exchange rate policy has seldom been approached in these terms in the literature.² There are probably three major reasons for this: First, Mundell's later application of the principle of effective market classification to the fiscal-monetary mix aroused such great interest and controversy that the original application came to be neglected. Second, the institutional arrangements under the Bretton-Woods era precluded the use of exchange rate variations for anything but balance of payments purposes. Third, there seems to be a widely held presumption that it is more or less "self-evident" that exchange rate policy has a comparative advantage over demand management

¹ Cf. KORKMAN (1977 a).

² An exception is the "New Cambridge View". See SPRAOS (1977).

with respect to the balance of payments, thus rendering this assignment problem trivial.¹

As will be shown in this section, the general validity of this presumption is questionable at least within the simple model used above. In fact, it turns out that the opposite of the conventional presumption will hold provided that the economy is sufficiently "open", the exact condition for exchange rate policy to have a comparative advantage with respect to the internal target in the simple case under consideration being that the marginal propensity to import is greater than the marginal propensity to save (not to absorb). An application of Mundell's principle of effective market classification would then dictate that exchange rate policy be used for domestic stabilization purposes, leaving equilibrium in the balance of payments to be handled by fiscal and/or monetary policy.

Assume then that there are two targets, internal balance (absence of inflationary pressure at full employment) and external balance (zero balance of payments), and two instruments, financial policy, taking the form of interest rate variations, and the exchange rate. The assignment problem then becomes the question of how the rate of interest and the exchange rate should be allocated to the targets. In order to ensure that the principle of effective market classification is a useful guide to policy, dynamics of price and output behaviour are abstracted from (thus the only dynamic element relates to the behaviour of the instruments). Instead, it is assumed that the first equation below determines either the domestic price level with output fixed (full employment) or the level of output with the domestic price level fixed (unemployment), while the second equation gives the balance of payments:

$$Y = E(Y,r) + X(q) - \frac{1}{q} F(Y,q),$$

$$B = qX(q) - F(Y, q).$$

Under this set of assumptions the outcome for the case of full employment is obvious. It was seen in the previous section that the balance of payments cannot be affected by the exchange rate once monetary effects are neglected.

¹ In a textbook by COHEN (1969, pp. 106-7), for instance, it is said that: "In general, financial policies tend to have a relatively greater impact domestically, since ex hypothesi they operate directly on the level of expenditures and only indirectly on the balance of payments. Conversely, switching policies tend to have a relatively greater impact externally, since their most direct effect is on the volume and direction of international transactions. Thus governments are well advised to pair the former with the objective of internal balance and the latter with the objectives of external balance."

Hence, assignment of the exchange rate to the external target is out of the question while, on the other hand, exchange rate policy will, under the same assumptions be a powerful tool for affecting the price level. This is but a restatement in assignment terms of one of the basic insights of the absorption approach to devaluation analysis.

Under unemployment assumptions, on the other hand, exchange rate policy will have a comparative advantage with respect to the level of output if

$$\left| \frac{\delta Y / \delta e}{\delta B / \delta e} \right| > \left| \frac{\delta Y / \delta r}{\delta B / \delta r} \right|,$$

which, in this simple model, reduces to the condition

$$(3.6) \quad m > s,$$

according to which the marginal propensity to spend on foreign goods should be greater than the marginal propensity not to spend.

Apparently, the above condition for “reversed pairing” might well be fulfilled. It is also interesting to observe that it pays due respect to considerations frequently stressed in much of the policy-oriented literature concerning exchange devaluation and international reserve holding. First, demand policies to secure external balance are more preferable the greater the marginal propensity to import (because of the reduction in the size of the income variation required to offset a given imbalance in the balance of payments) — a central contention of the optimizing approach to the demand for international reserves.¹ Second, irrespective of the expansionary effect of a devaluation, exchange rate policy is no good for balance of payments purposes unless the marginal propensity to save (hoard) is significantly above zero — another basic conclusion of the absorption approach.

In sum, an application of Mundell’s principle might well call for a “reversed” pairing of exchange rate policy to the internal and demand management to the external target. Thus the exchange rate should be revalued in booms and devalued in slumps irrespective of the state of the balance of payments (if the reversed pairing condition holds). This conclusion seems a bit startling; it

¹ See, for instance, CLARK (1970), KELLY (1970) or CLAASSEN (1974). The importance of the “openness” of the economy has also been stressed by MCKINNON (1963), though he uses a high degree of openness as a case for fixed exchange rates, i.e., for not using exchange rate changes for balance of payments purposes. Cf. also KORKMAN (1975).

amounts to the suggestion that small economies pursue systematic "beggar thy neighbour" policies. It is clearly desirable to investigate its robustness with respect to some qualifications.

Given Mundell's principle, there is undoubtedly some force in the argument. Thus exchange rate policy necessarily has strong effects on the price level in a highly open economy. The point that demand management policies are likely to have more reliable effects on the balance of payments as compared to exchange rate variations is also well recognized in the literature. It is clearly conceivable, then, that the reversed pairing condition holds, i.e., that exchange rate policy has a comparative advantage with respect to the internal target.

Two objections may be raised, however. First, income distribution effects might be introduced to complicate the question of the (short-run) comparative advantage of instruments. Second, before drawing far-reaching policy conclusions, it is also necessary to consider the robustness of the principle of effective market classification itself. In particular, and contrary to contentions sometimes made,¹ it will be shown in the following section that Mundell's assignment principle is sensitive to assumptions about time lags in the effects of instruments on targets. This will be demonstrated by distinguishing explicitly between short and long-run effects of policy actions.

3.5. The Assignment Principle: An Extension

While many modifications of the framework of the assignment principle might be investigated, the question of time lags in policy effects would seem to be particularly important. This follows from the fact that there are often good reasons to believe that short and long-run effects of policy are very different — sometimes even of opposite sign (cf. the discussion in chapter 4 below).

To make the analysis manageable, assume that the two instrument variables, x_1 and x_2 , have direct effects on the two target variables, y_1 and y_2 , as well as indirect effects via an intervening variable z :

$$(3.7) \quad y_1 = y_1(x_1, x_2, z), \quad y_{11} > 0; \quad y_{12}, y_{1z} \geq 0$$

$$(3.8) \quad y_2 = y_2(x_1, x_2, z), \quad y_{22} > 0; \quad y_{21}, y_{2z} \geq 0.$$

¹ Cf. FORTIN (1974, p. 572).

The variable z is taken to have a long-run value which depends on x_1, x_2 and which it approaches over time:

$$(3.9) \quad \dot{z} = \lambda_z \left[z(x_1, x_2) - z \right], \quad \lambda_z > 0; \quad \frac{\partial z}{\partial x_1}, \frac{\partial z}{\partial x_2} > 0.$$

Observe that the targets in both the short run (z given) and the long run (z fully adjusted) may be thought of as being determined only by the two instruments; the introduction of the intervening variable z is a simple device for creating a difference between the short and long-run effects of changes in instruments.¹

Assume that x_i has a comparative advantage with respect to y_i , i.e., that

$$|y_{11}/y_{21}| > |y_{12}/y_{22}| \quad \text{implying} \quad y_{11}y_{22} \pm y_{12}y_{21} > 0,$$

and that instruments are paired to targets according to the principle of effective market classification (calculated on the basis of the immediate effects of policy):

$$(3.10) \quad \dot{x}_i = -\lambda_i (y_i - y_i^0) \quad \lambda_i > 0; \quad i = 1, 2.$$

Observe that we now have to distinguish between the direct or impact effects of x_j on y_i , which is given by y_{ij} , and the indirect effect via z . When comparing two equilibrium positions (two constellations of x_1, x_2 under the assumption that z has been given time to adjust accordingly), the indirect effects is equal to $y_{iz}(\partial z/\partial x_j)$. The long-run or "total" effect of x_j on y_i may thus be written as

$$y_{ij}^L = y_{ij} + y_{iz} \frac{\partial z}{\partial x_j}$$

It will be convenient to express the relevant stability conditions in terms of the short and long-run effects of policy instruments (y_{ij} and y_{ij}^L respectively).

¹ There are, however, now three variables that the decision maker should care about: the two target variables and the variable z , which will affect the behaviour of the targets over time even though not instantaneously. Therefore, it might be argued that we now, in fact, have three targets but only two instruments, and that the analysis of this section is therefore not concerned with the question posed by Mundell. The reply to this objection is that z is not a target variable; it is an endogenous variable that affects the target variables and that cannot be eliminated from the system (like the "irrelevant" endogenous variables), but is part of the reduced form since it is predetermined in the short run. There are still only two instruments and two targets in the system and the variable z is only dynamically relevant, i.e., it is relevant to the assignment problem but not directly to the static problem. Thus the set-up of this section differs from Mundell's analysis only because short and long-run effects of policy are allowed to differ.

Linearizing equations (3.7) – (3.10) about equilibrium and substituting, the system may be written as

$$(3.11) \quad \begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{z} \end{bmatrix} = \begin{bmatrix} -\lambda_1 y_{11} & -\lambda_1 y_{12} & -\lambda_1 y_{1z} \\ -\lambda_2 y_{21} & -\lambda_2 y_{22} & -\lambda_2 y_{2z} \\ \lambda_z \frac{\partial z}{\partial x_1} & \lambda_z \frac{\partial z}{\partial x_2} & -\lambda_z \end{bmatrix} \begin{bmatrix} x_1 - x_1^o \\ x_2 - x_2^o \\ z - z^o \end{bmatrix}$$

Employing the definition of y_{ij}^L given above, the characteristic equation of the coefficient matrix of (3.11) may (upon some manipulation) be written as

$$h^3 + (\lambda_1 y_{11} + \lambda_2 y_{22} + \lambda_z) h^2 + [\lambda_z (\lambda_1 y_{11}^L + \lambda_2 y_{22}^L) + \lambda_1 \lambda_2 (y_{11} y_{22} - y_{12} y_{21})] h + \lambda_1 \lambda_2 \lambda_z (y_{11}^L y_{22}^L - y_{12}^L y_{21}^L) = 0.$$

A necessary condition for stability is that all coefficients of the characteristic equation be positive. Necessary and sufficient conditions are that $\alpha_2 > 0$, $\alpha_4 > 0$ and $\alpha_2 \alpha_4 - \alpha_3 > 0$, where α_i is the coefficient of the i th term.

Observe first that pairing of instruments to targets according to short-run comparative advantage is neither necessary nor sufficient for stability. (From the coefficient of h , it is seen that it would be helpful, though, by ensuring that $y_{11} y_{22} - y_{12} y_{21}$ is positive.) Second, from the (necessary) stability condition

$$\lambda_1 \lambda_2 \lambda_z (y_{11}^L y_{22}^L - y_{12}^L y_{21}^L) > 0,$$

it is seen that allocation of instruments according to long-run comparative advantage will ensure stability (provided that the other conditions are met). If short and long-run effects have the same sign (so that $y_{ii}, y_{ii}^L > 0$), stability is then likely to be ensured by applying the long-run comparative advantage criterion (and will necessarily be so unless comparative advantage of instruments is reversed as between the short and long-run).

However, the problem is that the sign of the short and long-run effects may well be different. First, a devaluation may well affect employment positively but only after a certain lag, the initial effect being negative due to the short-run smallness of elasticities and/or strong distribution effects (cf. chapter 4). If this is so, the assignment of exchange rate policy to the internal target may be an unstable assignment, even if it were compatible with long-run comparative advantage (since the coefficient of h^2 may turn out to be negative). In other words, a devaluation aimed at expanding employment but having intended effects only after a long lag might actually aggravate problems if the short-run (and temporary) reduction of employment arising were wrongly interpreted as requiring further increases in the price of foreign exchange.

Second, it is conceivable that exchange rate changes, while having short-run effects, do not affect the balance of payments or the level of employment in the long run (once money wages have adjusted). This would necessarily imply that

$$y_{11}^L y_{22}^L - y_{12}^L y_{21}^L = 0,$$

and thus the system would not be stable. Assignment of exchange rate policy to either target would then imply never-ending de- or revaluations without the equilibrium ever being reached.

These observations illustrate the limitations of Mundell's assignment principle demonstrated in more general terms above.¹ While the comparative advantage of instruments is certainly important, it is necessary to consider the time path of the effects in some detail before policy conclusions can be safely made. Given that long lags and great differences in short and long-run effects are likely to be particularly important with respect to exchange rate policy, the merits of the beggar-thy-neighbour policy suggested above may consequently be questioned also on purely domestic grounds.

3.6. Concluding Comments

The basic argument for a flexible exchange rate has always been that it will eliminate the conflict between internal and external balance likely to prevail under fixed exchange rates.² Particularly if domestic money wages and prices

¹ There are, of course, many other examples of policy actions that may well have different effects in the short and long run. For instance, it is often argued that a contractionary monetary policy will lead to an improvement of the balance of payments in the short run but a deterioration in the long run (a rise in the interest rate induces "stock-shifting" capital inflows in the short run, which, however, give rise to interest payments to foreigners which persist in the long run). The Mundellian assignment of monetary and fiscal policy may then be unstable. Cf. LEVIN (1972), TSIANG (1975) and KORKMAN (1977 a).

² Cf. JOHNSON (1970, pp. 91-2): "The fundamental argument for flexible exchange rates is that they would allow countries autonomy with respect to their use of monetary, fiscal and other policy instruments, consistent with the maintenance of whatever degree of freedom in international transactions they chose to allow their citizens, by automatically ensuring the preservation of external equilibrium."

It should be observed that the above argument for free exchange rates presupposes that domestic demand management policy is actively and successfully used to stabilize the economy domestically, i.e., that the balance of payments is the only restriction on countercyclical policies. If, for any reason, domestic demand management policy is inactive or unsuccessful, then the implications of exchange rate flexibility for domestic stability in the face of exogenous disturbances become important. See TOWER & COURTNEY (1974), TURNOWSKY (1976), KORKMAN (1975) and section 4.5 below.

are rigid, exchange rate flexibility is argued to be necessary for the simultaneous achievement of internal and external balance.

As pointed out above, one problem with the conventional view is that it has not directly investigated the question of whether exchange rate changes should be undertaken, and, if so, how and for what purposes. Instead, it has tended to confuse the exchange rate regime question and the assignment problem, and thus to identify the exchange rate as the instrument that is to take care of external balance. Further, since the effects of exchange rate changes are ambiguous even in relatively simple models, this assignment is not necessarily viable. And even if it were viable, it need not be efficient in the sense of Mundell's principle. In particular, relative effects may well be such that exchange rate policy has a comparative advantage with respect to employment or inflation; conversely, demand management policy may have stronger effects on the balance of payments. Nevertheless, assignment of exchange rate policy to the internal target may still be destabilizing if lags are important and short and long-run effects very different.

While the comparative advantage criterion has a certain common sense appeal, the relevance of policy conclusions based on it are nevertheless very much open to question. This is so not only because of the kind of "immanent" criticism that may be raised (section 3.1.5); the whole framework may be deemed too simple to be useful.

First, from a formal perspective the fixed target approach has been criticised for implicitly being based on a very "special" utility function of the decision makers.¹ It may be argued that it would be preferable to approach the policy problems by employing, e.g., control theory in order to derive optimal policy rules, given a descriptive model of the economy as well as a more general specification of the preferences of the decision makers.² This line of criticism is not necessarily very convincing: given the limitations of prevailing knowledge, the optimization procedures may well beg more questions than they clarify or even raise.³

Second, the idea that the achievement of all targets merely requires the availability of a sufficient number of instruments may be criticized for bypassing important features of the context in which macroeconomic policy is typically pursued. In particular, the assumption that targets are independent

¹ See, e.g., FLEMING (1968).

² VIOTTI & NYBERG (1976).

³ Cf. LEIJONHUFVUD & AOKI (1976).

may often be unwarranted; a change in the distribution of income can favour one group of income receivers only at the expense of some other. It should also be observed that this problem may not be evaded by introducing a utility function to determine the "optimal point" on the trade-off locus between the conflicting targets. This procedure is conceivable and indeed "rational" when an individual is considered, but it has no meaning when the contradictory targets belong to different decision makers.¹

This problem is particularly important when exchange rate policy is discussed; any devaluation will be favourable to some income categories and unfavourable to others. The conflict thus involved is always an essential ingredient of the predicament of policy making; in an analysis which considers only internal and external balance, however, the problem may remain implicit. Instead, it may show up, e.g., in the form of an observation that exchange rate policy will not reconcile internal and external balance unless "money illusion" prevails. (Thus the strange idea arises that exchange rate policy is useful only to the extent that trade unions are "irrational" in the sense of letting themselves be "cheated" by the nominal-real distinction.²)

A final objection to the framework concerns the specification of the target of external balance: it is not clear why one should aim at external balance in the first place (in the same sense as it is natural to aim at internal balance). It is, of course, reasonable and even imperative that policy makers should attempt to stabilize employment; a high degree of unemployment is associated with considerable costs even if it is of limited durability. There are however, no similar reasons why one should aim at stabilizing the balance of payments; fluctuations in trade and payments only imply a certain need for foreign exchange reserves or variations in net lendings to the rest of the world. Therefore, one may argue that external balance is important primarily in the sense of a level of competitiveness adequate to ensure appropriate market shares and capacity growth in the long run (cf. chapters 4 and 5), and that the conventional treatment of internal and external balance as symmetrical policy targets lacks justification.

¹ Difficulties such as these have been dealt with in the general literature on economic policy; see, e.g., THEIL (1964). It remains true, however, that little if any attention has been paid to these characteristics of the policy context in the literature on internal and external balance problems.

² It is, of course, true that a devaluation will be rather pointless if it is immediately followed by an equal percentage increase in all domestic prices and costs. Rather than requiring money illusion, however, it would seem correct to say that the devaluation requires "consensus" vis-à-vis its desirability. If all parties agree that the profitability of production must be raised, the constancy of money wages in the face of a devaluation is no expression for "money illusion", but may instead be related to the fact that a devaluation at constant money wages is likely to be the most practical way of achieving the desired effect on the real wage.

4. Analysis of Exchange Rate Policy in a Simple Dynamic Model

The purpose of this chapter is to reconsider the role of the exchange rate as an instrument of macroeconomic policy in an economy in which income distribution effects are of some importance and in which there exist dynamic relationships between inflation and employment on the one hand and exports and competitiveness on the other. The chapter thus attempts a more systematic investigation of issues raised in the preceding chapters: the role of income distribution effects in devaluation analysis and the policy implications of time lags in policy effects, i.e., of differences in short and long-run effects. An additional issue to be discussed concerns the automatic consequences of macroeconomic disturbances under alternative assumptions about the norm or rule governing the conduct of exchange rate policy.

The plan of the chapter is as follows. In section 4.1 a simple “Keynesian” (demand-oriented) macroeconomic model of a small economy is formulated. The model abstracts from the significance of asset behaviour (and the capital account). Instead, it is designed so as to highlight absorption and relative price effects as well as the income distribution effects associated with changes in (real) wage and raw material costs. Dynamic relationships between exports and competitiveness and wage inflation and its determinants are then specified. The short-run comparative statics and the dynamics of the model under fixed exchange rates are investigated in sections 4.2 and 4.3 while section 4.4 goes on to discuss the macroeconomic role of exchange rate and demand management policies.

In section 4.5 the consequences for domestic stability of three alternative norms for exchange rate setting are compared. The first norm — the “currency norm” — is fixed exchange rates (stabilizing the price of foreign exchange). According to the second norm — the “inflation norm” — authorities should aim at stabilizing the domestic currency value of a price index of traded goods, or its rate of inflation. Finally, the third norm — the “competitiveness norm” — is equivalent to fixing the international price competitiveness or the “real exchange rate” of the economy (according to a rule based on purchasing-

power-parity). In each case the consequences of four types of exogenous disturbances are considered: an international price disturbance (an equi-proportionate change in the price level of all foreign goods), a change in the price of imported raw materials (a terms-of-trade shift), a change in foreign demand for domestic exports and an exogenous shift in domestic money wages. Section 4.6 summarizes the conclusions of the chapter, suggests that exchange rate policy should be used to assist in controlling the rate of inflation and draws attention to some qualifications which affect the real world applicability and relevance of the conclusions reached.

