THE ADJUSTMENT OF PAYMENTS AMONG OPEN FINANCIAL ECONOMIES.

THE TRANSFER THEORY APPROACH

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Roberto Tamborini

INTRODUCTION

1. A study in international monetary economics

The field of the present work is international monetary economics, and its analytical focus is the adjustment of payments among economies participating in an integrated international system. This choice has been made in the belief that multilaterality and interdependence are essential features of "open" economies that cannot be studied properly from the usual individual-economy standpoint. Moreover, this work is concerned with the adjustment of overall payments, that is to say more precisely, with the interrelations between trade payments and financial payments at the level of the individual economy and of the world economy as a whole. As far as the adjustment of payments is concerned, two different theories have been propounded since the early days of international economics. The one theory maintains that financial payments can only "compensate" for trade payments -these latter being regarded as the true independent variable; this may well be defined as the "classical" view. The other theory states that it is instead trade payments that are adjusted to autonomous and independent financial payments; this being the main feature of the so-called "transfer theories". The analysis of world payments adjustments in this vein has recently regained momentum (see the useful overview by Dornbusch (1987a)) under the pressure of the dramatic financial transfers that have dominated the world scenario in the last decade, and will dominate it in the future, such as the world capital overflow towards the United States, the related debt transfer problem of the United States which will soon fall due combined with the analogous problem of developing countries, the incipient huge demand for capitals of Eastern European countries and the Soviet Union. The study presented here aims at developing and generalizing the analytical contributions drawn from transfer theories as an approach to the international movements of real and financial resources and the adjustment processes of the related payments.

To introduce to the motivations and implications of this proposed approach, it should be said at the outset that the essential difference with the classical view lies not only in the idea that financial transactions are able to determine the extent of trade balances, but more importantly this idea is traced back to a reconsideration of the theory of the monetary economy.

International monetary economics has been largely involved in the past two decade's programme of reduction of all branches of economics to the first (Walrasian) principles of value and exchange -the so-called "microfoundations". The severe requirements of microfoundations have brought about some valuable theoretical results; one of the most important is that we can now see more clearly where our branch is not fully reducible to the theory of value and exchange, and where the straightforward application of those principles to international monetary matters may hide pitfalls.

Let us begin with the motivation itself for the theory of international payments, to which this study hopes to contribute. Traditionally, the key issue for both theory and policy is under what conditions, and with what consequences, each national economy brings its worldwide autonomous transactions in goods and assets into balance. However, according to first principles, all sorts of transactions stem from independent, decentralized decisions led by signals and constraints perceivable by agents whose ultimate end is the satisfaction of their needs through consumption. The fact that transactions are mediated by money, as Frank Hahn has repeatedly stressed, finds no room in the theory of value and exchange (1982); to a greater extent, the same applies to the coexistence of different monetary conventions, and to the importance we all usually attach to the distinction between "national" and "international" transactions as well as to that accounting sheet called "the balance of payments". If in, and among, markets exchanges happen to take place through means of payment, the former must be matched by the circulation of the latter, and we obtain nothing but a circular flow of deliveries against monetary payments. It is the existence of sovereign states and currency sovereignty that has long legitimated a specific concern with "external" transactions and payments; for currency sovereignty generally entails responsibility over limited means of international settlement. Furthermore, concern with official reserves leads to their hoarding as store value -another piece which hardly fits into the exchange economy of pure theory. Finally, monetary authorities are the only agents who directly perceive the "external constraint", whereas private indvidual agents may face it only to the extent that monetary authorities are able to enforce it.

If we attach economic importance to international monetary relationships and dignity to the study of them, we are also attributing money with a status it cannot have in the theory of value and exchange. Therefore, the first part of this work sets out to search monetary foundations consistent with the role that money plays on the international stage; a search which should dispense with today's rephrasing of the old classical dichotomy between the "real" (Walrasian) economy of pure exchange and its "monetary veil". Current research on monetary foundations is still far from this goal, but it has been able to open a promising track by looking into the key concepts of **time** (in particular sequential time) and **uncertainty** (in the meaning of incomplete information). In Part One these concepts are used to characterize the **open financial economy** as a sequential-time economy in which production and consumption decisions are made over a limited time horizon, are not pre-reconciled by tatonnement devices, but are instead co-ordinated through time (but also across markets) by means of "wealth carriers" (financial instruments). A particular instrument working as **general** means of payment and store of value can plausibly emerge only if uncertainty, in the form of incomplete information on all possible future states, and hence lack of contingent contracts, is introduced as a corollary to time.

This road leads us out of the Walrasian world. As recent studies in decision theory have shown, incomplete information gives way to **precautionary behaviour** (or "flexibility") in alternative to expected utility maximization; whereas the expected utility maximizer spreads his claims to future consumption over the whole set of possible contingencies, the cautious agents seeks to minimize the consequences of forecast errors with positive probability. One way of doing this is by accumulating financial assets. Money can survive among alternative assets thanks to a particular form of precautionary behaviour, otherwise known as **liquidity preference**; in fact the service money renders is to minimize, or nullify, the probability of nominal losses in the transfer of wealth across markets and through time.

Generally speaking, we move to a situation of **monetary and financial non-neutrality**. Non-neutrality is a general consequence of the fact that decisions entailing commitments to specified future states, when such commitments can be modified only at an uncertain cost (namely production and investment), are conditioned by the financial position that can back them up. In fact, actual financial instruments, unlike Arrow-Debreu pure securities, are tailored precisely to avoid binding specification of future state-dependent commitments and to minimize the liquidation cost of no-longer desired positions (where money bears zero liquidation cost). International payments theory draws significance not from the assumption of worldwide pure exchange, but from the non-neutral distribution and circulation of monetary and financial instruments. There is also a specific implication of non-neutrality which should be mentioned introductorily. As is well known from information theory, incomplete information (or an asset vector of lesser order than all future possible states) constrains the economy to less-than-optimal market allocations. Hence, it seems that when money is "essential" it is also non-neutral on the achievements of the economy, and in particular, the Two Fundamental Theorems of Welfare Economics, which crown both classical and modern dichotomized monetary theories alike, can no longer be taken for granted. No doubt, however, things could even be worse in an uncertain financial economy without money.

Once we recognize that money may be a token of informational imperfection, and hence it may be associated with market failures, another seemingly happy marriage runs into troubles, namely that between money and rational expectations. As is discussed in some detail in the first chapter, if all the informational axioms of rational expectations held, so that stochastic realizations of the predictions of the pure theory of exchange occured, then money would be driven out of the economy. A more promising marriage would then seem the one between money and imperfect-information expectations. Unfortunately, research in this field is still in its infancy and we do not have a box of tools ready for use; however some basic principles and methods are presented in the first chapter, which are then recalled in some expectational issues encountered in the analytical development of the work.