4.1. The Model

The specification of the model set out in this section has been so chosen as to bring out the importance of the income distribution and the dynamics of wage inflation and exports in as simple a way as possible. It is assumed that the economy under consideration produces only one commodity, which may be either consumed or invested domestically or exported abroad, and imports two commodities: a final good which is substitutable for the domestic commodity in consumption and investment, on the one hand, and a pure intermediate input (raw materials or energy), on the other. The *equilibrium condition for the domestic commodity* is:

$$(4.1) \quad Y = C^D + I^D + G + X,$$

where Y is gross output¹ of the domestic commodity, C^D and I^D denote domestic consumption and investment of the domestic commodity respectively, G is government expenditure (assumed to be spent entirely on the domestic commodity) and X is the volume of exports. *Private consumption of the domestic commodity* is taken to depend on household disposable income and relative prices (wealth and interest rate effects are disregarded):

$$(4.2) \quad C^D = C^D\left(Y_h, \frac{ep_F^*}{P_D}\right); \quad \frac{\delta C^D}{\delta Y_h} = C_Y^D > 0; \quad \frac{\delta C^D}{\delta \left(\frac{ep_F^*}{P_D}\right)} = C_p^D > 0,$$

where Y_h is disposable real income of households in terms of the domestic commodity, p_D is the price of the domestic commodity, p_F^* is the foreign currency price of final imports and e is the price of foreign exchange. Demand

¹ Domestic gross output Y is net of domestic raw materials but not of imported inputs.

is assumed to be homogeneous in money income and money prices and may therefore be written as a function of real income in terms of the domestic good and the price ratio between foreign and domestic final output. *Private investment demand for the domestic commodity* is analogously assumed to be a function primarily of relative prices and firms' disposable income:

$$(4.3) \quad I^D = I^D\left(Y_f, \frac{eP_F^*}{P_D}, r\right); \quad \frac{\delta I^D}{\delta Y_f} = I_Y^D > 0;$$

$$\frac{\delta I^D}{\delta \left(\frac{eP_F^*}{P_D}\right)} = I_P^D > 0; \quad I_r^D < 0,$$

where Y_f is retained after tax profits in terms of the domestic good and r is the domestic rate of interest or some other indicator of domestic credit market conditions.¹ These conditions are treated as exogenous in this chapter, implying that the monetary consequences of current account imbalances are taken to be neutralized.² Equation (4.3) is most easily interpreted as being based on a "liquidity" theory of investment. Since the stock of real capital in existence is treated as a given constant, however, it could alternatively be based on a relationship between the volume of investment and the (expected) rate of profit on capital. The equation could easily be modified so as to also include an accelerator relationship.

Household disposable income in terms of the domestic good is equal to the real wage times employment plus distributed profits less taxes:

$$(4.4) \quad Y_h = \frac{w}{P_D} L + \Pi - T_h,$$

where w is the money wage, L is employment, Π is distributed profits and T_h is household taxes. All taxes are for simplicity treated as autonomous.³

¹ The rate of interest is generally not an appropriate indicator of the cost of borrowed funds if credit markets are imperfect. Then at least some customers are likely to find themselves subject to binding constraints in the form of credit rationing phenomena, implying that credit amounts rather than interest rates enter as arguments in, e.g., their investment functions. An explicit treatment of credit market imperfections is, however, beyond the scope of this study.

² In Finland banks have typically been heavily indebted to the Bank of Finland. Abstracting from information and decision lags, the inflow or outflow of base money associated with an external imbalance may in such circumstances be counteracted simply by changing the basic quotas and other determinants of the central bank debt of banks (and/or by measures affecting the regulated inflow of foreign capital).

³ Given the assumption (made above) that all government expenditure is spent on the domestic good, it seems natural to assume that the tax amounts are also given in terms of the domestic good.

Distributed profits (in terms of the domestic good) are also treated as given during the time horizon considered (a fixed dividend per share times the given stock). *Profits retained after taxation* in terms of the domestic good are then residually determined as the difference between output, on the one hand, and the sum of the wage bill, raw material costs, distributed profits and firms' taxes, on the other:

$$(4.5) \quad Y_f = Y - \frac{w}{P_D} L - \Pi - \left(\frac{e p_R^*}{P_D} \right) R - T_f,$$

where p_R^* is the foreign currency price of imported inputs, R is the quantity of raw material imports and T_f is firms' taxes. Equations (4.6) and (4.7) specify *employment and raw material imports* as being simply proportional to gross domestic output:

$$(4.6) \quad L = \alpha Y,$$

$$(4.7) \quad R = \beta Y,$$

with α and β as the (constant) factors of proportionality. More complicated input demand functions could be introduced; the assumed lack of factor substitutability serves to maximize the harmful effects of an increase in the price of imported raw materials and ensures that changes in real wages affect the distribution of income.

The *price setting* behaviour of firms is often described in terms of a mark up — possibly a variable depending on the level of demand — on domestic wage and raw material costs. For simplicity price setting is in this context assumed to be independent of the demand for domestic output; the state of the market thus affects inflation at most indirectly through the behaviour of money wages. Given that competition is imperfect (prices are assumed to be set by firms), it also seems reasonable to assume that domestic prices may be directly affected by the development of prices of competing exports.¹

The price setting equation assumed thus relates the price of the domestic commodity to labour and raw material costs (per unit of output) and the prices of competing exports:

¹ Price setting behaviour of exporters is known to be influenced by the prices set by competitors (possibly "price leaders"). If firms demand the same price to be paid by domestic and foreign customers, it follows that the domestic output price level is directly affected by price behaviour of competing exports even when the commodities are not imported into the country under consideration. The described link is, of course, of some importance primarily for small economies with exports heavily dependent on a few goods.

$$(4.8) \quad p_D = \Phi(w, ep_R^*, ep_X^*); \quad \Phi_w > 0, \quad \frac{\delta \Phi}{\delta ep_R^*} = \Phi_R > 0,$$

$$\frac{\delta \Phi}{\delta ep_X^*} = \Phi_X > 0,$$

where p_X^* is the foreign currency price of competing exports. Imposing the requirement that Φ is homogeneous implies:

$$p_D = w\Phi_w + ep_R^*\Phi_R + ep_X^*\Phi_X.$$

Treating the volume of exports and the level of money wages as momentarily given, equations (4.1) – (4.8) above may be used to determine endogenously the eight variables $Y, Y_h, Y_f, C^D, I^D, L, R$ and p_D . Abstracting from the capital account, *the balance of payments* (in foreign currency) may then be determined by adding the equations:

$$(4.9) \quad B = \frac{p_D}{e}X - p_R^*R - p_F^*(C^M + I^M),$$

$$(4.10) \quad C^M = C^M(Y_h, \frac{ep_F^*}{p_D}); \quad \frac{\delta C^M}{\delta Y_h} = C_Y^M > 0, \quad \frac{\delta C^M}{\delta \left(\frac{ep_F^*}{p_D}\right)} = C_P^M < 0,$$

$$(4.11) \quad I^M = I^M(Y_f, \frac{ep_F^*}{p_D}, r); \quad \frac{\delta I^M}{\delta Y_f} = I_Y^M > 0, \quad \frac{\delta I^M}{\delta \left(\frac{ep_F^*}{p_D}\right)} = I_P^M < 0,$$

$$I_r^M < 0,$$

where B is the balance of payments (on current account) in foreign currency and where the other two endogenous variables, C^M and I^M denote the demand for consumption and investment imports respectively.

The level of *exports* may be treated as momentarily given if it is assumed that there is a time lag in the reaction of export volumes to price changes. Such a reaction lag is indeed concluded to exist (and to be fairly long) in many empirical studies of export behaviour.¹ This does not, of course, mean that the level of exports always develops steadily and adjusts gradually to changes in its determinants. On the contrary, shifts in foreign demand and consequent export fluctuations probably constitute the single most important source of cyclical disturbances for many small economies. An export function

¹ See, e.g., DORNBUSCH & KRUGMAN (1976) or JUNZ & RHOMBERG (1973).

which admits of both of these facts may most simply be derived by defining exports as the product of the country's market share x and the size of the market M^* :

$$X = xM^*,$$

and by assuming that the market share adjusts gradually to its long-run value which is a function of relative export prices:

$$\dot{x} = \lambda_x \left[x^\circ (ep_x^*/P_D) - x \right],$$

where $\dot{x} = dx/dt$ denotes the time derivative of x . Abstracting from continuous growth of the market, the adjustment equation for the volume of exports may then be written as:

$$(4.12) \quad \dot{X} = \lambda_x \left[X^\circ (ep_x^*/P_D, M^*) - X \right]; \quad \frac{\delta X^\circ}{\delta \left(\frac{ep_x^*}{P_D} \right)} = X_p^\circ > 0,$$

where $\dot{X} = dX/dt$ is the time derivative of exports. The short and long-run effects on exports of a decrease in the foreign currency price of domestic goods are now zero and X_p° respectively, implying that the price elasticity of exports may be high in the long run without being so in the short run (if exports adjust slowly to price changes, i.e., if λ_x is "small").

Modelling of *money wage behaviour* is complicated by the variety of influences — labour market pressure, the development of the cost of living, firm's profits, institutional practices, etc. — that wage determination is known to be subject to. One very popular formulation is the expectations augmented Phillips-curve, which (assuming productivity to be constant) may be written as:

$$(4.13) \quad \hat{w} = \eta(L) + Z, \quad \eta_L > 0,$$

where $\hat{w} = \frac{dw/dt}{w}$ is the rate of change of money wages, $\eta(L)$ indicates the relation between wage inflation and employment (or, given labour supply, unemployment) and where Z is the expected rate of change of some relevant price index. With respect to inflation expectations, the most common assumption is that they are determined adaptively:

$$(4.14) \quad \dot{Z} = \lambda_z (\hat{p} - Z),$$

where λ_z indicates the speed of adjustment of expectations and where p

is an index of prices of consumption goods. The above formulation admits of the simple Phillips-curve with static expectations ($\lambda_z = 0$) as well as of "perfect foresight" ($\lambda_z \rightarrow \infty$ or $Z = \hat{p}$) as special cases.

Most of the following analysis is, however, built on the somewhat simpler specification according to which expected inflation equals the longer-run rate of inflation (as distinguished from instantaneous shifts of absolute and relative prices) of domestic currency prices of foreign goods. The long-run rate of foreign inflation is treated as exogenous and constant. The assumption ensures that price expectations will be realized in the long run though they may be mistaken in the short run. (The equation will of course have to be modified if the exchange rate continuously and persistently depreciates or appreciates.)

An alternative specification occasionally considered is to assume that money wages rise at a rate equal to the expected rate of inflation and, in addition, adjust gradually so as to close any gap between a given target real wage and the actual real wage:

$$(4.18) \quad \hat{w} = \lambda_w \left[\left(\frac{w}{p} \right)^{\circ} - \frac{w}{p} \right] + Z.$$

This formulation may be taken to reflect an assumption about wage indexation or it may be interpreted as stating that labour demands compensation whenever money wages fall behind the rate of increase of prices and productivity ("real wage resistance"). Given the fixed labour input requirement, the assumption implies that labour strives for a target share in gross output equal to α (w/p).

The behaviour of the model under fixed exchange rates is analyzed in the following two sections. In section 4.2 the characteristics of the short-run equilibrium for a given level of exports (or, rather, for a given market share) and money wages are investigated, while section 4.3 turns to the time path of the short-run equilibrium as determined by the dynamics of wage inflation and exports. For purely notational reasons, it is assumed that units of measurement are so chosen that $p_R^* = p_F^* = p_X^* = e = w = p_D = 1$ initially. It will also be convenient to introduce the following symbols for some recurrently appearing expressions:

$$\delta_D = (C_Y^D - I_Y^D)L,$$

which gives the (direct) effect of an increase in wages on the demand for domestic output;

$$\delta_M = (C_Y^M - I_Y^M)L,$$

which gives the corresponding effect on imports of final goods (or — given the normalization of prices — on the balance of payments in foreign currency);

$$\varepsilon_D = C_P^D + I_P^D - I_Y^D R,$$

which gives the (direct) effect of an increase in the price of foreign exchange on the demand for domestic output; and

$$\varepsilon_M = -X - C_P^M - I_P^M + I_Y^M R,$$

which gives the corresponding effect on the balance of payments.¹

4.2. Short-run Comparative Statics

Most of the interest in this section is focused upon the short-run substitution and income distribution effects of changes in relative prices. The analysis of the effects of, e.g., demand management policies is conventional and also based on some highly simplifying assumptions. We start by analyzing the effect of a devaluation on the level of domestic (gross) output (and thereby on employment). The effect is given by

$$(4.19) \quad \frac{\delta Y}{\delta e} = \left[\Phi_w \varepsilon_D - (1 - \Phi_w) \delta_D \right] \frac{1}{\Delta} \geq 0,$$

where $\Delta = 1 - C_Y^D \alpha - I_Y^D (1 - \alpha - \beta)$.

The multiplier $(1/\Delta)$ depends in the usual way on the various “injections” and “withdrawals”: it is diminished by a high marginal propensity to import raw materials (β), and it is greater to the extent that an increase in output (which increases household income by α ($= w\alpha$) and firms’ retained profits by $1 - \alpha - \beta$) leads to an increase in the demand for domestic output via the incomes of households (C_Y^D) or firms (I_Y^D). In the following it is assumed that $\Delta > 0$.

The effect of a devaluation on output and employment is seen to be ambiguous. A positive effect is likely if substitution effects in consumption and investment are strong, if the use of imported raw materials is unimportant, and if the effect on the demand for domestic output of a decrease in household income is more than offset by the effect of an equal increase in firms’ profits. Such

¹ The model has been solved by inserting (4.2) and (4.3) into (4.1), (4.6) into (4.4), (4.6) and (4.7) into (4.5) and (4.7), (4.10) and (4.11) into (4.9) to get 5 equations in Y , Y_h , Y_f , p_D and B . By differentiation and repeated substitution one may then derive the solutions for dY and dB which yield the comparative static results discussed in the next section.

conditions are, however, unlikely to prevail: raw materials loom large in the imports of any small economy and a shift in real incomes from households to firms may well lead to a net decrease in the demand for domestic output. This outcome is more probable the greater the marginal propensity to consume as compared to the effect of profits on investment, and the greater the propensity to import out of investment as compared to consumption expenditures.

Given the fact that investment expenditure in small economies is typically much more import-oriented than consumption expenditure, a devaluation may thus be deflationary.¹ The probability of this outcome is enhanced if short-run elasticities are low and if the devaluation is undertaken in a situation of considerable excess capacity, in which case it may be argued that an increase in profits is unlikely to have a strong effect on investment.

The corresponding effect of a devaluation on the current account may be written as

$$(4.20) \quad \frac{\delta B}{\delta e} = \Phi_w \varepsilon_M + (1 - \Phi_w) \delta_M - m \frac{\delta Y}{\delta e} \underset{<}{\geq} 0,$$

where $m = C_Y^M \alpha + I_Y^M (1 - \alpha - \beta) + \beta$, which is the economy's average (marginal) propensity to import and where $\delta Y/\delta e$ is given by (4.19). The balance of payments effect may be thought of as consisting of a direct effect (the first two terms) and an indirect effect associated with the repercussions on the level of domestic output (the third term). Both effects are ambiguous. In particular, the direct effect may be negative if substitution effects are weak (causing ε_M to be negative) and/or if investment is more strongly import-oriented than consumption (causing δ_M to be negative). A devaluation may thus fail to improve the balance of payments.

Consider next an increase in government expenditure. It is expansionary with respect to domestic output and employment while the effect on the balance of trade is negative:²

¹ Cf. DIAZ (1963), COOPER (1971), KRUGMAN & TAYLOR (1978) and popular discussions of the so-called J-curve effect.

² It should be observed, though, that these expressions implicitly assume that any deficit in the government's budget arising as a consequence of the increase in expenditure is financed in such a way as to leave domestic credit market conditions unchanged (i.e., an "appropriate" fraction of the deficit is financed by borrowing from the central bank or from the rest of the world as compared to the fraction borrowed from domestic households or banks). Otherwise monetary repercussions would have to be considered.

$$(4.21) \quad \frac{\delta Y}{\delta G} = \frac{1}{\Delta} > 0,$$

$$(4.22) \quad \frac{\delta B}{\delta G} = -m \frac{1}{\Delta} < 0.$$

The corresponding effects of an increase in the rate of interest are given by:

$$(4.23) \quad \frac{\delta Y}{\delta r} = \frac{I_r^D}{\Delta} < 0,$$

$$(4.24) \quad \frac{\delta B}{\delta r} = -I_r^M - m \frac{\delta Y}{\delta r} \geq 0.$$

The output effect is negative while the effect on net exports is ambiguous (but likely to be positive).

Let us turn now to the short-run effects of some conceivably important macroeconomic disturbances. It will be sufficient for our purposes to consider the effects on the level of domestic output and employment. Take first the case of an increase in foreign demand. The effect on domestic output is clearly positive and is given by:

$$(4.25) \quad \frac{\delta Y}{\delta M^*} = \frac{X_{M^*}^o}{\Delta} = \frac{x}{\Delta} > 0.$$

(The effect on the current account of an autonomous increase in exports may nevertheless be negative, i.e., domestic absorption may increase more than net output.) Take next the case of an equal relative increase in the prices of all foreign goods. Such a price increase has precisely the same effects as an (equi-proportionate) increase in the price of foreign exchange:

$$(4.26) \quad \frac{\delta Y}{\delta P_{FRX}^*} = \left[\Phi_w \varepsilon_D - (1 - \Phi_w) \delta_D \right] \frac{1}{\Delta} \geq 0,$$

where $\delta Y / \delta P_{FRX}^*$ denotes $\delta Y / \delta p_F^* + \delta Y / \delta p_R^* + \delta Y / \delta p_X^*$. Thus an increase in the foreign price level has ambiguous effects on output and employment (and on the balance of trade). The effect of an increase in the price of imported intermediate inputs only is less ambiguous:

$$(4.27) \quad \frac{\delta Y}{\delta p_R^*} = - \left[I_{YR}^D + \Phi_R (\varepsilon_D + \delta_D) \right] \frac{1}{\Delta} < 0,$$

As may be shown,¹ the effect is necessarily negative: to the extent that the price of the domestic good is not raised in response to the increase in costs, a deflationary decrease in profits will occur, while if price rises passing on the cost increase are undertaken, household real incomes will fall. The increase in the domestic price level will also cause unfavourable substitution effects in final demand. A deterioration in the terms of trade due to an increase in the prices of imported raw materials is thus unambiguously deflationary. (This contrasts with a deterioration in the terms of trade due to an increase in the price of final imports which, under the assumptions made, is expansionary.) The final effect to be considered is an increase in the level of domestic money wages. The output effect is given by:

$$(4.28) \quad \frac{\delta Y}{\delta w} = - [\Phi_w \epsilon_D - (1 - \Phi_w) \delta_D] \frac{1}{\Delta} \geq 0.$$

As is seen, the effect is exactly opposite to the effects of an equal (relative) increase in the price of foreign exchange. Thus the short-run employment effects of an increase in money (and real) wages are ambiguous; an increase in wages may improve employment if import elasticities are small and if the import content of consumption is much smaller than the import content of investment. It should be emphasized, though, that the equivalence of the effect of a depreciation (or foreign inflation) and a reduction in money wages is due to the neglect of real cash effects and, more generally, of the effects of changes in the price level as compared to changes in relative prices.