Part One also assembles the building blocks of an open-economy model with monetary and financial non-neutrality in the light of the above- mentioned monetary foundations and of recent macroeconomic advances in this direction. The macroeconomics of the financial economy in this work will be a coordination problem among decision units which are distinguishable not only in terms of their objective functions, but also in terms of their positions in the time sequence of the economy and, consequently, their financial structure (basically net spending and net saving units). Sequential time imposes to specify the financing of current production; here the market for working capital is the money market, which should thus be kept distinct from the market for money as an asset. Assets span from money deposits to variable-return assets, obtaining results in the spirit of, though not identical to, portfolio theory. Under well specified conditions, consumption and investment decisions turn out to preserve essential Keynesian (or perhaps "New Keynesian") characteristics, while production and pricing fail to conform to perfect competition; hence, macreconomic equilibrium will have Keynesian characteristics too.

2. International payments theory and the transfer-theory approach

For the reasons expounded above, money and finance have always been in an uncomfortable position in international economics. The classical theory of international payments was (is) the academic application of the principle of "monetary veil" and its associated money-prices quantity mechanism. This theory has constantly been developed and applied despite the fact, mentioned previously, that the "external constraint" and all that it entails do not have clear foundation in the (supposedly) underlying pure exchange economy. More coherently, classical fathers maintained that international payments were not a true problem, that money could only follow goods, and that there was no economic rationale for international capital movements when these could entirely be replaced by goods movements. In this picture, non-trade autonomous payments (due to special circumstances like the payment of tributes, war debts, military expenditures, etc.) only give rise to temporary disturbances, which are automatically corrected and which exert no permanent influence over the determinants of international trade. In connection with these disturbances, however, it was recognized that the adjustment mechanism of payments could reverse its direction, that is, goods could follow money. This was called the **transfer mechanism** to signify that unilateral money transfers were followed by goods transfer by the same amount thus leaving overall payments in balance. Almost all handbooks of international monetary economics have a section on the transfer mechanism in this ancillary position inherited from the classics.

Following the development of neo-Keynesian macroeconomics during the 1950s and 1960s, non-trade, financial payments were recognized as a stable and essential feature of the international system, one able to impose substantial modifications on previous analyses and prescriptions. The Mundellian framework provided the new basis for studying international monetary relations. The fundamental innovation was that establishing the **open-economy macroeconomic equilibrium** involves the markets for goods, for money and for assets simultaneously. Hence, movements of funds across domestic and foreign asset markets alike were "endogenized" as a function of differentials in asset returns, as yielded by nominal interest rates, current and expected asset prices and expected changes in exchange rates. More recently, another important advance has been made thanks to the principle of **stock equilibrium (steady state)**. This has been added in order to correct the implict result in Mundellian "internal-external equilibria" of boundless willingness of asset holders in one country to finance the foreign deficit of another, while theoretically full equilibrium is not established until stocks are invariant. As a consequence, whereas international payments theory has traditionally focused on the balance between trade and capital account, current analyses have completely centred on steady state conditions where trade balances (or current accounts) are zero and there are no capital movements worldwide.

The extreme importance attached to the financial component in modern international economics has not, however, brought any substantial change in its classical function as the dependent or compensatory component in international payments with respect to the real one. Even in common parlance capital movements are usually referred to as "compensating" or "financing" trade imbalances. This view emerges clearly from Mundell-Fleming original models and is also apparent, with some important qualifications, in their later developments that I have just mentioned. In a system where the equilibria of the financial and real markets are determined simultaneously, it seems that the former can have no autonomy whatsoever: the equilibrium of the financial market is entirely coincident with the equilibrium of the real sector (which signals the so-called "fundamentals") and can only be upset by real shocks or by shocks of fiscal and monetary policy. It is true that in the portfolio approach, in a system of flexible exchange rates, the adjustment of asset markets has a direct effect on the trade balance. But this is the case only in "the short run", while, over "the long run", financial flows assume again the role of compensating for trade disequilibria until their complete exhaustion.

Such a conventional view is not completely suitable for the study of the adjustment of international payments in the system as a whole (and consequently in the individual country too). The first and most apparent reason is that a large amount of financial payments remains unmodelled -as was remarked by Machlup several years ago (1965). Financial payments do not stem from portfolio adjustments only; direct investments, governments transfers due to international commitments, capital and labour incomes paid internationally or payments imbalances ("indirect transfers") due to shocks to terms of trade, phenomena which mostly concerned old transfer theories, have by no means disappeared; actually, they are all means by which financial resources are moved from one economy to another in the world.

Also, there is a more fundamental reason for dissatisfaction. Although decisions to transfer capital may admittedly be due to some "shock" in some part of the world, in view of the fact that there are n countries but only n-1 independent balances of payments, capital transfers in at least one country cannot be endogenously determined in relation to the desired trade imbalance. In fact the opposite must happen: in at least one country it is capital transfers that represent the exogenous variable, **a transfer problem,** given the **ex ante** desired trade imbalances of the rest of the world.

As Kindleberger shrewdly pointed out, the relation between financial and trade payments appears a typical "chicken and egg" problem (1968). What we actually **observe** is nothing but a circular flow of monetary means. Attribution of cause and effect can only derive from some **theory** of production and consumption in a monetary, or I would say a financial, economy. Hence we realize that subscribing to a theory of financial non- neutrality as explained previously in par.1, as an alternative to neutrality theories, cannot be without consequences upon international payments theory either. Indeed, if all goods-market decisions of agents dispersed in the world are found to be conditioned by agents' financial resources, the natural consequence at the international level should be that the acquisition of real resources by each individual country (and ultimately by the overall system) cannot be determined independently of the level and distribution of financial resources. In aggregate terms, the international transfer problem is by no means different from the closed-economy problem of transferring capitals from savers to investors (and there is no presumption that this problem is exclusively due to the public sector). In other words we should reverse the classical view and say that "fundamentally" goods follow money.

The theoretical development of this principle is the subject matter of Part Two. The task will be accomplished on two interrelated grounds: first, the static-comparative study of the properties, both in analytical and historical perspective, of different patterns of world transfers of financial and real resources; second, the analysis of transfer models of world payments adjustments, which is of paramount importance for understanding how a particular network of payments is established, how it determines the economic performance of individual economies, and how the whole system can (or cannot) achieve the scenarios previously described. Notice that saying that "fundamentally" goods follow money should be interpreted as a result of so-called "fundamental analysis", not as a claim of deterministic laws governing the world economy in all times and circumstances.

The resulting picture not only reverses the traditional priority of the determinants of trade over those of finance in the world economy, but also shifts the analytical focus from today's almost exclusive conditions of stock equilibrium (stationary state) back to conditions of flow equilibrium. The logical necessity of stock equilibrium is by no means neglected; rather, it is carefully discussed in its implications and relevance (e.g. for the sustainability of world flow equilibria) within a framework where international economic adjustments as capitals are flowing, instead of world stationarity, matter the most.

3. Transfer theories. An overview

The development of the analysis of the "transfer mechanism" of resources should begin by recovering those "lost ideas" that have fallen by the wayside during the long progress of international payments theory. Johnson (1956), who gave an extremely useful systematization of the transfer theory, emphasized that the real root of the transfer problem is the pattern of financing in the transfer country (T), and of utilizing in the recipient country (R), the financial transfer. The source, or the outlet, of the financial transfer may be the existing stock of assets (including official reserves), or the current flow of expenditure, or both of them in some proportion. In this framework the whole array of transfer mechanisms that have been envisaged since the Napoleonic Wars can find a place.

At the one extreme we shall first examine the classics' idea that the transfer problem is essentially a **currency problem**; that is to say, non-trade payments are unilateral shifts of "gold" such that their source and outlet are official reserve stocks. The economic variable which is usually associated with this kind of transfer mechanism is the real exchange rate; T excess demand for R currency gives rise to real depreciation in T, and consequently, to net positive exports from T to R. Among the most representative advocates of this approach we find Mill (1848), Taussig (1919, 1928), Viner (1933) and Keynes (1929, 1930); however, it is apparent that almost everyone who is now thinking of the future U.S. transfer problem of external debt is applying quite the same model (e.g. Branson (1985), Krugman (1985)). Variations across currency transfer-models concern the links between the foreign currency market and the real exchange rate. In the strict classical transfer model, where the nominal exchange rate is fixed, a monetary transmission between the currency stocks and relative prices in the two countries is necessary. Obviously, changes in the nominal exchange rate can partly or totally take over the adjustment of relative prices. In any case, an important result is that variations in real exchange rates (and, if the case, in nominal ones too) are explained as a necessary step in the world transfer process, rather than as an undesirable departure from stationarity due exclusively to uncoordinated policies as in current views.

It is certainly true that any form of international financial transfer has to go through markets for foreign exchanges, however such a simple definition of the problem overlooks a number of other economic variables that may get involved in the **financing-utilization problem** of the transfer. Generally speaking, financial transfers involve decisions of other agents, in addition to central banks, as to their possible sources and uses. According to the taxonomy outlined above, a purely **financial transfer model** will be analyzed such that the source and outlets of financial means are the stocks of assets in the two countries. In this kind of transfer model, the main transmission mechanism is therefore the vector of asset return rates through financial non-neutrality effects on real expenditure and income across countries. We are thus led into the realm of current portfolio models, which, as noted previously, can claim to cover only a part of the phenomenology of international payments. On the other hand, we shall also have to consider the possibility that financial transfers impinge directly on current expenditures (such a pattern is in fact likely for important classes of international payments such as tax-paid government transfers, direct investments or indirect transfers due to shifts in terms of trade). In this case we shall be able to synthetize a wide array of transfer theories based on **pure expenditure models**, which historically have been introduced as the alternative to the classical price-specie-flow mechanism since the early insights by Ricardo (1809) and then by Ohlin (1929, 1933) and by proponents of the Keynesian international trade models (e.g. Machlup (1965, part V)).

It goes without saying that, under the floating regime, the nominal exchange rate adds to the factors capable of linking goods transfers to financial ones. The models examined here will confirm the general presumption that appreciation of R-economies' currencies may be regarded as a fundamental result of international portfolio adjustments:

on the one hand R-currency nominal appreciation contributes to world asset markets adjustment, while on the other it fosters goods transfers from T to R. Notice, then, that the conclusion of the classics is still valid: (real) exchange-rates dynamics is dictated by world transfer processes, quite independently of policy mismanagement. In the last few years, such a world-transfer view, albeit not with full acknowledgment, has gained consensus among leading scholars (e.g. Dornbusch (1987a)).

Differences and similarities between my main results and traditional as well as current views will be discussed rather extensively, especially with regard to adjustments of portfolios in T-economies in favour of R-economies' assets, and their effects on real expenditures, incomes and payments in the world economy. It is worth anticipating that a general presumption will emerge against the case that the world transfer process leaves real income unaffected, and in favour of the case that T economies experience a real loss if they wish to preserve external balance, no matter what the exchange rate regime is. Exchange-rate dynamics, too, will deserve accurate comparison between current views and the results of the approach proposed here. Assuming perfect real and asset markets, it is usually concluded that the fluctuation of the exchange rate will enable optimal transfers of resources in that it eliminates payments imbalances and therefore intervention by central banks. In fact, taking R asset supply as given, there exists an equilibrium vector of exchange and asset-returns rates such that T is ready to offer the desired transfer of capitals and goods to R. This new, optimistic version of the transfer problem -one closely linked to the experience of the United States during the period 1980-85 - begs a number of questions which instead put under trial the assumption of efficient foreign exchange market and the achievements of the floating regime.

4. Plan of the work

The aim of Part One is to give a consistent characterization of an economy which makes use of monetary and financial instruments (called **the financial economy**) starting from the principle that such an economy cannot consistently retain the usual Walrasian properties. Chapter I is concerned with the foundations of the uses of monetary and financial instruments; it moves from recent theoretical research on sequential time, uncertainty and the uses of money to show in what respects the financial economy departs from the Walrasian economy (sec.1). The key to understanding the financial economy is seen in imperfect information, specifically incomplete information and lack of complete contingent markets; general principles of imperfect information, uncertainty and market inefficiency are expounded in section 2. Section 3 introduces precautionary behaviour, as opposed to expected utility maximization, to explain asset holding. By applying the same methodology, liquidity preference is deduced from precautionary behaviour to explain money holding. Finally in section 4 it is also shown how international monetary economics draws significance from the above monetary foundations.

Sequential time, uncertainty and the uses of money as considered above have distinct macroeconomic implications that are developed in chapter II. Section 1 sets forth the basic elements of macroeconomic analysis in terms of interaction and coordination among decision units that are defined according to their objectives, their information endowments and their financial position. Section 2 defines the criteria and methodological instruments of macroeconomic equilibrium.

Chapter III builds up a macromodel of the open financial economy on the foundations laid down in ch.I; its results, though not all systematically, will be available to use in the various analytical contexts of transfer models. Two sections (1 and 2) are devoted to analyzing the money market in stationary state and then in the expanding economy (where investment, saving, the public budget and the balance of payments are not nil); the sequential methodology introduces the important distinction between the market for monetary working capital (where the banking system and production units interact to set the discount rate, or the the basic money interest rate) and the market for money as an asset (money deposits). Section 3 adds the asset market, with assets ranging from money deposits to variable-return assets. The method of precautionary behaviour and liquidity preference is here applied to obtain asset prices. Stock equilibrium with foreign assets, under fixed and floating exchange rate, is analyzed in detail. The goods market is considered in section 4, where decisions of consumption, investment, production and pricing are examined. Consumption and investment decisions, under well specified conditions of precautionary behaviour, display Keynesian features with important qualifications related to the explicit role played by the agent's financial position. Production and pricing, being framed in a sequential setting, are analyzed as producers' forward-looking decisions; as a result of the conditions of imperfect information, price making turns out to be imperfectly competitive. Section 4 ends with the determination of macroeconomic equilibrium.