For the purposes of the dynamic analysis, it will be convenient to summarize the analysis of this section in terms of two reduced form equations for the level of employment and the balance of payments respectively. Due to the fact that the prices of foreign goods and the price of foreign exchange enter the model only multiplicatively, the reduced form equations may be written with these variables appearing jointly (as the prices of foreign goods in domestic currency):

$$L = L(X, G, r; w, ep_F^*, ep_R^*, ep_X^*)$$

$$B = B(X, G, r; w, ep_F^*, ep_R^*, ep_X^*).$$

¹ The condition may be written as

$$I_Y^D R + \Phi_R (\epsilon_D + \delta_D) = I_Y^D (R - \Phi_R R - \Phi_R L) + \Phi_R (C_p^D + I_p^D) + \Phi_R C_Y^D L > 0.$$

The second and third terms are positive by assumption and the first term is non-negative since

$$(1 - \Phi_R) R - \Phi_R L = Y [(1 - \Phi_R)\beta - \Phi_R \alpha] = Y [\Phi_X \beta + \Phi_w \beta - \Phi_R \alpha] \geq 0.$$

(Assuming the same mark-up is applied on labour and raw material costs, now implies $\Phi_w/\Phi_R = \alpha/\beta$, yielding $\Phi_w \beta - \Phi_R \alpha = 0$.)

As was demonstrated above, the model and its reduced form equations are homogeneous in money wages and the domestic currency prices of foreign goods. Thus the price and wage variables may be divided by the price eP_F^* and the equations may be rewritten (the same symbols are retained) as:

$$(4.29) \quad L = L(X, G, r; \omega, \frac{P_R^*}{P_F^*}, \frac{P_X^*}{P_F^*}),$$

+ + - ? -

$$(4.30) \quad B = B(X, G, r; \omega, \frac{P_R^*}{P_F^*}, \frac{P_X^*}{P_F^*}),$$

- + ?

where $\omega = w/eP_F^*$, i.e., the money wage, the price of foreign exchange and the price level of final imports may be merged into a single variable representing the real wage in terms of foreign goods. The partial derivatives of the L-function are related to the partial derivatives investigated in this section by the relationship $\delta L/\delta X = \alpha(\delta Y/\delta X)$, etc. The assumptions to be made in the following about the signs of the partial derivatives of the L and B-functions are (for reasons discussed above) as indicated below the equations (4.29) and (4.30).

4.3. Dynamics

Most of the relationships of the model could probably be made more realistic by specifying them as being in one way or another dynamic.¹ To make the analysis manageable; however, we shall focus mostly on the dynamics of wage inflation and exports.

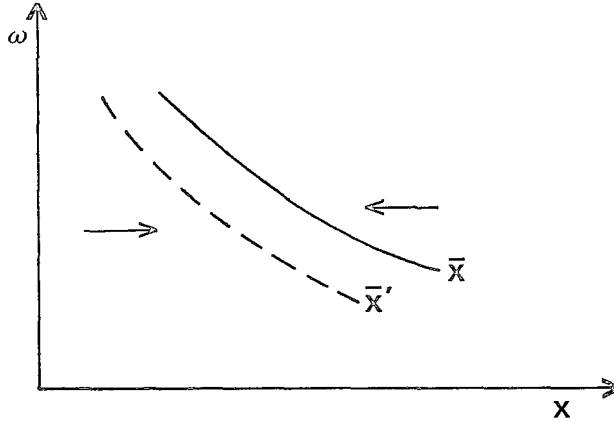
Recall first equation (4.12) describing the behaviour of exports:

$$(4.12) \quad \dot{X} = \lambda_x [X^\circ (eP_X^*/P_D, M^*) - X].$$

Setting $\dot{X} = 0$ and differentiating, the slope of the \bar{X} -curve representing the locus of points (in the ω, X -space) for which exports are constant is found to be given by:

¹ It should also be observed that explicit consideration of stocks would introduce some "intrinsic dynamics": investment affects the stock of capital, the associated flow of finance affects stocks of debt, saving changes wealth, government budget deficits and the current account change some asset or debt positions of the private sector, etc. The complications arising from these dynamic relationships have received much interest in the more recent literature. See, e.g., TURNOWSKY (1977).

Fig. 4.1



$$(4.31) \quad \left(\frac{\partial \omega}{\partial X} \right)_{\bar{X}} = - \frac{1}{X_p^o \phi_w} < 0.$$

The \bar{X} -curve simply shows that the equilibrium level of exports is a decreasing function of the real wage in terms of foreign goods; if, for a given level of exports, the real wage is below the \bar{X} -line, exports are increasing (due to good "competitiveness"); in the opposite case exports are decreasing. The slope of the curve directly reflects the long-run elasticity of exports, being flatter the greater the equilibrium sensitivity of exports to changes in price competitiveness. As is easily shown, the \bar{X} -curve is shifted upwards to the right by an increase in foreign demand (M^*) or in prices of competing exports (p_X^*) and downwards to the left by an increase in the price of imported raw materials (p_R^*).

Let us turn now to the behaviour of money wages as described by equation (4.16):

$$(4.16) \quad \hat{w} = \eta(L) + Z.$$

Assuming the price of foreign exchange to be given and the ruling rate of foreign inflation to be equal to the expected rate of inflation ($\hat{p}_F^* = Z$), we may then write the following adjustment equation for the real wage (in terms of final imports):

$$(4.32) \quad \hat{\omega} = \left(\frac{\hat{w}}{\epsilon p_F^*} \right) = \eta(L(X, G, r; \omega, \frac{p_R^*}{p_F^*}, \frac{p_X^*}{p_F^*})).$$

The slope of the locus of points such that the real wage ω (and employment) is constant is given by:

$$(4.33) \quad \left(\frac{\delta \omega}{\delta X}\right)_{\bar{\omega}} = - \frac{\delta Y / \delta X}{\delta Y / \delta \omega} \gtrless 0.$$

The ambiguity of the slope of the $\bar{\omega}$ -curve follows from the ambiguity of the short-run employment effect of an increase in money (and real) wages. Fig. 4.2 is based on the conventional assumption that an improvement of competitiveness and a reduction in the real wage leads to an increase in employment. The increase in employment is due to the "switching" of domestic demand from imports to domestic production and/or to a profit-induced increase in investment which is greater than the reduction in consumption caused by the fall in the real wage. Since exports affect employment positively, employment is unchanged only if an increase in exports is associated with a higher real wage; thus the $\bar{\omega}$ -curve is upward sloping and employment increases when moving downwards or to the right in fig. 4.2.

Fig. 4.3 depicts the alternative case in which an improvement in price competitiveness (a fall in the real wage) affects short-run employment negatively. As was mentioned above, this outcome is likely if import elasticities are low and if consumption is domestically oriented while investment goods are largely imported (or if a rise in profits mainly increases financial saving). Now employment is constant only if an increase in exports is associated with a fall in the real wage; thus the $\bar{\omega}$ -curve is downward sloping and employment increases when moving upwards or to the right in fig. 4.3. As has been indicated by the broken-line curves, it may well be that an increase in real wages is expansionary only at a relatively low level and that the "normal" outcome will hold for a real wage above a certain level (sooner or later

Fig. 4.2

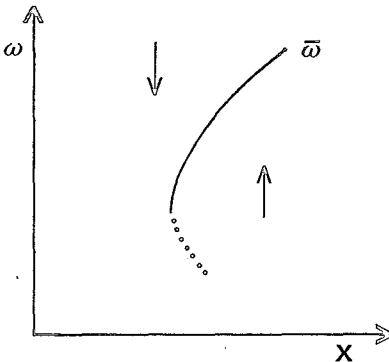
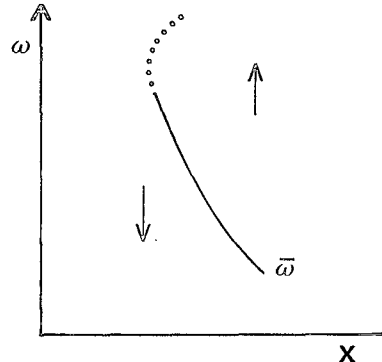


Fig. 4.3



substitution effects become very strong, etc.). It may also be shown that the $\bar{\omega}$ -curve will shift to the left in response to an increase in government expenditure or a decrease in raw material prices.

Combining the \bar{X} - and $\bar{\omega}$ -curves we now have three cases to consider. First, assume that an increase in wages is contractionary so that the slope of the $\bar{\omega}$ -curve is positive. Then the behaviour of the system may be analyzed with the help of the diagram in fig. 4.4.

Assume that we start from the long-run equilibrium at point F and that the real wage is then lowered (through a devaluation, rise in the foreign price level or a reduction of domestic money wages) shifting the economy downwards in fig. 4.4 to its new short-run equilibrium at point A. Due to the fall in the real wage, output and employment are now above (long-run) equilibrium and because of the improved competitiveness exports are increasing. Domestic inflation exceeds foreign inflation, however, thus gradually eroding the gain in competitiveness. In zone II exports start falling but the level of employment remains relatively high and real wages continue to increase until the economy gets into zone III, in which exports and real wages are both falling. These cyclical movements will continue until the system has converged to equilibrium or been subjected to a new disturbance.

Second, assume that an increase in wages is expansionary, but that real wages affect exports relatively more strongly than employment so that the

Fig. 4.4

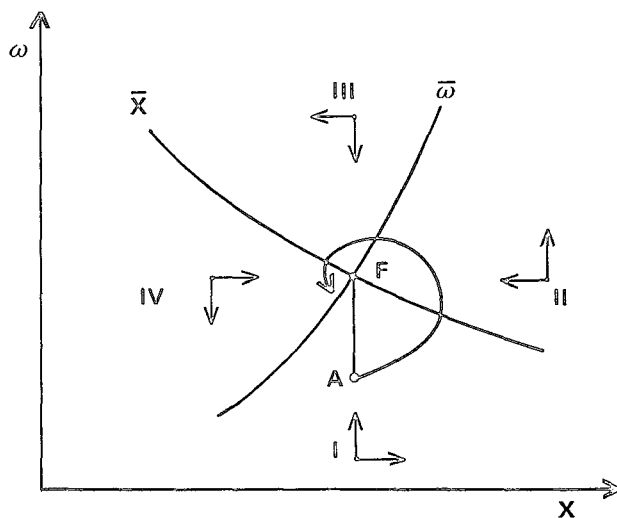


Fig. 4.5

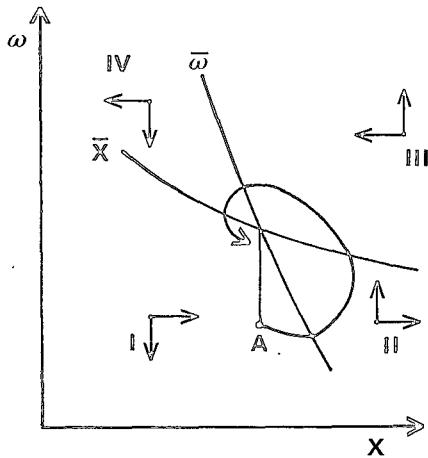
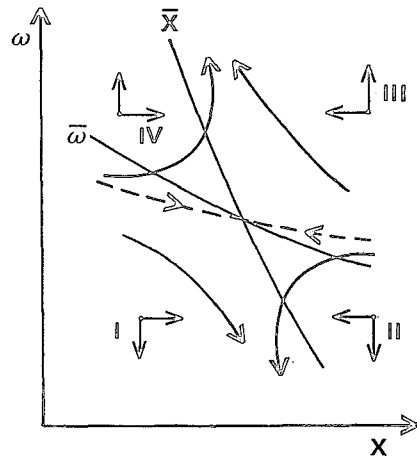


Fig. 4.6



slope of the $\bar{\omega}$ -curve exceeds the slope of the \bar{X} -curve. In this case the behaviour of the system may be described with the aid of fig. 4.5. Starting again from the short-run equilibrium at point A, it is now found that output and employment are below (long-run) equilibrium. Real wages are falling and exports increasing until the economy enters zone II, in which exports and employment are high enough for the real wage to start rising. In this way the economy again returns to its long-run equilibrium (if stable). Thus the behaviour of the economy will be characterized by relatively long phases of falling real wages and increasing exports and vice versa, being interrupted only for shorter time periods by phases in which exports and real wages increase or fall together.

Third, assume that an increase in real wages is expansionary and has a relatively strong effect on employment so that the relative size of the slopes of the curves is reversed. In this case the model is unstable and the economy will move towards the ("saddlepoint") equilibrium only if it happens to get on (and stay on) the appropriate path (the broken line). Below equilibrium, real wages are falling and decreasing domestic demand and output more rapidly than they increase exports, thus adding further to the deflationary pressure; above equilibrium, exports start falling sooner or later while domestic inflation is accelerating, etc.¹

¹ The formulation of the model does not take account of the qualitative change in behaviour which will necessarily occur once full capacity utilization is reached.

In sum, a fall in the real wage brought about by, e.g., a devaluation may be contractionary in the short run and this fact may be of considerable importance if exports react to changes in competitiveness only after a relatively long lag. In this section we have analyzed the implications of these circumstances for the dynamic behaviour and stability of the model.¹ In the next section we discuss their implications for the policy problem of achieving and maintaining internal and external balance.

4.4. The Exchange Rate, Demand Management and Employment

Abstracting from lack of information and real wage resistance, what are the policy consequences of a time lag in exports or of the (related) possibility that a fall in the real wage has a contractionary effect in the short run? Consider the problems faced by an economy which finds itself in a short-run equilibrium at point A (figs. 4.7 and 4.8) — possibly as a consequence of an international recession (a fall in foreign demand M^*). The $\bar{\omega}$ - and \bar{X} -curves indicate constant levels of the real wage (and employment) and exports as before and the \bar{B} -curve is the locus of points for which trade is balanced. The slope of the \bar{B} -curve is a priori uncertain but is here taken to be positive. It is also assumed that exports affect the trade balance positively so that there is an external surplus to the right of the \bar{B} -curve and vice versa. Point F now represents the target (“internal and external balance”), and at point A there clearly is unemployment as well as a deficit in the balance of trade. What can the policy makers do to improve the situation?

Assume first that a reduction in real wages is expansionary (fig. 4.7). By a sufficient devaluation, the economy may then be shifted from A to C, at which point employment is restored, albeit at a lower real wage.² The improved competitiveness will gradually lead to an increase in market shares of exports

¹ In the analysis above, wage inflation has been assumed to be determined according to the simple Phillips-curve. If inflationary expectations are endogenized, the dynamics cannot be satisfactorily traced by the phase diagrams used. It may be shown, however, that the $\bar{\omega}$ -curve (if negatively sloped) must still be steeper than the \bar{X} -curve for the system to be stable. If wage inflation is assumed to be determined by the alternative specification involving real wage resistance, then the $\bar{\omega}$ -curve will be horizontal (in this case employment is obviously not constant along the $\bar{\omega}$ -curve). A fall in the real wage brought about by, e.g., a devaluation will again be temporary, stability is ensured by the assumptions made, and the approach to equilibrium will be direct rather than oscillatory. The dynamics associated with the monetary mechanism of adjustment may also, of course, be added to the export and wage dynamics.

² For a \bar{B} -curve as drawn, a devaluation shifting the economy from A to C will reduce but not eliminate the deficit.

Fig. 4.7

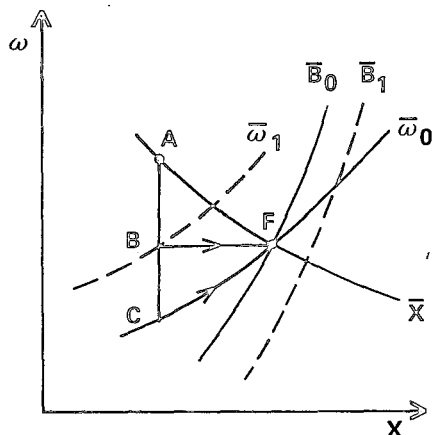
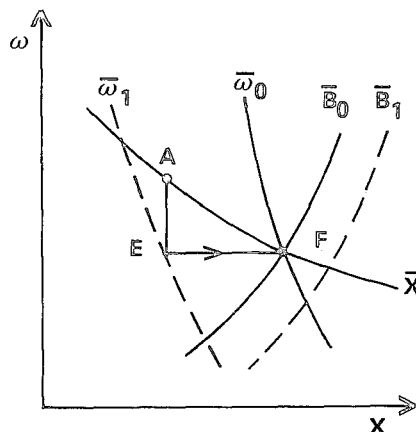


Fig. 4.8



and the economy will move to the right and towards F along the $\bar{\omega}$ -curve if real wages are permitted to rise at a rate compatible with constant employment.

An important difficulty with this devaluation strategy is, of course, that the required short-run fall in real wages may be very large if import demand is inelastic and if the income redistribution has unfavourable effects on domestic demand. An alternative strategy would therefore be to devalue only to the extent that is required to achieve the level of competitiveness compatible with full employment in the long run (shifting the economy to point B). If, in addition, the $\bar{\omega}$ -curve is shifted from $\bar{\omega}_0$ to $\bar{\omega}_1$ by expansionary fiscal policy (which also shifts \bar{B}_0 to \bar{B}_1), full employment may be achieved even in the short run. The stance of fiscal policy may then be successively tightened as exports increase so that the economy moves at a constant real wage towards F (the $\bar{\omega}$ -curve moving towards $\bar{\omega}_0$ and the \bar{B} -curve towards \bar{B}_0). Nevertheless, in the short run this devaluation cum fiscal expansion strategy may be associated with considerable deficits in foreign trade (as indicated by the horizontal distance from point B to the \bar{B}_1 -curve) as well as in the government budget.

Assume next that a fall in real wages is actually contractionary in the short run (fig. 4.8). Then a devaluation will increase unemployment in the short run. From the point of view of employment, a revaluation (or an increase in money wages) would be called for, but this would worsen competitiveness and thereby over time lead to a further fall in exports. Employment may again be maintained in the short as well as the long run, however, by a de-

valuation that shifts the economy to E (restoring sufficient long-run competitiveness) and expansionary fiscal policy that shifts the \bar{w} -curve first to \bar{w}_1 (and \bar{B} to \bar{B}_1) and then gradually shifts it back towards \bar{w}_0 as exports increase (maintaining a constant level of employment).

Thus a combination of a devaluation and fiscal expansion seems to constitute a reasonable strategy for an economy with low short-run foreign trade elasticities and which faces the unemployment-trade deficit dilemma and aims at maintaining employment without excessive (from the point of view of the long run) fluctuations in the income distribution.¹ There are, however, obvious difficulties with this strategy. First, it requires an assessment to be made and agreed upon with respect to the level of competitiveness required in the long run, and the real wage to be adjusted accordingly. Second, the strategy may involve large deficits in the government budget and in the trade balance during the adjustment process. The latter aspect means that policy makers should not even aim at external balance in the short run; foreign exchange reserves and borrowing should be relied upon and the improved competitiveness should be given time to materialize as increases in market shares of exports.

In sum, the achievement of both internal and external balance in the short run will require volatile and largely reversible fluctuations in the distribution of income if the short-run employment and trade balance effects of price changes are small. Under such circumstances it seems natural to stress the buffer stock role of foreign exchange reserves and of foreign debt.² The analysis also suggests an "assignment" of instruments in the sense of an emphasis on the importance of relative prices for market shares and external balance in the longer run on the one hand, and on the role of demand management as the central instrument of short-run employment policy on the other.

4.5. Alternative Norms for Exchange Rate Policy

It has been demonstrated above that a devaluation is an unreliable means of improving the balance of payments, and that a devaluation is also no cure for short-run unemployment if market shares adjust slowly and if a redistribution of income from wages to profits for this or for some other reason leads to a small effect or even to a fall in the demand for domestic output.

¹ Cf. the fiscal-monetary mix (fiscal expansion and accommodating monetary policy to maintain the rate of interest and exchange rates) as discussed in DORNBUSCH & KRUGMAN (1976).

² Cf. section 3.6 above.