Part Two develops the methodological, historical and analytical elements in the proposed transfer approach to the adjustment of payments among open financial economies. Chapter IV begins with taxonomy, methodology and lessons from history; the latter two (sections 2 and 3) are closely related since they show how the transfer approach can be used as an ordering principle for theoretical as well as historical world scenarios. The analysis of transfer models will show and discuss a number of explanations of the capability of financial transfers to induce goods transfers across integrated economies while leaving the world economy in flow equilibrium. The treatment is organized according to the different definitions of the transfer problem to be found in the literature, while it places them into a wider interpretative framework based on the so-called **financing-utilization pattern**.

Chapter V starts with the transfer problem as a currency problem. In its classical version (section 1), the currency transfer problem is essentially based on shifts of "gold" from T to R-economies which involve the adjustment of the real exchange rate. Section 2 revises the assumptions and the predictions of the classical transfer model in the light of some stylized facts. Three important modifications on the classical body of the model are considered: an alternative monetary mechanism based on the discount rate, the distinction between tradable and non-tradable goods, and the flexible exchange rate.

Those parts of the classical theory that prove to be unsatisfactory are mainly due to the restrictive specification of the transfer problem and to the assumptions of the macroeconomic model; hence chapter VI (section 1) introduces wider possible specifications of the financing-utilization pattern, on the one hand, and adopts the macroeconomic model of the open financial economy of chapter III, on the other. Therefore chapter VI encompasses models based on pure financial effects as well as models based on pure expenditure effects, under the fixed and the floating exchange rate regime (section 1 and 2).

Finally chapter VII addresses some issues in exchange rate dynamics in the light of the proposed transfer approach, and in comparison with current theories. Section 1 defines the so-called "fundamentals" of exchange rate dynamics in this approach, and stresses that the latter entails a major change of focus relative to early asset-market theories. Then the transfer models previously elaborated are used to establish in what respects exchange rate dynamics in the world transfer process may differ from the representation in conventional models; this is done with regard to the path(s) towards world flow equilibrium as well as to the long-run evolution of the world economy. Having thus defined the fundamentals, section 2 raises the question of how well the exchange rate may be expected to work, that is to say, to reflect fundamentals efficiently. The foundations of Part One play an important role in the answer, since they lead to the imperfect information hypothesis in the analysis of the issue of exchange-rate efficiency.

PART ONE

THE OPEN FINANCIAL ECONOMY

CHAPTER ONE

TIME, UNCERTAINTY AND THE FINANCIAL ECONOMY

Introduction

The theoretical framework of monetary economics that has emerged as dominant from the fierce clash between Keynesians and Monetarists is a highly sophisticated, updated version of the older "dichotomy" between the Walrasian "real" economy and its monetary "veil". The anchor of the latter to the former is ensured by the **assumptions** of market general efficiency and rational expectations. Thus the popular idea is still that an economy which uses money and securities can naturally be analyzed within the Walrasian apparatus and by means of Walrasian tools. However, such an idea is sharply in contrast with the well-known finding of fundamental "inessentiality" of the use of monetary instruments in a Walrasian economy (Hahn (1973, 1982, 1988). Roughly speaking, "inessentiality" means that in such an economy there is nothing that cannot be done without money, and in particular there exist non-monetary general equilibria. If this finding is correct, current monetary economics seems to suffer from a serious misunderstanding of its own subject matter. The aim of this chapter is to identify the basic elements for a consistent characterization of the subject matter of the monetary economist.

In the first place this chapter concentrates on time and uncertainty as keys to understanding the uses of money in the market economy (sec.1). After having recalled basic principles of market general efficiency, a shift of focus is proposed from the traditional exchange economy to the more general **financial economy**. A financial economy belongs to the class of "**timesequence economies**", in which production and consumption decisions are made over a limited time horizon and are linked from one period to the next by means of stores of value (**financial instruments**). To recall Radner's famous statement, an economy which uses money must be a sequence economy (1968), but sequence time may not be sufficient. After a brief survey of major "innessential" attempts to graft money onto a Walrasian economy, the chapter draws on recent developments in monetary theory (e.g. Hahn (1988)) which relate the use of an instrument working as general means of payment and store of value to the lack of information on all possible states of the economy and to the absence of contingent markets (secs.2-3). Throughout the present work, **uncertainty** will indicate these latter characteristics of agents' decision framework.

This road leads us out of the Walrasian world. The first reason is that, as market efficiency theory has proved, an economy in which the price space is of lesser order than that of possible states is constrained to inefficient allocations. The second reason is that uncertainty as due to incomplete information and lack of contingent contracts conflicts with the orthodox theory of economic behaviour. The risk-averter expected utility maximizer is in the conditions to place himself in the most preferred position for any possibile future contingency; by contrast, the uncertain agent has to cope with the consequences of unforeseen (or uninsurable) contingencies. Hence human fallibility in forward-looking activities is quite binding whereas it plays little or no role in economic theory. Recent research in this field has revived interest in the idea of **precautionary behaviour**, in alternative to expected utility maximization, as a rational conduct of fallible individuals in the face of uncertainty (the Appendix traces a line of thought which goes from Knight's (1921) early emphasis on human fallibility in economic decision-making, to Hicks's (1979) and other decision theorists' (Jones-Ostroy (1984)) reformulation of Keynes's "precautionary motive" in terms of "flexibility", up to the "New Keynesian" revival of the issue by Greenwald-Stiglitz (1987, 1988)). This paper devises a simple model of precautionary behaviour, based on the minimization of a finite and positive probability of error (see the Appendix for details), to investigate into the role of money and securities in the financial economy.

Section 3 shows that under uncertainty asset holding can be related to precautionary behaviour, e.g. to the consumer's objective to minimize the probability of default on his normal stream of payments, instead of maximizing the expected utility from future consumption. Parallely, the uses of money emerge because of agents' precaution in the choice of how to transfer wealth across markets and through time. In particular, by means of a portfolio choice problem in which the objective is to minimize the probability of loss in the monetary value of wealth, we shall see that money holdings must be positive independently of agents' tastes. The probability of nominal loss in wealth may well be defined a **liquidity problem**, and hence **liquidity preference** turns out to be a particular form of precautionary behaviour.

Finally, the chapter (sec.4) also aims to characterize the international dimension of the financial economy. It is stressed that the international dimension has no economic relevance in general equilibrium theory, whereas such a relevance may only derive from political judgements -which are not our concern here- or from the existence of different monetary constitutions and sovereigns. Money is doubly "essential" in international economics.

1. Time, money and finance

1.1. Monetary economies.

A monetary economy is an economy which uses money. Such a definition is not tautological if one can show that the use of money is, in some sense to be defined, rational. Consequently, a theory of the monetary economy has to be based on a theory of money. The importance of this seemingly pointless distinction between monetary theory and theory of money was advocated by Hicks as early as 1935.