In the long run, on the other hand, a sufficient degree of competitiveness is clearly an important prerequisite for the maintenance of employment, and the more so the greater the long-run price elasticity of exports. These considerations are in accordance with the view that cyclical unemployment should be met with demand management policies while competitiveness is preferably kept stable, except in the case of a "fundamental" imbalance (a real wage unambiguously out of line with long-run requirements).

Even if the scope for balance of payments oriented or countercyclical exchange rate policies is argued to be narrowly limited, the foregoing is not a restatement of old fashioned arguments for fixed exchange rates. This would be so only if stable exchange rates always implied stable competitiveness, which clearly is not the case. On the contrary, fixed exchange rates leave the price competitiveness of an economy highly vulnerable to monetary disturbances. Conceivably these disturbances could be offset by appropriate exchange rate changes. Instead of discussing the scope for discretionary exchange rate policy (directly oriented towards internal or external balance), one might therefore investigate whether there are alternative regimes, rules or norms for exchange rate policy that would lead to a more satisfactory pattern of automatic reactions in the face of various exogenous disturbances.

This is the question dealt with in the present section. The alternative regimes or norms considered are the following:¹

- I. *Fixed exchange rates.* In a world of widespread floating this actually means that an index² of prices of foreign exchange is stabilized:

$$e = \gamma \text{ or } \hat{e} = 0,$$

where γ is a given constant.

- II. *The inflation norm.* In this case a basket of commodities is focused upon instead of a basket of currencies. We shall assume that the inflation norm means that the authorities stabilize the domestic currency value of a price index of foreign goods or the rate of inflation of such an index:

$$(\hat{ep}^*) = \gamma, \text{ i.e., } \hat{e} = \gamma - \hat{p}^*,$$

¹ The regime of flexible exchange rates (in the sense of free floating) is not discussed here. In such a system the short-run behaviour of exchange rates would be importantly affected by capital flows. Thus it cannot meaningfully be analyzed without an explicit treatment of capital flows and financial markets.

² For an analysis of the problem of selecting appropriate weights of the currency basket see BRANSON & KATSELI-PAPAEFSTRATIOU (1978).

where p^* is the relevant index of prices of foreign goods. The inflation norm means, inter alia, that unexpected shifts in the foreign price level will be met with counteracting changes in the exchange rate so that the domestic currency price level of foreign goods develops steadily.

III. *The competitiveness norm.* In this case the real exchange rate is stabilized:

$$\frac{ep^*}{P_D} = \gamma \quad \text{or} \quad \hat{e} = \hat{P}_D - \hat{p}^*$$

i.e., domestic inflation in excess of foreign will lead to a depreciation of the exchange rate offsetting the difference in inflation rates since a purchasing-power-parity rule is followed.

In the following we shall compare the implications of policy behaviour according to these alternative norms in the face of 1) an upward shift in the foreign price level ($dp^* = dp_F^* = dp_R^* = dp_X^*$), 2) an increase in the level of domestic money wages (dw), 3) a deterioration in the terms of trade due to an increase in the foreign prices of imported raw materials (dp_R^*), and 4) an exogenous fall in foreign demand ($-dM^*$). The comparison will abstract from demand management policies and will focus on the short-run equilibrium as well as the adjustment process set in motion.

Behaviour according to any one of the norms outlined does not, of course, preclude the use of discretionary exchange rate changes to correct a "fundamental" deviation from appropriate cost and price ratios (when and if such an imbalance may be identified and agreed to prevail). The norms only describe the policies in relation to which discretionary actions should be defined.

4.5.1. Fixed Exchange Rates

An economy with fixed exchange rates is highly vulnerable to foreign price disturbances. This observation is particularly important for economies in which raw materials occupy an important position both in exports and imports. For such an economy changes in prices of tradeables may well be rapid and approximately balanced in the sense that major shifts in the terms of trade are not involved. For an upward shift in the foreign price level, competitiveness will improve, the real wage will fall, and a process of inflation will be set in motion to restore earlier price and cost ratios. In terms of the figure used above, this means that the economy is shifted from its original

equilibrium (at, say, point F) vertically downwards to a position where the real wage is lower and unemployment higher or lower depending on the slope of the $\bar{\omega}$ -curve. Through a subsequent process of inflation the economy will then gradually return towards the original equilibrium (cf. section 4.3 above).

Similarly, the fixed exchange rate economy is vulnerable to domestic inflation. If domestic money wages rise substantially more than foreign wages (corrected for productivity increases) the domestic price level and real wages will increase (shifting the economy vertically upwards in the ω , X-space). At the new short-run equilibrium, unemployment may again be higher or lower (depending on the slope of the $\bar{\omega}$ -curve) and domestic real wages may rise further or immediately start falling. Sooner or later a deflationary process sets in, however, and the economy will again gradually return towards F (assuming stability).

An increase in the price level of imported raw materials will at fixed exchange rates be deflationary, though less so in the short run (with given exports) than in the longer run (with exports adjusted to the increase in raw material costs). The rise in unemployment, on the other hand, will cause the real wage to fall and thereby competitiveness to improve until the level of employment has returned to its previous level (at a lower real wage). The fall in employment may become permanent if real wage resistance prevails.

A fall in the level of foreign demand will directly decrease exports, output and employment (the \bar{X} -curve as well as the position of the economy shifts horizontally leftwards). Unemployment then puts pressure on real wages and gradually competitiveness and exports may increase until "full employment" is restored at a lower real wage (if the fall in foreign demand is permanent).

4.5.2. The Inflation Norm

A major argument in favour of the inflation norm is that a revaluation is an appropriate means of (and practically the only means of) protecting the economy against the consequences of unexpected (and undesired) shifts in the price level of foreign goods. The inflation norm would simply mean that extraordinary increases (decreases) in the foreign price level are offset by corresponding decreases (increases) in the price of foreign exchange (keeping the economy at F in spite of the price disturbance).

Such a revaluation might of course also be undertaken as an action of discretionary policy under fixed exchange rates. Indeed, economists in the

Nordic countries have repeatedly urged on various occasions since at least the Korean boom that revaluations be undertaken as a means of fighting inflation originating externally. For various reasons the demands for revaluations have always proved unsuccessful. To the extent that shifts in the foreign price level are an important source of disturbances, however, an exchange rate norm focusing on a commodity basket (an inflation norm) would clearly be more appropriate than the rules now applied (variations of fixed exchange rates).

While the inflation norm would insulate the economy from foreign price level fluctuations, it would in other respects be much like fixed exchange rates. In particular, it would do nothing to offset the harmful effects of domestic wage inflation or the consequences of increases or decreases in the level of foreign demand. In the case of increases in the prices of imported raw materials, the inflation norm might actually aggravate the problem by leading to an appreciation of the exchange rate and thus slowing down the downward adjustment of the real wage which is actually required (if the adverse shift in the terms of trade is permanent and if no other compensating changes in the structure of the economy are taking place). The obvious conclusion is that prices of imported raw materials (lacking domestic substitutes) should be excluded from the index of foreign prices that exchange rate policy aims to stabilize.¹

4.5.3. The Competitiveness Norm

The importance of an adequate level of competitiveness in the long run might seem to suggest that exchange rate policy be used to maintain the "target" level of competitiveness, i.e., that a purchasing-power-parity rule be used in exchange rate setting. Such a policy rule has a certain intuitive appeal and some obvious advantages. First, it would be like the inflation norm in insulating the economy from undesired fluctuations in the price level of foreign goods. Second, unlike the inflation norm it would imply that the effects of an upward shift in the level of domestic money wages would be offset by an equivalent devaluation so as to render an internal deflationary process unnecessary. This is the basic rationale for the purchasing-power-parity procedure for determining the appropriate level of exchange rates.²

¹ A similar argument is that the index used for indexation of wages should not be a basket of goods consumed (like a 'cost of living' index) but rather a basket of goods produced or domestic value added like the GNP deflator. Cf. MODIGLIANI (1976, p. 102).

² Cf. the discussion of the so-called OPTICA-report in THYGESEN (1978).

Third, under the competitiveness norm an increase in raw material prices would lead to some devaluation of the exchange rate (as called for to achieve the required fall in real wages) if raw materials get a sufficiently small weight in the price index p^* as is reasonable since raw materials do not compete with domestic production in exports or imports.

There is, however, obviously a basic problem with any policy which, like a purchasing-power-parity rule, aims at stabilizing a central price ratio (and thereby also, *ceteris paribus*, the distribution of income). The problem is that a policy of deliberately maintaining competitiveness at a particular level will inhibit desirable adjustments if underlying conditions are subject to change. Assume, for instance, that a permanent fall in the level of foreign demand has occurred which puts downward pressure on money and real wages. The competitiveness norm would now imply that the fall in domestic inflation leads to an increase in the external value of the currency such that competitiveness and real wages (as well as exports) remain unchanged and the deflationary pressure undiluted. If foreign demand has increased so that there is an upward pressure on money and real wages, adherence to the competitiveness norm would correspondingly lead to a process of increased inflation (which might well turn out to be unstable once inflation expectations are affected).

In the case of a temporary or cyclical export fluctuation, the maintenance of a stable level of competitiveness could of course be justified. Nevertheless, the example considered illustrates the fact that the competitiveness norm would be destabilizing, in the sense of supporting a continuing deflationary or inflationary process, if the level of competitiveness aimed at is at variance with underlying conditions. (A particularly obvious case arises if there is real wage resistance and if the real wage is above the level which is compatible with the level of competitiveness fixed as a norm for exchange rate policy.)

4.6. Concluding Comments

Some of the findings of this chapter have been rather negative: in particular, a devaluation may affect the balance of payments and/or the level of output in the short run either way even if relative prices change and the real wage is permitted to fall. The possibility of weak or even "perverse" short-run effects of changes in competitiveness is particularly relevant if there is a long lag in price effects on exports, if imports are inelastic, and if an income redistribution from wages to profits leads to a decline in the demand for domestic output. Weak short-run effects are also, of course, fully compatible with the widely held view that competitiveness is a central determinant of exports in

the long run. Since external balance must prevail in the long run, this means that competitiveness is also crucial indirectly for employment in the long run, even if not directly and not in the short run.

The general implication which would seem to follow if price effects are considerably stronger in the long run than in the short run is that policies with respect to relative prices and real wages should focus on longer-run consequences rather than aim at short-run trade and employment effects. Another consequence is that it may be desirable to combine a devaluation, undertaken in order to increase market shares in the long run, with expansionary demand policies in order to stimulate employment in the short run (the time period which it takes for market shares and exports to adjust).

The importance of an adequate level of competitiveness in the long run might also seem to suggest the appropriateness of a competitiveness norm for exchange rate policy. There are, however, two crucial difficulties with this suggestion which would seem to rule it out from the set of relevant alternatives. First, it requires the appropriate level of competitiveness to be identified. This may be difficult if the foreign demand for domestic output, relative prices, domestic productivity, etc. are subject to frequent changes. Second, it presupposes that there is a widely held consensus with respect to the appropriate income distribution which the target level of competitiveness entails. This consensus may be hard to achieve. To suggest that the monetary authorities use exchange rate policy to fix relative prices and income shares is therefore to assume away the importance of the existence of conflicting views about what constitutes an appropriate distribution of income.

The advantage of the inflation norm is that it would offset the domestic consequences of price level fluctuations originating externally while at the same time avoiding the rigidities of the competitiveness norm. The suggestion of an inflation norm for exchange rate policy is, however, also subject to a number of qualifications which detract somewhat from its practical usefulness.

First, the price index focused upon should include only tradeable goods the prices of which reflect world market conditions rather than domestic costs, while imported intermediate inputs which affect the cost of domestic output directly should be excluded. Such an index is not readily available.¹ Second, price developments for various kinds of exports and imports may be very uneven. A revaluation cutting "excess profits" in one sector may therefore

¹ It should also be remembered that most available indices are unit value indices rather than price indices.

create a "profitability crisis" in another. For this reason it is sometimes suggested that selective export taxes and import subsidies be used instead of exchange rate changes.¹ Third, time lags in the collection of price information, etc., would necessarily mean that exchange rate changes would lag in relation to the price changes causing them. Thus it might in practice be difficult to control the development of prices of traded goods if price changes were rapid and unpredictable. Nevertheless, the existence of an inflation target would mean that excessive price level increases would be expected to be temporary (in domestic currency) and this could well be enough to prevent foreign inflationary impulses from being transmitted into domestic wages and prices.

In sum, exchange rate policy conducted according to an inflation norm could conceivably be very useful even though its role would be strictly limited: given that commodity prices are what basically matters, there are strong reasons why a foreign price shock should lead to an automatic appreciation of the currency rather than be allowed to increase the domestic rate of inflation (or lead to prolonged negotiations about a revaluation as an extraordinary action).² Exchange rate policy tied to an inflation norm would, of course, as such do nothing to eliminate the difficulties caused by shifts in comparative advantages and foreign demand fluctuations, domestic money wage inflation in excess of productivity increases, etc. Nevertheless, inflation-oriented exchange rate policy would eliminate or at least reduce one important source of uncertainty about the development of relative prices and real wages. Thus it would contribute towards making it possible for trade unions, employers, etc. to negotiate in real terms rather than on the basis of highly uncertain expectations.

¹ The administrative problems associated with such taxes and subsidies may of course be considerable. It is also not quite clear why profitability differences caused by changes in relative prices should make it less desirable to stabilize profitability levels in the face of changes in price levels.

² While the argument above has been set out for the case of an upward shift of foreign prices, it is also applicable in the reverse to a fall in the foreign price level (or a rate of increase smaller than the "target" rate).

5. External Balance and the Long Run

From the point of view of long-run analysis, the usefulness of a Keynesian framework is restricted by the demand-oriented character of the models employed. This is an important drawback of the analysis since external balance may be argued to be essentially a long-run problem (cf. the discussion on pp. 60 and 79 above). Although even sizable short-run imbalances may be perfectly compatible with successful stabilization policies, there is thus no escape from the conclusion that the maintenance of external balance in the long run is of utmost importance for any small economy.¹ The foregoing implies, *inter alia*, that the terms of trade of the economy must be compatible with an appropriate long-run share of world markets, and that the long-run profitability of export production should be such as to attract a share of total investment which ensures sufficient growth of export supply. In the event that this does not happen, exports will emerge as a "bottleneck" restricting the scope for expansionary policies and growth.

The purpose of this chapter is to analyze problems related to the maintenance of external balance in the long run. This is done by integrating a model employing the tradeables-nontradeables distinction (which is more convenient for the purposes at hand than the alternative exportables-importables distinction²) with a simple description of the process of capital accumulation and allocation. Particular interest is focused on wage behaviour as a determinant of competitiveness, capital accumulation and growth.

The analysis of this chapter is tangential to a number of different strands in the literature. First, it may be viewed as a simple open economy version of the Harrod-Domar growth model which focuses not only on the rate of

¹ Even then the definition of external balance should allow for the fact that countries may find it desirable to increase or decrease their level of foreign indebtedness at certain stages of their development.

² The aggregation of goods into tradeables and nontradeables is often contrasted with the aggregation into exportables and importables and argued to be more appropriate in the case of a "small" economy. One might argue, however, that appropriate aggregation is related to the time horizon of the analysis. Observe that if the long-run price elasticity of the foreign demand for exports is very high (approaching infinite) then the price level of exports will in the long run be fixed by conditions external to the economy (though export prices may be cost-determined in the short run).

growth but also on the distribution of capital as between the tradeables and nontradeables sectors. Second, the assumptions made are in some respects similar to those contained in the so-called "capital specificity hypothesis" which is attracting increasing attention in international trade theory.¹ Third, the analysis is alien to the "two-gap theory" in emphasizing that external balance may constitute a "bottleneck" giving rise to a "foreign exchange constraint" on growth which is separate from the savings constraint.² Fourth, in the spirit of the EFO-model³ wage policies are viewed primarily in relation to their effects on competitiveness or profitability and investment in the tradeables sector.

The plan of the chapter is as follows. In section 5.1 the basic concept of structural balance is introduced and discussed in terms of a graphical exposition of the model based on the tradeables-nontradeables distinction. The point of the concept is to emphasize the importance of the intersectoral allocation of resources, and, in particular, of capital, for the problem of reconciling internal and external balance.

In section 5.2 the dynamic allocation of resources is investigated within some simplified cases. Section 5.3 takes up devaluation policy. It also discusses the characteristics of the "devaluation cycle". The final section discusses conditions for balanced growth and makes some comments on the EFO-model, which is here interpreted not primarily as a theory of inflation but rather as an attempt to establish a wage-price policy for which the allocation of investment in a growing economy is such as to maintain structural balance.

5.1. The Concept of Structural Balance

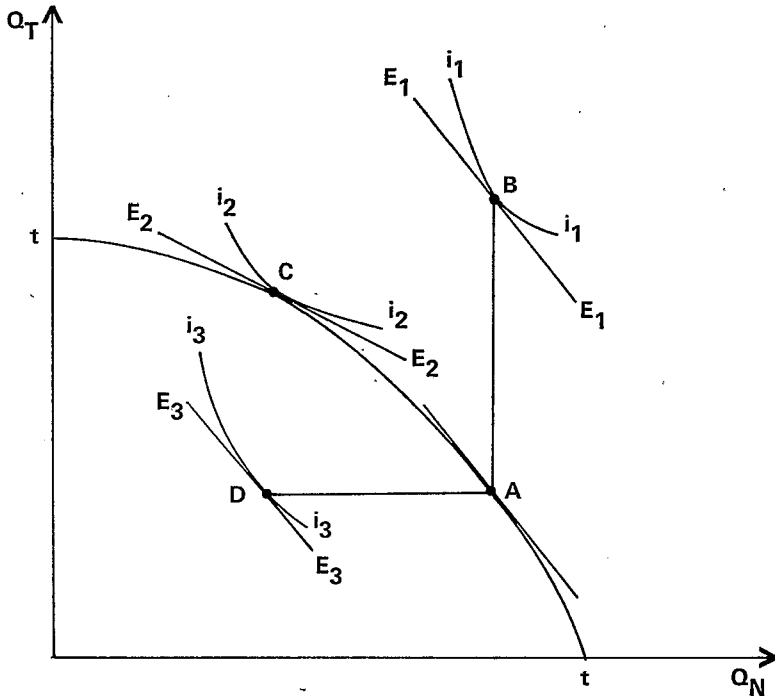
Real wages and relative prices affect the average rate of return on investment as well as the relative profitability of investment in various sectors. Investment, in turn, gives rise to changes in the capital equipment which is part of the data conditioning short-run processes in the economy. As will be seen below, this leads directly to a concept of structural balance in terms of the allocation of capital resources (as well as to a concept of competitiveness in terms of relative rates of return on investment in different sectors).

¹ See, e.g., JONES (1971), CORDEN & JONES (1976), MAYER (1974), BRUNO (1976) and NEARY (1978).

² See, e.g., LINDER (1976), SCOTT (1971), McKINNON (1964), CHENERY (1961) or FINDLAY (1971).

³ EDGREN, FAXÉN & ODHNER (1969, 1973).

Fig. 5.1



As a starting point, consider the simple version of the tradeables-nontradeables model in which only consumption is considered. This version is well entrenched in the literature and may be graphically exposed in the following way.¹ The symbols Q_T and Q_N refer to quantities of traded and nontraded goods, tt and ii are transformation and indifference curves, and EE the budget line, the slope of which is determined by total expenditure and the price ratio between traded and nontraded goods.

Given relative prices and the level of total expenditure indicated by the budget line E_1E_1 , production is at point A and absorption at point B ; the deficit in the balance of trade is therefore equal to $B-A$ (in terms of traded goods). This deficit will be eliminated in the "long run" through the monetary

¹ Assumptions involved in the analysis include profit and utility maximization, perfect competition, free trade and, in particular, that the conditions required for the existence of community indifference curves and a concave-to-the-origin transformation curve are satisfied.

mechanism of adjustment or through balance of payments oriented policy. If, in addition, prices and wages are flexible, the long-run equilibrium will obtain at point C with balanced trade and full resource utilization. Alternatively, point C may be reached by deliberate policy actions regulating relative prices (through wage and/or exchange rate policy) and total expenditure (through monetary and/or fiscal policy).

If prices and wages are "rigid" (exogenous and constant), however, long-run equilibrium is reached at point D; balanced trade now requires an underutilization of resources, which is graphically represented by the distance DA.¹ In this case there is superficially external balance but, in fact, an underlying deficit equal to B-A. The point effectively communicated by this model is that it is necessary to consider both relative prices and the level of absorption when diagnosing the state of the balance of payments.

Given this background, consider now the transformation curve *tt*. Superficially it is just a simple device for characterizing the production possibilities of the economy by describing graphically the combinations of the two goods that may be produced with the given technology and resources. But is it really feasible to move instantaneously along the full range of the transformation curve? Does the curve stay put in the long run? What is the concept of resources implicit in the construction?

Two interpretations are possible: either it is assumed that the stock of capital is not only totally but also sectorally given (completely immobile), or then the stock of capital is (like labour) treated as perfectly mobile. (Both interpretations are met with in the literature.²) The first case is applicable for short-run analysis. In the second case it is assumed that the existing capital equipment may be costlessly and instantaneously reallocated between firms and sectors. The restrictive nature of this assumption should be emphasized; it implies that errors of investment may be immediately corrected. As a matter of fact, in this case the distribution of past investment is without any consequence whatsoever; prices and factor costs at each moment in time determine the allocation of the whole capital stock.

In reality, by contrast, at least some factors are obviously sectorally immobile at least in the short run. Capital equipment and its sectoral distribution, in particular, may reasonably be treated as part of the data inherited from the

¹ For a more detailed description of the adjustment process in this model under various assumptions about price and wage flexibility see DORNBUSCH (1974).

² A third possibility is that the role of fixed capital is entirely neglected.

past. Investment in real capital is, after all, typically irreversible; once made, it cannot be remade.¹ Assume therefore that the sectoral allocation of capital at a given point of time is fixed and that its allocation thus changes only over time and to the extent that the (endogenously determined) sectoral allocation of new investment is different from the given allocation of existing capital.

Consider now the following production functions (assumed to be "well behaved" and to exhibit constant returns to scale):

$$(5.1) \quad Q_T = f^T(K_T, L_T),$$

$$(5.2) \quad Q_N = f^N(K_N, L_N).$$

At every point in time the capital stocks K_T and K_N are given and immobile as between uses; labour L , by contrast, is assumed to be a homogeneous factor which may be freely reallocated between the sectors. Use of labour is then constrained only by the condition $L_T + L_N \leq L$ where L is the (given) total amount of labour.

Assume now that one unit of real capital, K , is always constructed (costlessly) by taking a_N units of the nontradeable good and a_T units of the tradeable good. Because of the fixed proportions, "capital" and investment may then enter the analysis as an aggregate commodity, the price of which is given by $p_K = a_N p_N + a_T p_T$, where p_i is the price of good i . For the purpose of graphical exposition in this section it is also assumed that the volume of net investment, \dot{K} ($=dK/dt$), at each and every point of time is such as to keep the average capital intensity constant: $K/L = k = \text{constant}$, i.e., $\dot{K}/K = \dot{L}/L = n$, where n is the exogenous and constant rate of growth of labour. Under these assumptions (and abstracting from depreciation) we may write:

$$(5.3) \quad \tilde{Q}_T = \frac{Q_T - a_T \dot{K}}{L} = f^T(K_T/L, L_T/L) - a_T nk$$

¹ Actually, real investment is likely to be irreversible in three different ways. First, a machine invested in a firm can typically not be transferred to another firm; for this reason, there are usually no rental markets for capital goods. Second, even if there were technological scope for substitution in the use of production factors, such substitutability is likely to be very limited once resources have been given a particular physical embodiment (i.e., technology is largely putty-clay). Third, the sectoral allocation of capital invested is fixed. In this section the somewhat artificial assumptions are made that capital is malleable (permitting instantaneous substitutability between capital and labour) and mobile between firms (permitting rental markets for capital) but immobile as between the T- and N-sectors.

$$(5.4) \quad \tilde{Q}_N = \frac{Q_N - a_N \dot{K}}{L} = f^N(K_N/L, L_N/L) - a_N nk$$

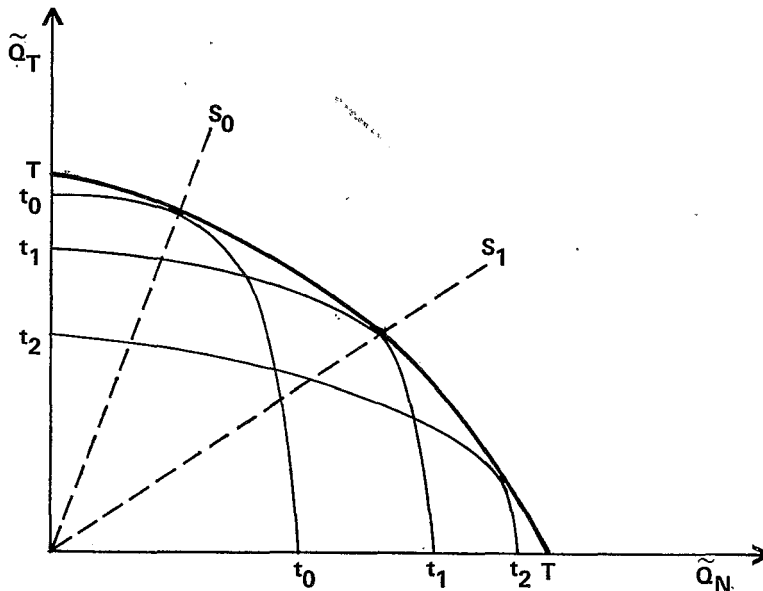
$$(5.5) \quad 1 = L_T/L + L_N/L$$

$$(5.6) \quad k = K_T/L + K_N/L.$$

The symbol \tilde{Q}_i denotes the production of good i per capita in excess of the quantity which is required to keep the average capital intensity of the economy unchanged. (This means that \tilde{Q}_T is the production of the T-good per capita which is available for consumption or net export; similarly, \tilde{Q}_N is maximal production per capita of the N-good for consumption.)

In the short run L , K , K_T and K_N are given; thus K_T/L and K_N/L are given. Equations (5.3) – (5.5) now constitute a system of three equations in four unknowns: \tilde{Q}_T , \tilde{Q}_N , L_T/L and L_N/L . This system may be reduced to one equation in two unknowns, \tilde{Q}_T , \tilde{Q}_N , and graphically represented as the short-run transformation curve tt . In the long run K_T/L and K_N/L

Fig. 5.2



may also be decided upon so as to maximize the value of \tilde{Q}_T for any given value of \tilde{Q}_N . By this procedure, one may derive another functional dependence between \tilde{Q}_T and \tilde{Q}_N , graphically represented as the long-run transformation curve TT.¹

While the short-run transformation curve gives the “net” output combinations that may be achieved by reallocating labour alone, the long-run transformation curve indicates the combinations of Q_T and Q_N that are achievable when the sectoral allocation of capital $e_{TK} = K_T/K$ may also be decided upon.² Given the assumption as to the constancy of the average capital intensity, k , the long-run transformation curve is unique and invariant in time. The short-run transformation curve, by contrast, is given only in the short run; potentially there are as many tt-curves as there are values of the allocation variable e_{TK} (the TT-curve is the “envelope” of the tt-curves).

Obviously the transformation curves t_0t_0 , t_1t_1 , etc. will lie within the TT-curve except if the goods are produced in the proportions for which the corresponding capital allocation is optimal. For instance, the transformation curve t_0t_0 lies within the TT-curve unless the goods are produced in the proportion indicated by the line OS_0 (for which the associated capital allocation e_{TK_0} is optimal); the same applies for t_1t_1 and OS_1 , etc.

By use of this distinction between long-run and short-run transformation curves, the concept of “structural imbalance” may now be characterized as in fig. 5.3 below. The given short-run transformation curve is t_0t_0 . The capital allocation associated with t_0t_0 is optimal if the goods are produced in the combination represented graphically by point A.

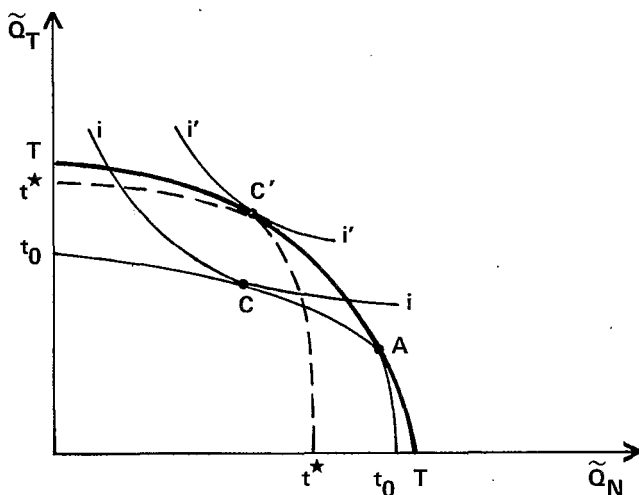
Given the assumed conditions of demand (indifference curves), however, production and consumption at point A is not a possible free trade equilibrium. Given t_0t_0 , the only short-run equilibrium compatible with full employment of the available resources and trade balance is instead given by point C, the point of tangency between the transformation curve t_0t_0 and an indifference curve.³ Even though external balance and full employment prevail, the economy is in a situation of “structural imbalance” in the sense that the intersectoral resource allocation is suboptimal, i.e., the output combination

¹ Cf. MAYER (1974, p. 959).

² Since k is constant, K_T/L and K_N/L are uniquely determined by e_{TK} : $K_T/L = e_{TK}k$ and $K_N/L = (1 - e_{TK})k$.

³ As was observed above, equilibrium at a point like C will not, in fact, necessarily be achieved. In the present context we focus on full employment-balanced trade equilibria only in order to have a convenient point of reference.

Fig. 5.3

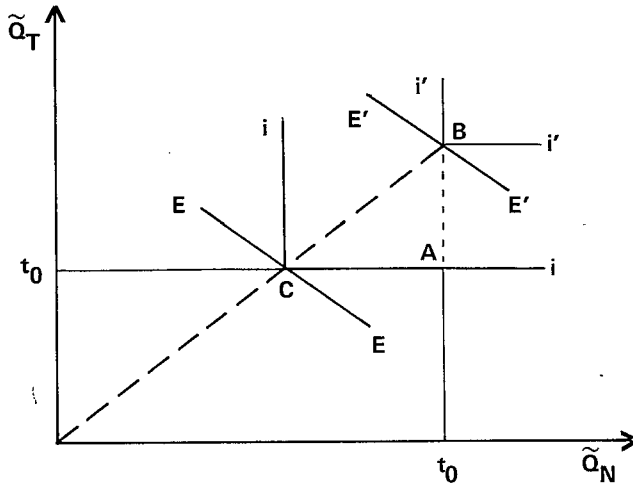


represented by point C' could have been achieved if the same resources had been allocated differently (such that t^*t^* had obtained).

While a structural imbalance will exist whenever the intersectoral resource allocation is non-optimal, the significance of this phenomenon is highly dependent on the degree of short-run substitutability in demand and supply. If substitutability is high, the intersectoral allocation of capital is of limited significance (i.e., point C is "close" to point C'); small price changes have relatively strong effects on quantities consumed and produced. If substitutability is small, on the other hand, the characteristics of the internal-and-external-balance equilibria potentially achievable are quite sensitive to the allocation of the existing capital stock (points C and C' are "far" apart); at some ranges price changes also have only limited effects on the pattern of demand. The small price sensitivity associated with the latter case also implies that it may be difficult to reconcile internal and external balance if there are some restrictions on conceivable changes in relative prices.

In the extreme case depicted in fig. 5.4, there is simply an insoluble conflict between internal and external balance. Full utilization of the given capacity (production at point A) requires the level of expenditure indicated by the budget line E'E', but then there is a deficit in the trade balance equal to $B - A$. Balanced trade (consumption at point C), on the other hand, requires the level of expenditure indicated by the budget line EE, but in this

Fig. 5.4



case there is excess capacity in the N-sector equal to $A - C$. The (broken) line CB is the locus of “compromise” combinations of excess capacity and trade deficit which it is possible to achieve by varying the level of domestic expenditure. In this case the price ratio between traded and nontraded goods is without significance.

In sum, the intersectoral allocation of capital will be important if the factor inputs are complementary and if substitutability in demand is small.¹ Under such circumstances, it may also be very difficult to achieve both full employment and balanced trade unless the existing structure of capacity corresponds to the pattern of demand (i.e., unless structural balance prevails). This points to the importance of the investment process as the determinant of the evolution of the resource structure over time.

5.1.1. Imbalance and Adjustment: Some Preliminary Observations

Assume for the rest of this section that physical capital is intersectorally immobile, but that it is “intrasectorally” mobile and rented on competitive

¹ This is often argued to be the case in Finland; the production of T-goods is mainly for export (and this export cannot be replaced by domestic consumption of these goods), and the consumption of T-goods consists of imports, which, by and large, cannot be replaced by domestic production.

markets.¹ Given the assumption of intersectoral immobility, capital rentals will, in general, differ as between the sectors. The wage rate, by contrast, is equalized if labour markets are competitive. Since the cost of acquiring a unit of physical capital is the same whether it is invested in the T-sector or the N-sector, one would expect differences in capital rentals to affect the behaviour of the owner-investors. Thus the question arises as to how investment will affect resource allocation and the associated short-run situation of the economy.

Assume now that the share of the T-sector in total investment, $e_{TI} = \dot{K}_T/\dot{K}$, is a function of the ratio of the capital rentals in the two sectors:

$$e_{TI} = \Phi(H),$$

where

$$H = H_T/H_N = \frac{(p_T Q_T - wL_T)/K_T}{(p_N Q_N - wL_N)/K_N}$$

(where w is the money wage). The Φ -function is assumed to have the characteristics $\Phi' > 0$ and $\Phi(1) = e_{TK} = K_T/K$. This implies that the share of the T-sector in total investment is a growing function of the relative capital rental, and that its share of total capital is growing ($e_{TI} > e_{TK}$ whence $e_{TK} > 0$) if $H_T > H_N$.

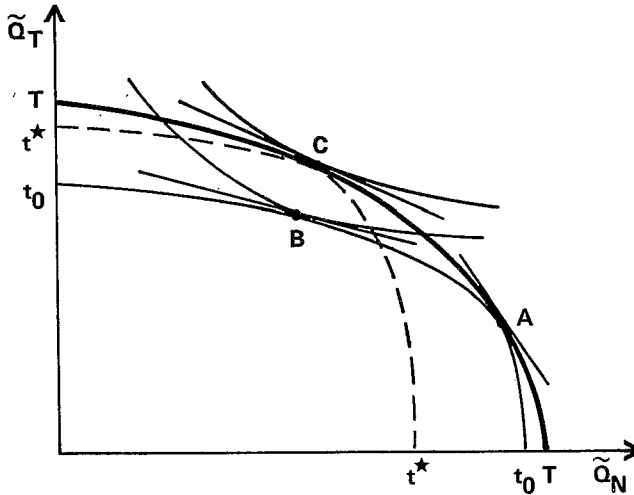
Let us start from an initial situation of "full" equilibrium, in which demand and supply of both goods are equal and capital rentals as well as wage rates equalized. This equilibrium is then disturbed by, say, a change in preferences towards tradeable goods (alternatively an adverse shift in the terms of trade might be investigated). The consequences for the short-run equilibrium and for the allocation of investment now depend on the assumptions made about price and wage flexibility as well as policy. Consider the following cases.

a) Prices and factor costs are flexible (full employment) and the level of (consumption) demand so adjusted that trade balance prevails. The short-run equilibrium is now at point B in fig. 5.5.

As compared to the original equilibrium at point A, the relative price of tradeables rises at the same time as the full employment condition implies that w/p_T falls and w/p_N rises. Capital rentals rise in the T-sector and fall

¹ This assumption is obviously unrealistic (cf. note 1 on p. 91). Observe also that it seems strange to assume that capital is fully mobile between firms in the same sector but fully immobile between firms in different sectors. Nevertheless, the assumption is not uncommon in the literature. The assumption is dropped in section 5.2 below.

Fig. 5.5



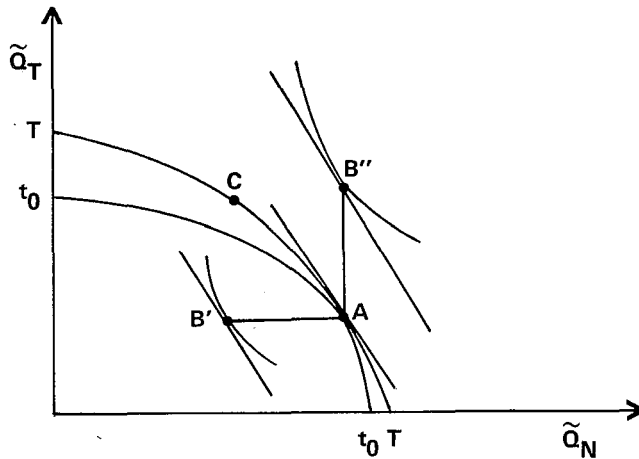
in the N-sector.¹ The share of total investment going to the T-sector will therefore be higher in the short-run equilibrium at point B. The change of the investment allocation gradually increases the T-sector's share of total capital. Graphically this means that the economy's short-run transformation curve changes from t_0 towards t^* and at the same time the production-consumption point moves from B towards C (if demand is all the time regulated so as to keep trade balanced). If the reallocation process continues until capital rentals are equalized, the new long-run equilibrium will finally be achieved at point C. Observe that the relative price $p = p_T/p_N$ rises more in the short run (point B) than in the long run (point C). This is a consequence of the more comprehensive adjustment which is possible in the long run.²

b) Prices and factor costs are "rigid" (constant) and the level of consumption

¹ This follows from the proposition derived by JONES (1971, p. 9), who, however, did not deal with investment.

² Observe that in this framework it would seem reasonable to say that an increase in competitiveness is equivalent to an increase in the relative rate of return on T-sector capital, the reason being that such a change will gradually lead to an increase in the T-sector's share of capital and thereby help to eliminate any structural deficit originally prevailing.

Fig. 5.6



demand is reduced so that external balance is achieved at point B' in fig. 5.6. At point B' production and employment of factors in the N-sector is smaller than at point A while output and factor use in the T-sector is unchanged. At constant prices and factor costs, average capital rentals will therefore fall in the N-sector while remaining unaffected in the T-sector. The consequence is again that a larger share of investment goes to the T-sector and that the economy moves away from the transformation curve $t_0 t_0$. Given the assumption of constant prices, however, long-run equilibrium (equalization of capital rentals) obviously cannot obtain at point C.

c) The level of expenditure is increased so that full resource utilization is achieved at point B'' (with a trade balance deficit equal to $B'' - A$). In this case production levels, prices and factor costs remain unchanged in both sectors. Therefore no "incentives" arise for a reallocation of capital. Instead, production and consumption continue to obtain at point A and B'' respectively for an indefinite future. The conclusion is that stabilization policy — when a structural imbalance prevails — must be supplemented with some actions which favour investment in the T-sector. Otherwise the needed restructuring of the economy will not occur and the policy pursued will defeat its purpose.

5.2. Accumulation and Intersectoral Allocation

In the context of the preliminary observations on this problem made in the previous section it was assumed that there are competitive rental markets for physical capital within each sector, and that the allocation of investment is related to relative capital rentals. This is only one of many conceivable mechanisms for the allocation of investment. Other possibilities include, e.g., the following.