The first, natural step of explorers into the nature of money has always been to look at "what money does" (Hicks (1967, p.1)). This can be justified as a sound empirical attitude, but immediately leads to a serious difficulty. Let us start by observing what money does today in "our own economy". We shall see that money performs three well-known functions: **unit of account, means of payment** and **store of value**. Thus anything acceptable as **standard, currency** and **reserve** is, in principle, money. Yet these three functions are generally performed by one single instrument -fiat paper notes issued by a State agency. We also accept it as natural that different State agencies should issue differently denominated monetary instruments. The difficulty arises from observations in different times and economies. For then we see the most varied combinations of each of those three functions with the others, and with different physical instruments, in a way that it makes it impossible to define "what money does" independently of the time and place of observation. And even if we take money to be one or more of those functions, regardless of the physical instrument employed, any attempt to isolate the genesis of money is inconclusive -or meaningless, since it should be pushed so back in the past that virtually all known forms of economic life could claim to be a monetary economy[1].

If historical excursions are discouraging, they are nonetheless a powerful antidote against the abstract modelling of the "invention" of money. After long and deep explorations in monetary history and theory, Hicks had to conclude that the theory of money is always topical (1967, ch.IX). Few monetary economists seem fully aware of this peculiar aspect of their subject, nor do they seem prepared to accept its consequences. Most disputes live on different definitions of money -or of money functions- which in turn derive from different, often hidden, characterizations of the monetary economy under examination (Leijonhufvud (1983)). Thus, the correct question should be: "What does money do in **our own monetary economy?**", which calls for a characterization of "our own" monetary economy. When we shall be able to give a satisfactory answer, we shall also be able to understand why a market economy uses State notes as standard, currency and reserve, and, accordingly, how it works.

1.2. Money and exchange. The pragmatic view.

The core of modern economics derives from Adam Smith's perception of "our own" economy as an **exchange economy**. Monetary economics is no exception - suffice it to read Book I, chapter IV of the **Wealth of Nations**, where the reader will find the distinctive concern of classical monetary theory: the efficiency of money as a medium of exchange of commodities.

In the exchange economy money enters the picture as the sum of money balances endowed to traders with a view to their future exchanges. Provided that the use of a general medium renders commodity exchange more feasible, the problem of efficiency is reduced to that of the exchange value of money itself. As is well known, this is also the economy of the quantity theory of money. The quantity theory appears to be a theory of the exchange value of money according to demand and supply. But, as Mill aptly pointed out, "it is indifferent whether, in characterizing the phenomena, we speak of demand and supply of goods or of demand and supply of money. They are equivalent expressions" (1848, Bk.III, pp.12-13). Surprisingly enough, the reference to money turns out to be redundant.

Indeed, in the classical monetary theory in general, and in the "quantity tradition" in particular, one could hardly find a satisfactory theory of money[2]. The quantity theory claims to explain how a monetary- exchange economy works, but it is rather loosely related to an inquiry into the nature of money. It is well known that Walras (1900) proved the existence of exchange general equilibrium in the absence of a general medium and even of a unit of account; the idea of "dichotomy" between real and monetary exchange was thus given an unshakeable confirmation (1900, Lessons 29-30). Thus money's function as general medium is accepted as a matter of fact or as an alleged development of the barter economy, with no need for further inquiry. Such a "pragmatic approach to money" -in Patinkin's words (1982, p.6)- marks classics' monetary theory, and perhaps most moderns' attitude. Indeed, the modern theory of the monetary-exchange economy (popularized as "monetarism") is based essentially on the function of money as medium of exchange, on the consumer's desired cash-balances, on the gross substitution principle between money and real assets, and, in the last instance, on a given state of Walrasian general equilibrium of real production and exchange[3].

The basic reasons for dissatisfaction with the classic tradition, and the foundations of the modern approach to money and monetary theory, are still those laid down by Hicks in "A Suggestion for Simplifying the Theory of Money" (1935)[4].

I would disentangle Hicks's "suggestion" into the three following points. First, in so far as only the medium of exchange is considered, money holdings -desired cash-balances- are a dead-end in the pure theory of exchange: they are nothing else than the monetary equivalent, the "veil", of goods and services on current demand. There is no choice of money against anything else, and no rationale can be given to holding money.

Second, only when it is recognized that money is chosen "rather than other things", only when money is regarded as an asset to store value, will there be true matter of choice analysis. Third, when money is a store of value, there is a double choice to be analyzed: money **vis à vis** goods, and money **vis à vis** other assets. It is time that underpins those three points. Money holdings are a genuine problem (i.e. they interfere with Say Law) only when demanders of commodities (or of services) hold money in excess of planned consumption (or production), and this can only occur if their wealth is to be carried through time. The demand for money is not the consumer's demand for transaction balances, but the wealth holder's demand for a store of value.

The subsequent story is well known and at the moment we need not go deeper into its theoretical details. Rather, it should be noted that the theory of the wealth holder's demand for money has been developed as if it were independent of the first point, which, one year later, did not find a place in Keynes's monetary revolution -in chapter XV of the **General Theory** the consumer's demand for money (the transaction motive) is mingled with the wealth-holder's demand for money (the precautionary and the speculative motives). This is the form in which "the demand for money" has been handed down since 1936. But revolutionary though the inclusion of the wealth holder may be, such a mixed form of the demand for money made theoretical rigour, and probably more revolutionary implications, vanish. I dare say it is doubtful whether Keynes or Tobin have covered Hicks's road up to the end. Room was still left for "the great traditional evasions which have led to Velocities of Circulation, Natural Rates of Interest, **et id genus omne**" (Hicks (1935, p.66)).

On the other hand, one major subsequent discovery has been that the theory of money as a "time machine" represents one crucial point of departure from Walrasian economics of monetary exchange. Most of Walras's successors have come to conclusions rather distant from those of Friedman[5].

To the fastidious theorist -in Hahn's words- the most serious challenge that the existence of money poses is this: the best developed model of the economy [the Arrow-Debreu model] cannot find room for it. (1982, p.1).

However, it seems to me that a decisive step forward in the understanding of money as essentially related to time has only been possible after "the missing ring" -information- came fully to light. Thus it is from this viewpoint that I propose to look at "our own" monetary economy.

1.3. Market general efficiency in the timeless economy.

The previous paragraph recalled the principle that market general efficiency can be proved to exist independently of the existence of money. Since this is a fundamental point in monetary theory, we shall now review its conditions and implications in some detail.

The efficient allocation of resources is such that, given the relative price of any pair of goods, the marginal rate of substitution in consumption equals the marginal rate of transformation in production of those goods, the two marginal rates being equal to the relative price. General equilibrium theory shows that **market general efficiency** (MGE) is an achievement of perfect competitive markets. Given individual endowments, well-ordered preferences and production functions, there exists an equilibrium price vector such that the allocation of resources is efficient in all markets[6].

Two aspects are to be stressed. First, efficiency ultimately relates to the allocation of resources in view of consumer utility maximization. Second, efficiency is not a matter of degree: an allocation is either efficient or it is not, and it seems deplorable to stretch this attribute to cover anything in the economic system that in some way "works well". On the other hand, such a rigorous definition of efficiency is extremely demanding.