First, it might be assumed that there are neither markets for physical nor financial capital. Instead, the capitalists, the owners of the firms, would simply spend part or all of the profits on new equipment. If the capitalists are well-informed and consider all opportunities, the amount of non-wage income per unit of capital (the rate of profit) would retain its allocational importance. If, on the other hand, no intermediation occurs but profits are invested within the units in which they arise (pure internal finance), then the sectoral distribution of investment is determined by the sectoral distribution of profits.

Second, markets for bonds, bank credit and other forms of debt might be introduced. For instance, it is sometimes assumed that all investment is financed by bank loans. If demand and supply for credit is equilibrated through the rate of interest, the sector with the higher expected profitability of investment could probably compete successfully for funds. In the case of rigid interest rates and credit rationing, on the other hand, some hypothesis about the criteria applied by the lending institutions is required.

Third, while there are no markets for physical capital once invested, there may be markets for financial capital or equities. Thus the valuation of capital (the prices of equities) may adjust so that the expected yield on ownership claims to capital in different sectors is equalized. Since the (re)production cost of capital is the same irrespective of which sector it is invested in, profitable firms may be expected to be at an advantage with respect to investment financing.

The growth and employment consequences of an initial structural imbalance will depend significantly on the characteristics of the investment allocation process as well as on the working of the price system and the degree of short-run substitutability in production. This is demonstrated in the present section, which proceeds by considering two simplified "cases" based on differing sets of assumptions. The problem at hand is clearly one of "real" (allocation) theory as much as it is a problem of "monetary" (income and balance of payments) theory; while the structural imbalance is a "real" phenomenon,

it has important consequences for the problem of achieving internal and external balance.

5.2.1. Dynamic Investment Allocation: First Example

Consider first a simple model with flexible prices and wages and perfect markets for goods, labour and equities. The two production functions are taken to be of the Cobb-Douglas type. Output per capita may then be written:

$$(5.7) \quad \frac{Q_T}{L} = (K_T/L)^{\alpha_T} (L_T/L)^{1-\alpha_T}$$

$$(5.8) \quad \frac{Q_N}{L} = (K_N/L)^{\alpha_N} (L_N/L)^{1-\alpha_N},$$

where again K_T/L and K_N/L are given in the short run because of the immobility of physical capital. Assume now that nontradeables may be identified as consumption goods and tradeables as investment goods, and further that all profits are invested and all wages consumed (all profits are distributed to the owner households who consume no part of their capital income).

Equilibrium in the market for nontradeables or consumption goods then requires that total consumption = total wage income is equal to the value of output; in real per capita terms:

$$(5.9) \quad \frac{w}{p_N} = \frac{Q_N}{L}.$$

Since all saving is taken to be automatically invested, trade is always balanced. The value of investment, $p_T \dot{K}$, equals the value of non-wage income, $Y - wL$, and the value of the production of tradeables, $p_T Q_T$; whence, in per capita terms:

$$(5.10) \quad \frac{\dot{K}}{L} = \frac{Q_T}{L}.$$

Competition and profit maximization ensure that the real wage in terms of output in both sectors is equal to the marginal physical product of labour:

$$(5.11) \quad \frac{\delta Q_T}{\delta L_T} = (1 - \alpha_T) \frac{(K_T/L)^{\alpha_T}}{(L_T/L)^{\alpha_T}} = \frac{w}{P_T}$$

$$(5.12) \quad \frac{\delta Q_N}{\delta L_N} = (1 - \alpha_N) \frac{(K_N/L)^{\alpha_N}}{(L_N/L)^{\alpha_N}} = \frac{w}{P_N}$$

which functions may be interpreted as giving the demand for labour in the sectors. Given the (inelastically offered) supply of labour, market clearing then requires:

$$(5.13) \quad L_T/L + L_N/L = 1.$$

The above equations may be viewed as a system of 7 equations in the 7 unknowns Q_T/L , Q_N/L , L_T/L , L_N/L , w/P_T , w/P_N and \dot{K}/L . The system is easily solved as follows. From equation (5.12), by using equations (5.8) and (5.9), one gets:

$$(5.14) \quad L_N/L = 1 - \alpha_N,$$

and equation (5.13) then gives

$$(5.15) \quad L_T/L = \alpha_N.$$

Using equations (5.15) and (5.7), equation (5.10) then yields

$$(5.16) \quad \frac{\dot{K}}{L} = \alpha_N^{1-\alpha_T} (K_T/L)^{\alpha_T}.$$

Observing that

$$(K_i/L) = \frac{\dot{K}_i}{\dot{K}} \frac{\dot{K}}{L} - n \frac{K_i}{L}$$

and using equation (5.16), we may then write:

$$(5.17) \quad (K_T/L) = e_{\pi} \alpha_N^{1-\alpha_T} (K_T/L)^{\alpha_T} - n \frac{K_T}{L}$$

$$(5.18) \quad (K_N/L) = (1 - e_{\pi}) \alpha_N^{1-\alpha_T} (K_T/L)^{\alpha_T} - n \frac{K_N}{L}$$

(where, as before, e_{π} is the T-sector's share of investment).

At this point a determination of the allocation of investment is required. Assume for this purpose that there is a market for financial capital in which the expected yield on equities is equalized. Focusing on the simple case of static expectations then gives the condition

$$\frac{(P_T Q_T - wL_T)/K_T}{P_T} = \frac{(P_N Q_N - wL_N)/K_N}{P_N},$$

where P_i is the price of equities of sector i (i.e., P_i is the market valuation of the ownership claim to one unit of i -sector capital which must obtain if wealth holders are to be willing to hold the existing stock of i -sector equities). Since capital is physically the same wherever it is invested, the allocation of investment may be assumed to be a function of the ratio of the capital valuations:¹

$$(5.19) \quad e_{TI} = \Phi(P),$$

where

$$P = \frac{P_T}{P_N} = \frac{(P_T Q_T - wL_T)/K_T}{(P_N Q_N - wL_N)/K_N}.$$

Assume the Φ -function to be such that²

$$\begin{aligned} e_{TI} &= 1 && \text{if } P > 1 \\ &= 0 && \text{if } P < 1 \\ &= e_{TK} && \text{if } P = 1, \end{aligned}$$

where $e_{TK} = K_T/K$. Using equations (5.7) - (5.13) above, we may then write P as

$$(5.20) \quad P = \frac{\alpha_T \cdot K_N/L}{1 - \alpha_T \cdot K_T/L},$$

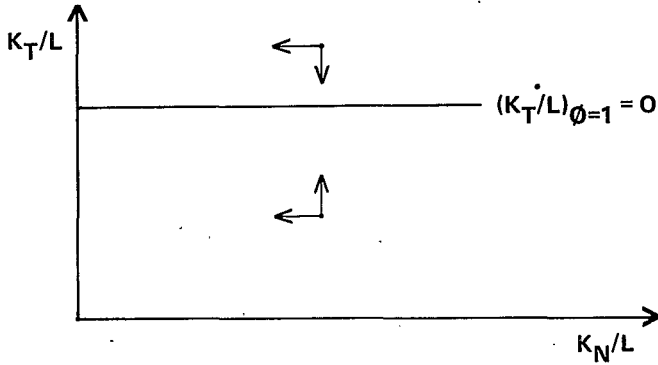
from which it is seen that $P = 1$ requires that

¹ Alternatively (but equivalently), we may say that the allocation of investment is a function of the ratio of the "Tobin q 's": $e_{TI} = \Phi((P_T/P_K)/(P_N/P_K)) = \Phi(P)$. See TOBIN (1969).

The assumption that no capital losses or gains are expected is important; with perfect foresight, troublesome indeterminacy and instability problems might arise. See SHELL & STIGLITZ (1967).

² The third assumption implies that there is no tendency for the capital allocation to change if yields are equalized and is made for convenience. Actually it might be more reasonable to argue that $\Phi(1)$ is indeterminate. On this, cf. SHELL & STIGLITZ, *op.cit.*

Fig. 5.7



$$(5.21) \quad K_T/L = \frac{\alpha_T}{1 - \alpha_T} \frac{K_N}{L}$$

It should be emphasized that the simple relation between allocation and marginal products of capital hold only because of the assumption of static expectations.¹

Assume now that the existing capital allocation is such that $P > 1$ and that therefore $e_{TT} = 1$. The expression for (K_T/L) then reduces to

$$(5.22) \quad (\dot{K}_T/L) = \alpha_N^{1-\alpha_T} (K_T/L)^{\alpha_T} - n(K_T/L),$$

while $(\dot{K}_N/L) = -n(K_N/L)$ is always negative. The value of K_T/L for which it is constant is given by

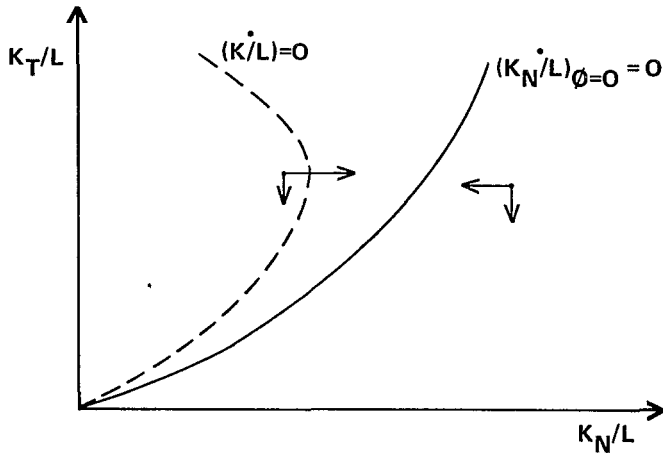
$$(5.23) \quad (K_T/L)_a = \alpha_N n^{\frac{1}{\alpha_T - 1}}$$

Above $(K_T/L)_a$ the value of K_T/L will be falling and vice versa below $(K_T/L)_a$. (See fig. 5.7.)

Assume next that the allocation of capital happens to be such that $P < 1$ and that therefore $e_{TT} = 0$. In this case $(\dot{K}_T/L) = -n(K_T/L) < 0$ while the expression for (\dot{K}_N/L) reduces to

¹ Using the "adding up theorem", it is easy to see that P equals the ratio of marginal products of capital in the sectors.

Fig. 5.8



$$(5.24) \quad (\dot{K}_N/L) = \alpha_N^{1-\alpha_T} (K_T/L)^{\alpha_T} - n(K_N/L).$$

The locus of K_T/L , K_N/L combinations for which \dot{K}_N/L is constant is given by:

$$(5.25) \quad K_N/L = \frac{\alpha_N^{1-\alpha_T}}{n} (K_T/L)^{\alpha_T}$$

Since the first and second derivatives of K_N/L with respect to K_T/L are positive and negative respectively and $\delta(K_N/L)/\delta(K_T/L)$ negative, we get the phase diagram (the solid curve) in fig. 5.8.

Finally, observing that

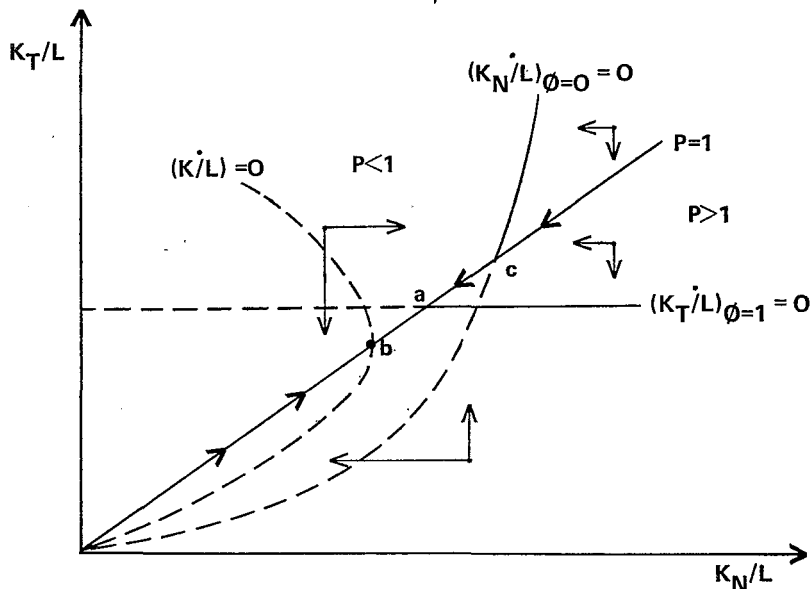
$$(\dot{K}/L) = \frac{\dot{K}}{L} - n \frac{K}{L} = \alpha_N^{1-\alpha_T} (K_T/L)^{\alpha_T} - n (K_T/L + K_N/L)$$

the locus for which \dot{K}/L is constant is given by

$$(5.26) \quad \frac{K_N}{L} = \frac{\alpha_N^{1-\alpha_T}}{n} (K_T/L)^{\alpha_T} - \frac{K_T}{L},$$

graphically inserted as the broken-line curve in fig. 5.8 above.

Fig. 5.9



Combining the phase diagrams, the dynamic behaviour of the system may now be analyzed by use of diagram 5.9 above. The curves give the loci of K_T/L , K_N/L combinations for which K_T/L is constant (when $e_{\text{TI}} = \Phi(P) = 1$), for which K_N/L is constant (when $e_{\text{TI}} = \Phi(P) = 0$), for which K/L is constant and for which $P = 1$.

To the right of the straight line from the origin (for which $P = 1$), $P > 1$ and K_N/L will be falling while the behaviour of K_T/L is governed by equation (5.22); to the left of the $P = 1$ -curve K_T/L is falling and the behaviour of K_N/L is governed by equation (5.24). It is easily shown that the point b is below points a and c (while point a may be above or below point c without any consequence for the reasoning¹). Under the assumptions made, point b then represents a unique and globally stable equilibrium. From any initial point the economy will always, sooner or later, move to the straight line through the origin (for which $P = 1$), whereafter $e_{\text{TI}} = e_{\text{TK}}$ and movement will occur along the $P = 1$ -line towards point b. It is also seen

¹ Eq. (5.23) gives $(K_T/L)_a$. $(K_T/L)_b$ and (K_T/L) may be derived by using eq. (5.21) in combination with eq. (5.26) and eq. (5.25) respectively.

that this equilibrium maximizes consumption per capita, since the $(K/L) = 0$ -curve has a maximum for K_N/L at point b.¹

While the case just considered may serve as a point of reference, it is not very interesting from the point of view of policy. Assuming away speculative investments (through static expectations), competitive markets ensure continuous full employment of all resources and maximum consumption. A devaluation will immediately increase all prices and wages in the same proportion as the price of foreign exchange without any other effects being involved (since real cash balance effects are abstracted from). In order to get closer to problems of more interest, it is clearly necessary to modify the assumptions about, e.g., wage and price behaviour or the mechanism of investment allocation.



5.2.2. Dynamic Investment Allocation: Second Example

Consider next a very different model with fixed coefficient technology, rigid wages and prices, and absence of well-functioning markets for financial as well as real capital. Take the production functions to be:

$$(5.27) \quad Q_T^0 = \min(v_T K_T, q_T L_T)$$

$$(5.28) \quad Q_N^0 = \min(v_N K_N, q_N L_N),$$

where Q_i^0 denotes maximum potential production of good i and where v_i and q_i are given technical coefficients² (output-capital ratios and labour productivities respectively). As before, the stocks of (everlasting) capital are immobile and given in the short run, while the homogeneous labour input is freely transferable between the sectors. Assume in the following that the capital restrictions are always binding (for potential production) while the labour restriction may or may not be binding. Then we may rewrite the production functions as:

¹ Taking the derivative of K_N/L with respect to K_T/L in eq. (5.26) and setting it equal to zero gives the same value for K_T/L as $(K_T/L)_b$ (as determined by the procedure mentioned in the previous note). The production function (5.8) then implies that Q_N/L is maximized when K_N/L is maximized.

² In the previous section capital was assumed to be instantaneously malleable, which is obviously an unrealistic assumption. It is of course also unrealistic to assume that substitution is entirely impossible. Permitting substitutability ex ante but not ex post would, however, greatly complicate the analysis.

$$(5.29) \quad Q_T^o = v_T K_T$$

$$(5.30) \quad Q_N^o = v_N K_N \quad K_N = Q_N / v_N$$

and the given labour productivities may be used to determine the corresponding employment levels:

$$(5.31) \quad L_T = Q_T / q_T$$

$$(5.32) \quad L_N = Q_N / q_N$$

i.e., employment is determined by actual production of output (Q_T and Q_N).

We may permit both goods to be consumed as well as invested. Thus capital, K , again denotes a composite commodity consisting of a_T units of T-goods and a_N units of N-goods, while consumption expenditure is defined as

$$(5.33) \quad C = p_T c_T + p_N c_N$$

Total consumption is simply taken to be proportional to money income:

$$(5.34) \quad C = (1 - s)Y$$

$$(5.35) \quad Y = p_T Q_T + p_N Q_N$$

while the proportions of consumption expenditure spent on the goods is a function only of the price ratio $p = p_T / p_N$:

$$(5.36) \quad p_T c_T / C = m_C$$

$$(5.37) \quad m_C = m_C(p),$$

i.e., m_C denotes the propensity to spend on tradeables out of consumption expenditure. For investment expenditure the corresponding propensity is given by

$$(5.38) \quad m_I = p_T a_T / p_K,$$

where

$$(5.39) \quad p_K = a_T p_T + a_N p_N$$

All prices and wages are treated as fixed in this section: domestic currency prices of tradeables are determined by the world market prices and the (constant) exchange rate, the level of money wages is fixed by labour market organizations and prices of nontradeables are cost-determined. With productivities and money wages constant, prices of nontradeables will then be constant, too. Assume that firms are never rationed in the (world) markets for tradeable goods. Actual production will then always be equal to maximum potential production — provided only that money wages and prices are such that variable costs may be covered:

$$(5.40) \quad Q_T = Q_T^o$$

For nontradeables, by contrast, actual production is taken to be demand-determined. This implies that we assume that excess capacity prevails in the N-sector — or that demand is just equal to supply — and that the real wage is such that variable costs may be covered.¹ We thus have the following equilibrium condition for nontradeables:

$$(5.41) \quad P_N Q_N = P_N c_N + P_N a_N \dot{K},$$

while the demand for and supply of tradeables only determine the balance of trade:

$$(5.42) \quad B = P_T Q_T - P_T c_T - P_T a_T \dot{K}.$$

In the context of the long run, we want to focus on the consequences of the requirement of external balance. (Alternatively we might consider some specified policy of foreign borrowing.) Conceivably, we could introduce the monetary mechanism of adjustment to ensure the preservation of equilibrium in the balance of payments. In the present context, however, we simply assume that investment expenditure is regulated (by credit and/or tax policy measures) so that external balance is achieved.

Adding equations (5.41) and (5.42) with $B = 0$, the following saving-investment condition is then derived:

$$(5.43) \quad sY - I = 0.$$

¹ The case of excess demand for nontradeables is not considered. (It may be excluded if excess demand is immediately eliminated by a rise in prices while excess supply does not trigger falling prices.)

Finally, rewrite equation (5.42) by using equations (5.29), (5.34), (5.36) and (5.35) as

$$(5.44) \quad m_C(1 - s)Y + m_I I = p_T v_T K_T.$$

Recalling that prices are fixed and m_C , m_I therefore given, equations (5.43) and (5.44) may be viewed as two equations in the two unknowns Y and I . The solution for money income is easily found to be

$$(5.45) \quad Y = \frac{p_T Q_T}{m} = \frac{p_T v_T K_T}{m},$$

where $m = sm_I + (1 - s)m_C$, i.e., m is the average propensity to spend on tradeable goods (the weighted sum of the proportions spent on tradeables out of investment and consumption respectively, with expenditure shares, s and $1 - s$, as weights). The rate of growth of total capital $\hat{K} = \dot{K}/K$ will then be given by

$$(5.46) \quad \hat{K} = \frac{I}{p_K K} = \frac{sY}{p_K K} = \frac{sv_T p_T}{m p_K} e_{TK}.$$

These are only short-run solutions, however. If $e_{TI} \neq e_{TK}$, the latter will be changing and so will the rate of growth of capital even if prices and wages are constant. The corresponding rate of growth of income is (by differentiating equation (5.45) with respect to time and using equation (5.46)):

$$(5.47) \quad \hat{Y} = \hat{K}_T = \frac{sv_T p_T}{m p_K} e_{TI}.$$

Recall that it has been assumed that there is excess supply of nontradeables (or that there is not at least excess demand). In other words, it has been assumed that the T-sector's share of capital resources e_{TK} is too "small" in the sense that the level of expenditure consistent with external balance results in a deficiency of demand for nontradeables (in relation to potential supply). Therefore production capacity in the T-sector is a "bottleneck" restricting employment and growth.