In the first place, all markets must be **perfectly competitive**. We shall have to focus on one condition which is today regarded as crucial: **perfect information** (Stiglitz (1985)). Perfect information exists when:

(i) **information is complete**: all necessary information is costlessly available to all agents;

(ii) **information is efficient**: all agents observe the same current prices and hold the same expectation of future prices conditional on the current information set.

Note that efficient information is only necessary, not sufficient, to achieve general efficiency: information transmitted by competitive prices must be complete too. The efficient information hypothesis has become a cornerstone of modern macro and microeconomics, especially with regard to asset and money markets, whether it is taken as an assumption or as a hypothesis to be tested. Efficiency in information processing is of course an extremely interesting characteristic of market organization to examine; yet the chief reason for interest seems to be the welfare implication that informational efficiency (IE) is synonymous with MGE (e.g. Fama (1970, p.383)). Such a proposition is not correct. Competitive prices that "fully reflect" all available information dispersed among individuals work like a clear transmission channel, but we also need the **correct signal** to be channelled. This correct signal is identified in the Arrow-Debreu intertemporal version of general equilibrium.

Consider "market organization 1" (**MO1**)[7]: for C goods and 1 current + T future consumption periods ($t = 0, 1, ..., T$) all current and future markets exist and are open at time ($t = 0$); all current and future contracts are struck at time ($t = 0$) with no recontracting.

Take commodity 1 as numeraire. Then, the correct signal consists of a price matrix $[P^*]$ of dimension $[C(T + 1)]$ with ($p_{10} \equiv 1$) . If consumption is contingent on the state of nature that actually obtains, and this state is not known with certainty but only probabilistically, then for S different possible states of nature ($s = 1, ..., S$) in each date ($t > 0$), each state having probability f_{st}, the correct signal consists of a price space of dimension $[C(TS + 1)]$ with ($p_{10} \equiv 1$). The price space can conveniently be decomposed in the **current price vector**

$$p^*_0 = [p^*_1, ..., p^*_c, ..., p^*_C]_0$$

and the **future price vectors**

$$p^*_{ts} = [p^*_{1s}, ..., p^*_{cs}, ..., p^*_{Cs}]_t \qquad \text{for each } (t, s)$$

Quantity vectors $[q^*]$ will follow the same notation.

State-dependent allocations. Risk aversion. When consumption decisions are state-dependent, consumers are not certain about the utility they will draw from them at future dates. However, provided that the full price space exists, agents with monotonic, strictly convex preferences will choose their optimal allocation consisting of

C goods for current consumption and CTS "contingent claims" for future consumption of each good at the date and state specified.

Monotonic, strictly convex preferences can be represented by a strictly concave utility function over goods (U(c), for all c). The current optimal consumption vector $[q^*_0]$ is the same as the solution to the maximization of such a function. The state probabilities for each future date being known (Π_{st}, $\Sigma_s\Pi_{st} = 1$, for each $t > 0$), the optimal allocation of each agent to contingent claims is equivalent to the maximization of the expected utility function (EU(.)) over the future consumption vectors $[q^*_{ts}$: $\max EU(q_{ts}) = \Sigma_{st}\Pi_{st}U(q^*_{ts})$, for each t]. In equilibrium, relative prices for any date t, state s, express the usual marginal rate of substitution between goods; whereas relative prices at any date across states express the probability-weighted marginal rate of substitution between goods across states.

The above properties of preferences (and utility functions) imply that consumers will hold the full portfolio of "contingent claims" (provided that $p^*_{cts} > 0$, $\Pi_{st} > 0$, for all c, t, s). Zero holdings of some claims would correspond to corner solutions in standard consumer theory, which would reveal non-convex preferences. The optimal composition of the portfolio is subjective and results from each consumer's preferences over goods (or from his utility function). From concave utility functions, it follows mathematically that, for any given t, $[\Sigma_{st}\Pi_{st}U(q_{ts}) < U(\Sigma_s\Pi_s q_{ts})]$. This property means that the utility of a composite consumption vector of certain amount ($\bar{q} = \Sigma_s\omega_{st}q_{ts}$, $\omega_{st} = \Pi_{st}$) is greater than the expected utility of the consumption vector of actuarial amount ($\Sigma_s\Pi_{st}q_{ts}$). In other words, the consumer refuses actuarially fair trades or displays **risk aversion**. If, for each (t, s), the portfolio $[q^*_{ts}]$ of "contingent claims" is actually held, the consumer must be gaining a **risk premium** in terms of consumption $[\Sigma_s\Pi_s q^*_{ts} = \bar{q} + \rho]$ such that $[EU(q^*_{ts}) = U(q - \rho)]$. Clearly, the degree of risk aversion, and hence the risk premium, depend on the curvature of the utility function, and this can be represented by absolute or relative measures of risk aversion, as was shown by Arrow and Pratt (Arrow (1965)).

Allocations under different numeraires. It is interesting to note that MO1 can also accommodate numeraire conversion rates if for some institutional reason there are more than one numeraire convention across markets[8]. Let us first consider the equilibrium price vector of goods for current consumption $[\mathbf{p}^*_0]$. Let us now introduce two numeraire conventions: H (for home) and F (for foreign). Then we shall have the following terms of exchange between one unit of each commodity and the two standard commodities (h) and (f):

(1) $$\mathbf{p}^*(\mathbf{H})_0 = [q^*_h/q^*_1, \ldots, q^*_h/q^*_c, \ldots, q^*_h/q^*_C]_0$$
$$\mathbf{p}^*(\mathbf{F})_0 = [q^*_f/q^*_1, \ldots, q^*_f/q^*_c, \ldots, q^*_f/q^*_C]_0$$

For $[\mathbf{p}^*(\mathbf{H})_0]$ and $[\mathbf{p}^*(\mathbf{F})_0]$ to preserve the allocative efficiency of $[\mathbf{p}^*_0]$, the following relationship must hold at time $(t = 0)$:

(2) $$p^*_{c0} = q^*_{h0}/q^*_{c0} = (q^*_{f0}/q^*_{c0})r_0 \qquad \text{for all } c \in H \cap F$$

A non-trivial condition for the numeraire coversion rate (r_0) is

(3) $$r^*_0 = q^*_{h0}/q^*_{f0} \neq 1$$

Relation 2 is the law of one price and states that for all the same physical goods available under both conventions there must exist only one equilibrium price. Condition 3 states that the conversion rate preserves general efficiency if it is equal to the relative price of numeraires[9]. It is easy to check that the same condition also satisfies the law of one price and general efficiency for all future contingent prices [for all $t > 0$, s: $p^*_{cts} = q^*_{h0}/q^*_{cts} = (q^*_{f0}/q^*_{cts})r^*_0$], if under both conventions they are valued with the current non-contingent numeraire (which is the usual assumption).

As some general equilibrium theorists have repeatedly warned, MO1 can accommodate a numeraire (or numeraires) but provides no rationale for such instruments as currencies and reserves. This is due to the timeless, once-and-for-all organization of exchanges and, it should be added, the free availability of the whole correct signal; then each agent faces one single intertemporal allocative decision, and current and future deliveries can simply be performed by means of contingent claims to commodities.

It is also apparent that 2 and 3 are the core relationships in the monetary approach to the exchange rate (Frenkel (1976)). But is the conversion rate in MO1 like the "price of two monies" in a monetary economy? The question is a thorny one since, as we know, MO1 is not a monetary economy. Any commodity c can be obtained in exchange of any other, not only of h or f. As Walras himself stressed, numeraire commodities are exchanged as commodities and not as means of payment or stores of value. In an efficient market organization the exchange rate, as we usually think of it, is rather a curiosity. First of all because there is no need for currencies. Moreover, the efficient exchange rate is not one further relative price, but a conversion rate: a pure number. In fact, if for some inexplicable reason such things as "nations" exist which obdurately use different standard commodities, then all that is needed is conversion rates set equal to the efficient relative price of such commodities in every (t, s). Such conversion rates prevent any opportunity of allocating wealth across differently-denominated bundles of commodities. One might be tempted to say that, as commodities, h and f could be traded for arbitrage purposes whenever $p(H)_c$ and $p(F)_c$ happened to be "misaligned" at the given r. But, it will be agreed, in MO1 "misalignment" is a meaningless concept[10]. Hence the informational function of the exchange rate is not that of a price, but that of a numeraire: it saves calculations of arbitrage opportunities, if any.

1.4. Market general efficiency in the financial economy.

We are now in the position to make one step further into the relationship between time and money. Money as a store of value is not simply justified by intertemporal allocations, not even by state-dependent allocations; these - as was shown by Arrow (1953) - must also be unfeasible all at once for all dates and states. An economy which makes use of stores of value must have, as minimal characteristics, trades at every date in the absence of future markets. In fact, agents must find it rational to make one allocative decision for each one date and link them by means of a store of value. According to Radner's famous definition a monetary economy must be a "sequence economy" (1968). The most robust reason for dated sequential decisions should be the lack of feasible contracts on all future possible states, that is, "an economy which either makes it too costly or impossible to engage in all desirable Arrow-Debreu trades" (Hahn (1988, p.957)). Less technically, and more familiarly, I shall call this a **financial** economy.

Consider "market organization 2" (MO2)[11]: exchanges and consumption take place at every date t after the state of nature s has occurred. At every date t each agent can obtain a bundle of goods for current consumption and a bundle of pure securities each of which entitles the bearer to one unit of numeraire if the specified state s occurs in (t' > t).

In the first place, MO2 reduces the number of markets that must be open simultaneously: they amount to [C + S] in each t. In the second place, there is still no need for means of payments, but there emerge stores of value; for pure securities perform the function of carrying wealth over the next period's probabilistic states of nature. Let us now briefly recall the conditions of efficiency equivalence between MO2 and MO1 since they are crucial to our argument.

First, define

$$p_{ts} = [p_1, ..., p_c, ..., p_C]_{ts}$$

the equilibrium post-state s spot prices at date t established in MO2. The usual convention is that the numeraire j is taken in the same (t, s), so that:

(4) $p_{cts} = q_{jts}/q_{cts}$

The efficiency equivalence between MO2 spot prices and MO1 contingent prices for the same (t, s) requires the former to be equal to the MO1 (t, s) terms of exchange between one unit of each good and the numeraire:

(5) $p_{cts} = q^*_{jts}/q^*_{cts}$

or, since in MO1

(6) $p^*_{cts} = q^*_{j0}/q^*_{cts}$ and

(7) $p^*_{jts} = q^*_{j0}/q^*_{jts}$,

then

(8) $p_{cts} = p^*_{cts}/p^*_{jts}$

i.e. the MO2 (t, s) spot price of any good must be equal to the ratio between the MO1 (t, s) contingent price of the good and the numeraire[12]. More precisely, if 8 holds and

p^*_{jts} is the unit price of the pure security if (t, s) occurs, then the allocation to current consumption and S pure securities under MO2 is equivalent to the allocation to current consumption and SC contingent claims to commodities under MO1[13].

The fundamental analytical point is that, under condition 8, the MO2 (T + 1) budget constraints

$$p^*_0 y_0 = p^*_0 q^*_0 + p^*_{j0} a_0, \ldots, p_{ts} y_{ts} + a_{t-1s} = p_{ts} q_{ts} + p^*_{jt} a_t, \ldots$$

are equivalent to the MO1 unique budget constraint

$$p^*_0 y_0 + \Sigma_t \Sigma_s (p^* y)_{ts} = p^*_0 q^*_0 + \Sigma_t \Sigma_s (p^* q^*)_{ts}$$

where, for each t, s: y = endowment vector, a = security holdings (Sx1) vector (and $a_{t-1s} \in a_{t-1}$), p^* = security price (1xS) vector, and q^* = optimal allocations vector.

In fact, consider for simplicity the two-period budget constraint (t = 0; t' = 1, state s) with one single good that can be consumed in each period (q_0, q_{1s}):

MO2: $p^*_0 y_0 = p^*_0 q_0 + p^*_{j0s} a_{0s}$, $\quad p_{1s} y_{1s} + a_{0s} = p_{1s} q_{1s}$

and compare it with

MO1: $p^*_0 y_0 + p^*_{1s} y_{1s} = p^*_0 q^*_0 + p^*_{1s} q^*_{1s}$

By 8 it follows that the MO2 (1s) budget constraint is equivalent to

MO2: $p^*_{1s} y_{1s} + p^*_{j1s} a_{1s} = p^*_{1s} q_{1s}$

Clearly the intertemporal budget constraint in MO2 turns out to be

MO2: $p^*_0 y_0 + p^*_{1s} y_{1s} = p^*_0 q_0 + p^*_{1s} q_{1s}$

which implies ($q_0 = q^*_0$, $q_{1s} = q^*_{1s}$).

Finally, note that efficiency condition 8 shows that MO2 sequential decisions of current consumption and security holding at each date achieve MGE only if spot prices embody the complete information contained in MO1 price vectors $[p^*_{ts}]$.

Production with pure securities. If time-sequence economies generate a motive for holding titles to future consumption, who is going to issue such titles? Consideration of this question immediately reminds us that exchange is an insufficient characterization. Obviously, behind exchange there must be production.

At this stage we may think of a large number of independent, fully specialized producers demanding an individual bundle of goods and services and offering their individual product. If it is admitted that most future contracts are unfeasible and that production takes time, it follows that production costs must be borne in advance: production costs are to be raised by issuing claims on future output. Such claims will work like pure securities: the bearer is entitled to a specified share of output, measured in standard units, on the next date t if state s obtains. It is intuitive, from previous treatment, that under efficiency conditions the (T + 1) purchases of shares in MO2 will amount to the equilibrium total output in MO1[14].