As long as this holds, the rate of growth of capital will be an increasing function of the T-sector's share of capital. It is easy to see that growth of capital will be below the growth rate which would be realized if e_{TK} were consistent with external balance at full capacity utilization, i.e., if a structural imbalance did not prevail. This is because the structural imbalance implies

that part of existing capacity lies idle and that some potential saving and investment is not therefore realized. The level of income, however, may grow rapidly (see equation (5.47)) if a high share of investment is allocated to the T-sector. This follows from the fact that the level of income grows as a result of the increase in capacity in the T-sector as such, on the one hand, and as a result of the increased capacity utilization and production of non-tradeables which is possible without upsetting external balance, on the other.

To study the behaviour of the economy over time, we again need some determination of how total investment is distributed between the sectors. Assume in this case that profits are always invested within the sector in which they arise, and that the saving of households is also intermediated (via a credit system) to the sectors in proportion to their profits.¹ Then the intersectoral distribution of investment will be equal to the distribution of profits. With some manipulation this yields:

$$(5.48) \quad e_{\text{TI}} = e_{\text{T}\pi} = \frac{P_{\text{T}}Q_{\text{T}} - wL_{\text{T}}}{Y - wL} = \frac{P_{\text{T}} - w/q_{\text{T}}}{(P_{\text{T}} - w/q_{\text{T}}) + \frac{P_{\text{T}}}{P_{\text{N}}} \left(\frac{1-m}{m} \right) (P_{\text{N}} - w/q_{\text{N}})}$$

Given the assumption that the money prices and wages as well as the technical coefficients are constant, the distribution of profits and the allocation of investment will then be constant, too.

Given the constancy of the allocation of investment, stability is straightforward: the allocation of capital must necessarily converge asymptotically to the value of e_{TI} as given by equation (5.48). In comparison to the mechanism of investment allocation considered in the previous section, adjustment will therefore be slow. If $e_{\text{TK}} = e_{\text{T}\pi}$ is a desirable equilibrium in the sense of being compatible with external balance at full capacity utilization, it would clearly be preferable that $e_{\text{TI}} = 1$ until the equilibrium is reached (which would then only take a finite period of time).

Another question that may be raised is the following: Given that investment is determined by profits ("availability of finance") is there any reason to believe that the rate of profit on capital will be equalized as between the sectors? There are two reasons for raising this question. First, allocation so as to equalize the profit rate may be compatible with structural balance (if

¹ This would occur if, e.g., banks were always to require firms to finance a certain fraction of their projects with internally generated funds (and if this fraction were the same for all firms).

prices and wages are "correct"; cf. below). Second, the assumption that $e_{\pi} = e_{\tau\pi}$ could hardly be maintained in the long run unless profit rates were equalized as part of the adjustment process.

Fortunately, this indeed turns out to be the case. This is seen as follows. Equalization of profit rates under the present assumptions (when the debt ratio is the same in both sectors and assuming the interest rate on credit also to be the same) requires that the ratio of total non-wage income to the value of capital is the same in both sectors:

$$\frac{p_T Q_T - wL_T}{p_K K_T} = \frac{p_N Q_N - wL_N}{p_K K_N}$$

Given the constancy of prices, wages and technology, there is only one distribution of capital for which this condition holds, this distribution being

$$e_{TK} = \frac{p_T - w/q_T}{p_T - w/q_T + \frac{p_T}{p_N} \left(\frac{1-m}{m} \right) (p_N - w/q_N)} = e_{\tau\pi}$$

A mechanism of profit-determined investment is thus compatible with the achievement of profit rate equalization; on the other hand, adjustment will be slow with this mechanism.¹

Finally, it may be observed that there is actually no mechanism in the present model which would ensure that structural balance would be achieved even in the long run (cf. section 5.4 below). This is most easily seen from the fact that the profit equalization condition (which, as we just observed, will hold in the long run) may be written as

$$(p_T - w/q_T)v_T = (p_N - w/q_N)v_N h,$$

where $h = Q_N/Q_N^o$ is the degree of capacity utilization in the N-sector. Obviously, less than full capacity utilization will prevail if

$$\frac{(p_T - w/q_T)v_T}{(p_N - w/q_N)v_N} < 1.$$

If prices of nontradeables are "too high", $h < 1$ must prevail since there

¹ The analysis above thus agrees with the old criticism of a mechanism of investment allocation based on internal finance according to which it is too "conservative" in conditions of rapid changes.

is no other way in which profit equalization may be achieved. In this case funds are invested in the N-sector up to a certain degree of excess capacity because the favourable price ratio implies that average profit rates will otherwise be higher in the N-sector.¹ It may be observed that high money wages as such may affect h in either way (the direction depending upon relative capital intensities). High money wages in combination with high prices of nontradeables, however, will affect equilibrium capacity utilization in the N-sector negatively (because the exogeneity of prices in the T-sector implies a reduction in profitability). By endogenizing domestic prices and wages, $h = 1$ may, of course, correspondingly be made part of the steady state.

5.3. Devaluation and Accumulation

In contrast to the first example, the model of the second example permits the existence and even persistence of policy problems. This model therefore forms the basis for the reasoning in the rest of the chapter. In this section devaluation policy is discussed.²

5.3.1. Effects of a Devaluation

It was assumed above that the short-run capacity is fixed in both sectors, that aggregate demand is adjusted so as to make demand for tradeables equal to capacity output, and that the resultant demand for nontradeables is such as to lead to excess capacity and unemployment in the N-sector. The solution most likely to suggest itself to an economist contemplating such a conflict between internal and external balance is a change in relative prices. Even if money wages and prices of nontradeables were rigid, the relative price, p , may be changed through exchange rate variations provided that real wages are sufficiently flexible.

A devaluation at a constant money wage, w , and price of nontradeables, p_N , will raise the price ratio, $p = p_T/p_N$, in the same proportion as the price of foreign exchange. Since the level of employment is given by

¹ It is assumed that the rate of return on new capital (investment) in the N-sector is equal to the rate of return on existing capital, i.e., that the rate of utilization is the same for all capacity in the N-sector.

² KORKMAN (1977. b) contains an analysis of budget policy within this model. It is found that debt and/or tax-financed government expenditure on N-goods permits internal and external balance to be reconciled even if there is a structural imbalance. Only in the case of tax-financed expenditure, however, it is possible to retain full capacity utilization without affecting investment and the rate of growth of capacity negatively. A preliminary version of sections 5.3.1—5.3.2 is in KORKMAN (1978).

$$L = \frac{Q_T}{q_T} + \frac{Q_N}{q_N} = \left[\frac{1}{q_T} + \left(\frac{1-m}{m} \right) \frac{P_T}{P_N} \frac{1}{q_N} \right] v_T K_T = l(p) K_T,$$

a devaluation will increase the size of the labour force employed by the given capacity if $l' = dl/dp > 0$ or if:

$$1 - m - \frac{p}{m} \frac{dm}{dp} > 0,$$

where

$$\frac{dm}{dp} = (1-s) \frac{dm_C}{dp} + s \frac{dm_I}{dp} + (m_I - m_C) \frac{ds}{dp}.$$

The short-run effect on employment is seen to depend on the following circumstances. First, under the assumptions made, a successful devaluation must affect the pattern of domestic demand in favour of nontradeables.¹ (It is not necessary for the average propensity to spend on tradeables, m , to fall, but it must rise at most by $m(1-m)$ since only then will there be an increase in the real absorption of nontradeables occurring at a given volume of production of tradeables.) Second, dm/dp may actually be positive and even large enough for a devaluation not to constitute an expansionary policy action. Though the first term of dm/dp may well be negative,² the second term is necessarily positive (due to the assumed complementarity of capital inputs), and the third term is also likely to be positive since $m_I > m_C$ is to be expected (at least in small countries³) and since the saving ratio is likely to increase as a consequence of the increase in the relative share of profits which a devaluation at constant money wages entails (see below).

The rate of growth of employment may now be written:

$$(5.49) \quad \hat{L} = \hat{K}_T + \varepsilon_{Lp} \hat{p},$$

where \hat{p} is the relative change of p , $\varepsilon_{Lp} = \frac{p}{L} \frac{dL}{dp} = \frac{p}{L} \frac{dl}{dp}$ is the (short-run) elasticity of employment with respect to the relative price of tradeable goods and \hat{K}_T the rate of growth of output and production capacity in the T-sector.

¹ Even if the assumption of zero short-run elasticity of supply is retained, a positive association between the price level of traded goods and aggregate supply may arise if the T-sector is heterogeneous so that raising the price level of traded goods through a devaluation increases the production which is able to cover variable costs and thereby the aggregate level of export production.

² As is easily shown, $dm_C/dp < 0$ holds if the price elasticity of demand for tradeables is greater than one.

³ In small economies, demand for any individual type of investment good is limited relative to the minimum efficient scale of production. This implies that small economies will have to refrain from producing these goods or then to restrain production to a limited range of goods and rely on foreign trade for the rest.

While the short-run employment effect of a devaluation is thus at best uncertain, the direction of the effects on the distribution of income and the rate of growth seem less ambiguous. The aggregate share of profits or capital income e_π (non-wage income) may be written as

$$e_\pi = m e_{\pi T} + (1 - m)e_{\pi N},$$

where $e_{\pi i}$ is the share of capital income in sector i :

$$e_{\pi i} = (p_i Q_i - wL_i)/p_i Q_i, \quad i = T, N.$$

A devaluation at constant money wages will increase the share of profits in the T-sector and leave the profit share in the N-sector unaffected. The effect on the average profit share will therefore be positive provided that

$$\frac{de_\pi}{dp} = m \frac{de_{\pi T}}{dp} + (e_{\pi T} - e_{\pi N}) \frac{dm}{dp} > 0,$$

which may be assumed to be the case. Observing that the T-sector's share of total profits may be written as $e_{\pi T}/e_\pi$, equation (5.47) may be rewritten as

$$(5.50) \quad \hat{K}_T = \frac{P_T}{P_K} \frac{e_{\pi T}}{e_\pi} = \varrho(p),$$

For a given price ratio, the rate of growth of employment is equal to \hat{K}_T as given by equation (5.50).

A devaluation is likely to affect the rate of growth positively for the following reasons: First, the price ratio p_T/p_K will rise unless $m_T = 1$ (i.e., unless $p_T = p_K$), implying that the price of inputs in terms of output is lowered (and that a given amount of finance will correspond to more real investment than before the devaluation). Second, the saving ratio may increase as a consequence of the increase in the share of profits forthcoming upon the devaluation. Third, the T-sector's share of total investment, $e_{\pi T}$, is likely to increase since it is the profit share in the T-sector which increases.¹ In sum, it seems reasonable to assume that $\varrho' = d\varrho/dp > 0$ holds.

¹ Observe that a devaluation will therefore affect the time path of the capital allocation in a direction that raises the rate of growth of employment and in due time may eliminate the structural deficit. For this to happen, furthermore, it is not necessary that the real wage falls; a change in the investment allocation may also be brought about by an increase in the prices of traded goods greater than the increase in money wages which, in turn, is greater than the increase in prices of nontradeables such that the aggregate wage share is unaffected (if profit margins in the N-sector are changeable). Such a devaluation would be neutral with respect to the distribution of income between wages and profits but would redistribute profits from the T- to the N-sector and thereby influence investment.

5.3.2. The Devaluation Cycle

Even if a devaluation increases the relative share of capital income and the rate of growth of capacity and output, these effects may be less than permanent. In the longer run money wages may rise in the same proportion as the price of foreign exchange and cost-based pricing then implies that prices of nontradeables rise, too. As will be demonstrated in this section, these characteristics of exchange rate policy may give rise to the recurrence of a particular sequence of events conveniently referred to as the "devaluation cycle".¹

A simple model of the devaluation cycle may be constructed along the following lines. Start by defining the rate of unemployment as

$$u = \frac{N - L}{N}$$

where N is the exogenously given supply of labour. Denoting the rate of growth of labour by n , differentiating u with respect to time and transforming into growth rates yields:

$$(5.51) \quad \hat{u} = \frac{1 - u}{u} (n - \hat{L})$$

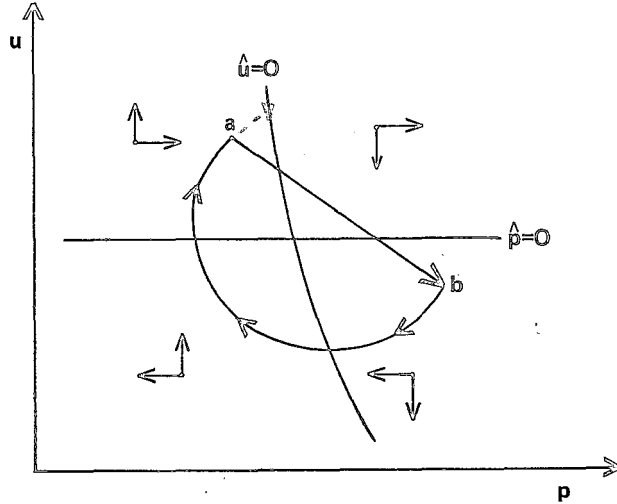
where \hat{u} is the rate of change of (the rate of) unemployment, and \hat{L} the rate of growth of employment as determined by equation (5.49). Assume further that the rate of increase of money wages is a function of the externally given rate of world inflation and the rate of unemployment:

$$(5.52) \quad \hat{w} = \hat{p}_T + \eta(u), \quad \eta' = d\eta/du < 0.$$

Wage inflation is thus assumed to be lower the higher the rate of unemployment. A discrete devaluation at a given point of time affects the price of tradeables but not its rate of change and is therefore taken not to affect wage inflation directly (devaluations are unexpected and there is no indexing of money wages). Finally, assuming prices of nontradeables to be

¹ Numerous and relatively large devaluations in Finland have been observed to result in the following sequence of events: During the first years after the devaluation the relative price of tradeable goods rises, the relative share of profits increases at the expense of wage income, investment and growth accelerates and unemployment gradually falls; during the latter years, however, the above process is reversed until a new devaluation is undertaken. For an empirical illustration of some of the relations involved see KORKMAN (1978, p. 364). The devaluation cycle has recently been much discussed by Finnish economists. For an early view, see PAUNIO (1969).

Fig. 5.10



cost-determined and productivity constant, implies that the relative price of tradeables will change according to:

$$(5.53) \quad \hat{p} = \hat{p}_T - \hat{p}_N = \hat{p}_T - \hat{w}.$$

Using equations (5.49) – (5.53), the model may be reduced to the following two equations:

$$(5.54) \quad \hat{p} = -\eta(u)$$

$$(5.55) \quad \hat{u} = \frac{1-u}{u} \left[n - \varrho(p) + \varepsilon_{Lp} \eta(u) \right].$$

The analysis of this system will be restricted to phase¹ diagrams. Since (assuming $\varepsilon_{Lp} \geq 0$):

$$\left(\frac{\partial u}{\partial p} \right)_{\hat{p}=0} = 0$$

$$\left(\frac{\partial u}{\partial p} \right)_{\hat{u}=0} = \frac{\varrho'}{\varepsilon_{Lp} \eta'} < 0,$$

the slopes of the curves along which $\hat{p}=0$ and $\hat{u}=0$ are as indicated in fig. 5.10 above. This diagram may now be used to illustrate the devaluation

¹ It is observed that the model analyzed here differs from the model in chapter 4 by allowing growth and with respect to the assumptions on commodity aggregation, investment determination, etc. In particular, the difference between short and long-run effects now arises partly because of lagged effects on capacity but not because of low short-run elasticities.

cycle. (Since p , e_π and q are all positively associated, similar diagrams could be drawn with the relative share of profits or the rate of growth on the horizontal axis.)

Initially the economy is at point a (for instance). Since the rate of unemployment is considered too high and/or the rate of growth of capital and output too low, the exchange rate is devalued. As an immediate (short-run) consequence of the devaluation, the relative price of tradeable goods rises and unemployment falls; the short-run equilibrium is shifted to point b. Because of the high relative price of tradeables and the low real wage, the relative share of profits is high with the consequence that the saving-investment ratio is high and growth of capacity rapid; unemployment is therefore falling.

Falling unemployment and high profits are causing a more rapid rate of wage inflation. The high domestic inflation causes the relative price of tradeable goods to fall steadily over time with the consequence that the profit share, investment and growth are tapering off. When growth of capacity has fallen sufficiently, it is outrun by the growth of labour, and at the same time the fall in the relative price of tradeables increases the excess capacity required for external balance to prevail: the outcome is that unemployment starts rising.

Rising unemployment in combination with the low relative share of profits slows down wage inflation and the relative price of tradeables may even start to rise again. At this point, however, the process is typically speeded up by a devaluation which raises growth and lowers unemployment (immediately via a fall in the proportion of expenditure spent on tradeable goods or after a lag via an increase in T-sector capacity) thus starting the process just described all over again.

Equations (5.54) and (5.55) constitute a system of nonlinear differential equations. Making the assumption that $\varepsilon_{Lp} = 0$ (and converting the rate of unemployment to the employment rate L/N and the share of profits to the share of wages, etc.), the system would reduce to the kind of "Volterra system" analyzed by Goodwin.¹ The resemblance is indeed more than formal. Like Goodwin's growth cycle, the model above explains the alternating ups and downs by the dynamic interaction of profits, wages and unemployment. In the present case, however, employment is taken to be subject to a balance of payments constraint. Investment will therefore affect employment via its effect on capacity in the T-sector and the external restriction rather than

¹ See GOODWIN (1967).

simply by adding to the capital stock. In an open economy it is also easy to accept the assumption that the real wage rises in the neighbourhood of full employment (Goodwin's assumption 7), since money and real wages will be positively related due to the exogeneity of the prices of tradeable goods.

Exploiting the formal similarity between the above equations (for $\varepsilon_{Lp} = 0$) and the system analyzed by Goodwin, one may also make the following observations: First, persistent cycles are possible even without any devaluations (since the Goodwin type of model is a non-linear conservative oscillator). Second, devaluations (like initial conditions in general) — even if recurrent — do not affect the long-run average price ratio, distribution of income, rate of unemployment or rate of growth.¹ This agrees with the view put forward by those writers who have argued that the devaluations only produce inflation and instability without affecting growth or long-run employment positively.²

Two additional comments are in order. First, if the devaluation is “agreed upon”, i.e., if there is consensus that the real wage must be lowered and that this is most conveniently done through a devaluation, then equation (5.52) may be inoperative and a devaluation may have persistent effects. Second, the assumption that the rate of growth of labour is given and constant is important; it implies that the distribution of income must adjust so that the average rate of growth of capital is equal to the given rate of growth of labour.

If, instead, it is assumed that labour supply is elastic (there is, say, a “reserve army of labour” in the agricultural sector), then the rate of growth of employment will adjust to the rate of accumulation of capital (not the other way around). The assumption that labour supply is elastic need not imply that money wages are constant. Assume for a moment that

$$\hat{w} = \hat{p}_T + \lambda_w \left[(w/p_T)^o - w/p_T \right],$$

i.e., that there is a given “target real wage” and that it will be approached gradually if deviated from. Obviously, the long-run real wage is not affected by a devaluation. On the other hand, the temporary fall in the real wage associated with a devaluation is in this case not counter-balanced by a subsequent deviation in the opposite direction. While the increase in the rate of

¹ Cf. GOODWIN, *op.cit.*, p. 58. The invariance of the long-run average values of real variables holds whether $\varepsilon_{Lp} = 0$ or not.

² See KORPINEN & KYKKÄNEN (1974).

accumulation is temporary, therefore, the devaluation will still cause a persistent upward shift of the level of the stock of capital per capita (due to the cumulative differences between the time paths with and without devaluation).

In this way a series of large devaluations may lead to a more rapid rate of accumulation of capital, the associated instability constituting the very mechanism through which rapid growth is achieved.¹

5.4. Conditions for Balanced Growth

In a state of long-run growth the sectoral allocation of capital is such that the profit rate is equalized. Growth may be said to be balanced if accumulation proceeds in such a way that external balance is compatible with full capacity utilization. Observe that the profit rate equalization condition in combination with the assumption of full capacity utilization ($h = Q_N/Q_N^0 = 1$) implies (cf. p. 111) that the price ratio p_N/p_T must satisfy the condition:

$$(5.56) \quad \frac{p_N}{p_T} = \frac{v_T}{v_N} \left[1 + \left(\frac{q_T v_N}{v_T q_N} - 1 \right) \frac{w}{p_T q_T} \right].$$

Assuming structural balance ($h = 1$) also implies that equations (5.43) and (5.44) may be written as

$$(5.57) \quad s(p_T v_T K_T + p_N v_N K_N) - I = 0$$

$$(5.58) \quad m_c(1-s)(p_T v_T K_T + p_N v_N K_N) + m_I I - p_T v_T K_T = 0.$$

Dividing this system by $p_K K$ and using the relation $K_N = K - K_T$, gives two equations in the two unknowns $e_{TK} = K_T/K$ and $\hat{K} = I/p_K K$. Denote the equilibrium (solution) values for e_{TK} and \hat{K} by e_{TK}^0 and \hat{K}^0 respectively.

If external balance is to prevail, investment should be allocated so as to ensure that the relative share of the T-sector in the total stock of capital is always equal to

¹ While devaluations may thus play a role in the accumulation process, this hardly constitutes an argument for the devaluation cycle itself. Rather it points to the need for developing other mechanisms capable of providing for a sufficient volume of saving and investment without causing the fluctuations associated with the devaluation cycle. Cf. PEKKARINEN (1977).

$$(5.59) \quad e_{TK}^{\circ} = \frac{1}{1 + \left(\frac{1-m}{m} \right) \frac{v_T p_T}{v_N p_T}},$$

and the associated rate of growth of capital is given by

$$(5.60) \quad \hat{K}^{\circ} = \frac{p_T}{p_K} \frac{sv_T}{m} e_{TK}^{\circ}.$$

Assume that no technical progress is taking place, which obviously means that e_{TK}° and \hat{K}° are constant as long as relative prices remain unchanged. Equations (5.59) and (5.60) then characterize a conceivable state of balanced and steady growth provided that the distributions of investment and capital are appropriate and equal, $e_{TI} = e_{TK} = e_{TK}^{\circ}$. (Observe that in the simple case in which $v_T = v_N = v$ and $p_T = p_N$, $e_{TK}^{\circ} = m$ and $\hat{K}^{\circ} = sv$.)

Three comments should be added to the foregoing. First, the determination of growth will be more complicated if an independent investment function is assumed (in which case saving must be matched by an appropriate "willingness to invest"). Second, the rate of growth as given above may deviate from the "natural" rate as determined by the rate of growth of labour (including possibly Harrod-neutral technical progress), i.e., unemployment may be rising or falling. Third, the condition (5.56) may be fulfilled through prices of nontradeables adjusting to a given money wage (and prices of tradeables and technical coefficients) or through the money wage adjusting to a given price level of nontradeables or a given mark-up factor on wage costs in the nontradeables sector.

These two cases have rather different implications. In the first case the distribution of income between wages and profits is determined by the behaviour of money wages and the exchange rate. An increase in money wages at fixed exchange rates would then increase the wage share but not affect the rate of capacity utilization. In the second case maintenance of structural balance implies a definite wage share given prices of tradeables and the mark-up applied on wage costs in the nontradeables sector. An increase in wages would still increase the wage share but at the same time the degree of capacity utilization (as well as employment of labour) would fall in the nontradeables sector (cf. p. 112 above).

Since the excess capacity associated with a structural deficit entails social waste of resources, the question arises as to how wage and income distribution policies might be pursued so as not to run into the balance of payments

barrier. Assuming that prevailing practices and institutions regulating pricing as well as saving and investment are accepted, the implications for wage policy are in principle quite simple: money wages should be regulated so as to ensure that condition (5.56) is continuously fulfilled (taking into account the dependence between prices and costs in the N-sector). While the principle is simple, its application is rendered somewhat difficult by the fact that appropriate wages then depend not only on prices of traded goods and the mark-up applied in the nontradeables sector but also on all the input coefficients. Thus simple rules are unlikely to meet the requirements if conditions are changing.

Take, for instance, the popular rule embodied in the EFO-report.¹ According to this rule money wages should rise so as to keep the wage share in the "open" sector constant, and prices in the "closed" or "sheltered" sector are then expected to rise so as to keep income shares in this sector constant, too (i.e., the mark-up is assumed to be constant). Assuming for simplicity that all investment goods are tradeables ($p_K = p_T$), the wage rule implies ($r_i =$ profit rate in sector i):

$$\hat{r}_T = \hat{v}_T,$$

and if the prices of nontraded goods behave so as to keep the profit share constant, then we must also have

$$\hat{r}_N = \hat{v}_N + (\hat{q}_T - \hat{q}_N),$$

where $\hat{r}_T = \dot{r}_T/r_T$, $\hat{v}_T = \dot{v}_T/v_T$, etc. Observe now that if technical progress is neutral so that $\hat{v}_T = \hat{v}_N = 0$, then the rate of profit in the T-sector is stabilized by the wage rule followed, but the N-sector rate of profit is increasing if growth of productivity is more rapid in the T- as compared to the N-sector (as it is usually found to be). This particular wage rule in combination with a given mark-up must then lead to the emergence of a structural deficit.² Observe also that $\hat{r}_T = \hat{r}_N$ if $\hat{v}_T - \hat{v}_N = \hat{q}_T - \hat{q}_N$, i.e., in this particular case the wage rule and mark-up pricing in the N-sector will maintain profit rate equalization. The rate of profit will increase or decrease, however, as will the rate of growth of capital required for the maintenance of full employment growth.

¹ EDGREN, FAXÉN & ODHNER (1969, 1973), LUNDBERG (1972), BRANSON & MYHRMAN (1976) and PAUNIO & HALTTUNEN (1976). For a more elaborated discussion along the present lines see KORKMAN (1977 c, 1979).

² $\hat{r}_T = \hat{r}_N = 0$ will hold only if $\hat{p}_N = e_{\pi T} \hat{p}_T + (1 - e_{\pi N})(\hat{w} - \hat{q}_N)$ instead of $\hat{p}_N = \hat{w} - \hat{q}_N$.

In this case there is therefore nothing to ensure the maintenance of a rate of saving appropriate to full employment growth. (Matters will be even more complicated if, for instance, raw materials and changes in relative prices of traded goods (the terms of trade) are taken into account.) Therefore, while the concept of a "wage room" is entailed in the role of profits for saving and investment, calculations of the wage room according to the above-mentioned rule would seem to be a procedure which has no obvious "economic" justification.

Acknowledging these problems, let us now assume that it is nevertheless possible to regulate money wages so that condition (5.56) is fulfilled. What this means then is that the rate of profit is determined by the mark-up applied by the firms in the sheltered sector, and that the role of wage policy is only to adjust wages so that the rate of profit earned on T-sector capital is in line with this given rate of profit. If the rate of profit is the central determinant of investment, this also means that the profit margins applied in the sector with cost-based pricing will determine (given the kind of wage policy assumed) the rate of accumulation of the whole economy. If this rate of accumulation is not appropriate to full employment growth (or if trade unions desire a certain income distribution for its own sake), wage policy will be faced with the additional difficulty that it cannot satisfy both condition (5.56) and at the same time further a particular growth (or income distribution) policy.¹

5.5. Concluding Comment

The concept of structural imbalance focused upon in this chapter is an example of a more general category. The general idea is simply that demand and supply must increase *pari passu* not only in the aggregate but also for individual commodities. Otherwise, it is often observed, lack of sufficient production capacity in certain strategic sectors may sooner or later halt a process of expansion because of the bottlenecks arising. In an open economy the situation is, in fact, somewhat different; since individual tradeable goods may be bought from or sold to the rest of the world, only the size of the production capacity in the T-sector as a whole matters (as far as tradeables

¹ Assume, however, that the N-sector mark-up for any given money wage may be regulated by price controls. Then the T-sector wage share may be set so as to achieve the rate of profit deemed appropriate to full employment growth, and price controls may adjust the mark-up in the N-sector accordingly (so as to satisfy the $r_T = r_N$ condition). In this case a particular wage share will not be implied by the maintenance of structural balance. Even the link between growth and the distribution of income (and wealth) may of course be broken by increasing collective saving provided that a sufficient "willingness to invest" can also be ensured.

is concerned). Unless capacity in the T-sector increases at a sufficient speed, the economy will face a structural imbalance (a "foreign exchange gap") which will be reflected either in a trade balance deficit or in domestic unemployment imposed by the external constraint.¹

Of course, sufficient price and wage flexibility may work as an equilibrating factor. Price changes may affect capacity utilization levels, investment allocation and may shift commodities from the N-sector to the T-sector or vice versa.² However, particularly in conditions in which substitutability is limited, the concept of structural imbalance seems useful in clarifying the nature of a problem which may be central to any "small", "open" economy partaking in free international trade.

¹ A related aspect is that the market mechanism could not possibly ensure correspondence of the pattern of demand and supply at each and every moment even if prices and wages were "flexible". Thus the importance of stocks emerges for the smooth functioning of an unplanned economy (or rather of any economy, centrally planned or not, in which foresight is less than perfect). In an open economy, in which individual commodities may be traded with the rest of the world, the situation is again somewhat different: availability of stocks of individual commodities is less important (for traded goods); instead, the foreign exchange reserve is crucial. See HICKS (1974, pp. 11—21).

² It should be observed that this is excluded by assumption in the T-N model.

6. Summary, Conclusions and Some Final Comments

In any small and (therefore) open economy, the policy pursued with respect to exchange rate determination will be an important determinant of macro-economic aggregates. The ways in which the exchange rate changes affect the economy will, however, depend in many ways on the functioning of the economy and in particular on the prevalence or absence of price and wage flexibility.

If all prices and wages are fully flexible, as assumed in the monetary general equilibrium approach, the choice between various arrangements for exchange rate determination is of limited "real" significance. When the exchange rate is fixed, all other nominal magnitudes will adjust to the exchange rate; in the flexible exchange rate system, on the other hand, all prices (including exchange rates) adjust to the given nominal supply of money. While attractively simple, these conclusions do not offer any profound insights of relevance to actual policy making; the assumption of automatic full employment is unwarranted and begs the essential questions.

Keynesian theory, by contrast, is designed (by choice of assumptions) to highlight the importance of policy actions. Assuming money wages to be fixed in the short run, devaluation analysts in the Keynesian tradition have usually concluded that a devaluation is expansionary but may possibly fail to improve the balance of payments. A related conclusion of the Keynesian policy analysis discussed in chapter 3 is that the twin targets of internal and external balance may be achieved by supplementing demand management policies with exchange rate flexibility. A further question which fits into the framework concerns the assignment of demand management and exchange rate policies: should exchange rate changes ensure external balance and demand management be directed to the internal target or the other way round?

This analysis was subjected to criticism on several accounts. First, as pointed out in sections (3.3) and (3.4), there has been a tendency to confuse the distinction between market arrangements for exchange rate determination and policy assignment of instruments. As a consequence, the potential useful-

ness of internally oriented exchange rate policy has not been systematically investigated. In fact, in small economies exchange rate policy may well have a comparative advantage with respect to the internal target with demand management policy correspondingly having a relatively stronger effect on the balance of payments. A consistent application of Mundell's principle would then dictate that exchange rate policy be used for internal balance purposes, leaving the balance of payments to be handled by monetary and fiscal policies.

Second, the robustness of the afore-mentioned conclusion was questioned by investigating the validity of the principle of effective market classification when there are time lags in the effects of policy on targets. It was found that Mundell's principle may be a seriously misleading guide to policy (the assignment may be unstable) if short and long-run effects of policy are different, as they may well be if the distribution effects analyzed in chapter 4 are important. If exchange rate policy has no real long-run effects, it will also, of course, be impossible to reconcile internal and external balance by demand management and exchange rate policies in the way envisaged by Meade (whatever the assignment).

While these points of criticism are "immanent" in the sense of accepting the target-instrument framework as such, some general limitations of such a set-up were also touched upon in section 3.6. One problem is that policy making and its outcomes may not realistically be viewed as depending only on market forces and a set of independent targets and instruments; in reality powerful interest groups with conflicting targets (particularly with respect to the distribution of income) are also involved. Another issue raised concerns the arbitrary character of the conventional specification of internal and external balance as symmetrical policy targets.

Chapter 4 was devoted to the more constructive aim of elucidating the potential importance of devaluation-induced effects on the distribution of income (and the composition of expenditure as between consumption and investment) as well as of the consequences of dynamic interrelationships between the real wage and the levels of exports and employment. In addition to being of interest in themselves, the income distribution effects were shown to have implications with respect to the employment and balance of trade effects of exchange rate changes. In particular, by reducing real wages and consumption a devaluation may be deflationary if short-run trade elasticities are small and the marginal propensity to import investment goods is relatively high.

The existence of time lags in the reaction of money wages and the market share of exports were also seen to have an important bearing on the "appropriate" assignment of tasks for demand management as compared to exchange rate (or money wage) policies. Section 4.5 attempted to throw further light on the potential role of the exchange rate by shifting attention from discretionary policies towards the norm of exchange rate policy and its significance for the automatic consequences of macroeconomic disturbances.

In the long-run context of chapter 5 the external balance problem was approached in terms of the intersectoral allocation of resources rather than by focusing on the relation between aggregate demand and supply or on the role of relative prices in influencing foreign and domestic demand patterns (as in short-run theory). The basic concept of structural balance was introduced and the consequences of an initial imbalance were analyzed under various assumptions with respect to the allocation of investment as well as the determination of prices and quantities. Additional sections discussed the relationships between devaluation and accumulation and some of the conditions for long-run growth to be balanced.

Before repeating some of the conclusions discussed in the preceding chapters, it may be appropriate to mention some of the major limitations of this study.

First, in the short-run analysis of chapter 4 many alternative specifications and amendments could have been considered; obvious omissions include wealth effects and portfolio behaviour, explicit budget restrictions, the role of financial markets, the interplay between inflation and inflationary expectations, the credit market implications of external imbalances, etc.¹

Second, international capital flows have been abstracted from or assumed to be strictly regulated by the authorities. As has been demonstrated by the asset approach to exchange rate determination, capital account events will be important for the working of a system of free exchange rates in the short run. If exchange rates are pegged, however, capital account developments will be of more limited significance (affecting mainly foreign exchange reserves and the effectiveness of monetary policy).

¹ There is also a methodological difficulty with the concept of "short-run equilibrium" (with some variables being predetermined) whatever the specifications of particular behavioural assumptions. This difficulty emanates from the fact that the predetermined variables are given only at a point of time; to reach equilibrium, however, some adjustment process (over time) must work itself out. During this process all variables will necessarily be changing *pari passu*; actually there can be no "equilibrium" short of the steady state.

Third, the treatment of the determination of prices and quantities of tradeable goods has been overly simplified. If the conventional assumption that output of tradeables is always equal to capacity or supply determined (any quantity being marketable at the given world price) held true, the external balance problem would be much simplified. Conceivably, there are important differences in this respect between various branches of the tradeables sector, some branches being more prone to price and/or quantity fluctuations than others. This implies that it is important not only to consider the structure of the economy as between the T- and N-sectors, but the internal structure of the sectors as well.

Finally, appropriate exchange rate policies cannot be determined without introducing some normative aspects or policy criteria; as a minimum, a set of "instruments" and "targets" must be specified. As was pointed out above, the presence of powerful groups with conflicting interests may create conditions in which policy making is more a matter of reconciling (if possible) conflicting interests than of counting independent instruments and targets. How these aspects of the predicament of macroeconomic policy making should most usefully be formulated is, however, an intricate problem beyond the scope of this study.

What, then, may be concluded with respect to exchange rate policy? Given the above-mentioned difficulties and the manifold and often ambiguous effects of exchange rate changes on macroeconomic variables, it should not be surprising that simple and unconditional conclusions are hard to come by; the modesty of the conclusions may correspondingly be argued to reflect the complicated nature of the problem. With appropriate qualifications and reservations (as discussed in the previous chapters), the analysis may, however, be said to suggest the following view on exchange rate policy.

First, the ambiguity of the output and the balance of payments effects of exchange rate changes implies that neither exchange rate flexibility nor discretionary changes need contribute decisively towards reconciling internal and external balance in the short run even if money wages were constant. Instead, the primary effects may be on the distribution of income and on the composition of demand. This supports the view that exchange rate policy should not be based on considerations of short-run employment or the prevailing trade balance. Given low short-run elasticities,¹ a preferable line of

¹ If short-run elasticities are high, on the other hand, exchange rate changes may be a powerful instrument of employment policy. (A devaluation in a slump need also not be considered beggar-thy-neighbour policy provided that imports are increased in line with exports.)

action is to aim at a stable level of competitiveness and rely on traditional demand management policies for the purpose of domestic stabilization. As was demonstrated in chapter 4, this may also imply that a devaluation should be combined with expansionary demand management policies.

Second, fluctuations in the world market prices of tradeable goods may always be offset by (and only by) corresponding exchange rate changes. If the dominating source of disturbances is recurrent "imported" inflationary impulses, the economy may therefore be successfully stabilized by replacing fixed exchange rates with an inflation norm as a guideline for exchange rate behaviour.

Third, exchange rate policy may conceivably influence the distribution of income and thereby the rate of accumulation as well as the allocation of investment. In this context it is important to differentiate between the functional and the intersectoral distribution of income. For instance, a devaluation of the exchange rate in combination with a certain wage increase (and regulation of prices of nontradeables) may be used to affect the distribution of income in favour of the tradeable sector while leaving the aggregate distribution between capital and labour unchanged. Such a policy would change the allocation of investment in favour of the tradeable sector and would thus be a requisite for the viability of a policy of full capacity utilization if a structural imbalance initially prevails.

Unless some additional actions are taken, however, a devaluation will not only favour the tradeables sector, but will also increase the aggregate share of capital income. The devaluation may of course also aim at such an increase in capital income in order to raise investment and growth. Unless the trade unions can be convinced of the desirability of using the functional distribution of income to regulate the rate of accumulation, such a policy will be successful, if at all, only at the cost of increased cyclical instability of the economy.

Finally, it should be pointed out that arguments against, e.g., balance of payments oriented exchange rate policy do not constitute a defence for fixed exchange rates (though fixed and flexible exchange rates have often been discussed in this way in the literature). There is no well-documented set of arguments to demonstrate that a system of fixed exchange rates is the best of conceivable systems, or that there are no practical means of improving upon it. On the contrary, it has been argued above that exchange rate policy pursued according to an inflation norm would be likely to be preferable to fixed exchange rates as the basic policy in relation to which discretionary actions may be defined. The fact that many small economies, including the

Nordic countries, still seem to prefer variations of fixed (pegged) exchange rates in the conditions presently prevailing — itself being a phenomenon requiring explanation — should therefore signify that continued interest in the problem of exchange rate policy is amply justified.

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