Allocations to pure securities under different numeraires. Let us now consider explicitly the two numeraire conventions. From equation 4, the following law of one price for each MO2 (t, s) market must hold:

(9) $$p_{cts} = q_{hts}/q_{cts} = (q_{fts}/q_{cts})r_{ts}$$

A non-trivial condition for the conversion rate is:

(10) $$r_{ts} = q_{hts}/q_{fts} \neq 1$$

i.e. the MO2 (t, s) conversion rate must be equal to the MO2 (t, s) relative price of the numeraires. But the numeraires are also commodities and hence conditions 5 to 8 must also apply. By simple manipulation of conditions 5, 8 and 10, the following interesting implications are obtained:

(11) $$r_{ts} = q^*_{hts}/q^*_{fts} = r^*_{ts}$$

(12) $$r_{ts} = [p^*(F)_{fts}/p^*(H)_{hts}]r^*_0$$

Equality 11 confirms efficiency equivalence: the MO2 (t, s) conversion rate is equal to the MO1 (t, s) conversion rate. Equality 12 expresses the MO2 conversion rate as a "relative price of assets" and shows its efficient link with the MO1 conversion rate of general efficiency given by 9. This, too, is a well-known definition of the exchange rate, namely in the portfolio approach (Branson (1977)). However, like the monetary-approach definition in the previous paragraph, it cannot be accepted without qualifications. Equality 12 is especially relevant to the allocative decision to pure securities in our MO2 with two numeraires; for the agent faces the possibility to hold H or F denominated pure securities if he perceives commodity arbitrage opportunities in the next period. Under efficient conditions, home and foreign pure securities pay $[1/p^*(H)_{hts} = q^*_{hts}/q^*_{h0},\ 1/p^*(F)_{fts} = q^*_{fts}/q^*_{f0}$, for each s] respectively. The present value of the foreign security in the home standard is $[(q^*_{fts}/q^*_{f0})(r_{ts}/r^*_0)$, for each s] or $[q^*_{hts}/q^*_{h0} = 1/p^*(H)_{hts}]$ by 12. Therefore, the amount of standard h that the agent can obtain in the next period, state s, is the same whether he holds H or F denominated pure securities. The reader himself can verify that, in force of 11 and 12, any other form of arbitrage is excluded. Then, equality 12 states that arbitrage opportunities do not exist if (i) the pure security market is efficient (i.e. (p^*_{jts}) is the price of the pure security contingent on s), and (ii) the current conversion rate is the efficient one. In financial terminology, H and F denominated pure securities are then perfect substitutes. Note that even if agents are risk-averse, they will allocate their wealth across pure securities according to their valuation of state-dependent future consumption, but not according to the denomination of pure securities. Perfect substitutability turns out to be a general equilibrium property, rather than something "intrinsic" in securities that can be assumed regardless of the specification of market organization and of the amount of information available to agents.

Rational expectations. In order to develop our argument, we have now to focus on a fundamental characteristic of the financial economy: decisions in view of future states of the economy must be based on **expectations**[15]. The difference between a decision made on direct price information (p_{cts}) and a decision made on the expectation of (p_{cts}) should be clear. In the latter case a function is needed that transforms current information inputs into future values of decision variables. Such a function is generally called "the model of the economy".

We have seen above that MO2 sequential decisions of current consumption, production and security holdings at each date achieve market general efficiency only if security prices embody the complete information contained in MO1 price vectors $[\mathbf{p}^*_{ts}]$. The obvious question arises: "How could [agents] know these prices if no exchange of commodities is to take place until it is known what state of the world obtains?" (Dreze (1987, p.129)). Paradoxically, MO2 is in fact justified by the lack of future contingent contracts.

Until now, the most sophisticated solution has been the assumption that efficient prices in vectors $[\mathbf{p}^*_{ts}]$ follow a stationary stochastic process[16]. Accordingly, repeated occurrences of $[\mathbf{p}^*_{ts}]$ make up an information set (I_t, up to t) which is a monotocally increasing sequence, and each observed occurence of $[\mathbf{p}^*_{ts}]$, is equivalent to drawing from a population with a stable probability distribution. Therefore, under MO2 and even though future contingent contracting never existed, the correct ("objective") probabilistic expectation of condition 8 would exist. The same holds equally for condition 12. Let ($p'_{ct'}$) be the (t') forward price set by competitive bidding in (t) on the basis of the expected value of the (t') spot price, known in (t) the efficient discount factor (p^*_{jt}); then:

(13) $$p'_{ct'} = E(p_{ct'} \mid I_t)p^*_{jt}$$

(14) $$E(p_{ct'} \mid I_t)p^*_{jt} = E(p^*_{ct'})$$

Relationship 13 is quite important, since it paves the way to the statistical analysis of informational efficiency under the form of martingale (Samuelson (1965)). 14 is the efficiency condition 8 in probabilistic form or, more familiarly, the rational-expectation condition. These two conditions generate a number of statements which lie at the core of current market-efficiency analysis:

(i) the forward price is the best unbiased estimator of the corresponding spot price;
(ii) from 13 $[E(p'_{ct'} - p^*_{ct'} \mid I_t) = 0]$: asymptotically, the market is a "fair game"; the expected difference (i.e. excess profit) between any expected (or forward) price and the corresponding (efficient) spot price is zero;
(iii) the expectation is rational not only because it is self-fulfilling (13), but also because it preserves general efficiency (14).

Statement (iii) is noteworthy because it represents a necessary qualification of equilibrium in a financial economy: it adds **expectational equilibrium** to the usual condition of market clearing.

It is also worth recalling, for later reference, that propositions (i)-(iii) can be interpreted as conditions for internal consistency of expectations, since they limit all possible expectations to those which

(i) use all available information optimally,

(ii) are set equal to the "objective" mathematical expectation of events,

(iii) are not systematically falsified and are asymptotically correct (orthogonality of errors).

(By implication, all agents have the same "true" model of the economy).

These are also the axioms of rational expectations[17].

The form in which the problem of expectational equilibrium has been handled and solved by the New Classical school leads, in the most rigorous way, to efficient financial economies.

2. Imperfect information, uncertainty and market inefficiency. General principles

2.1. Incomplete information.

What does MO2 tell us about the role of money in a time-sequence setting? MO2 indeed displays the key features of a financial economy (sequential trading, discrete-time decisions, the use of stores of value) and it actually permits economizing on the number of markets (Arrow (1953, p.45)). MO2 has in fact become the standard representation of an economy which uses "the barren asset" as store of value[18]. Yet such a representation is not sufficient to give money a specific role to play as store of value -or any role to play- unless fiat money is **imposed** to be the sole security (whether in force of a "Clower rule" or of a "Lucas cash-in-advance rule"). In fact, in MO2, money should be a pure security whose contingent value in terms of the standard is always ($p^*_{jts} = 1$, for all s). Look at conditions 5 to 8: ($p^*_{jts} = 1$) implies ($p_{cts} = p^*_{cts}$, for all s) or that the MO2 (t, s) spot price is always equal to the MO1 (t, s) contingent price, which would be rather peculiar. Of course, the fact that (p^*_{jts} = 1, for all s) entails no efficiency loss only if agents actually had unit marginal rate of substitution of the numeraire across all (t, s). It is not difficult to envisage states of the world where other securities would render money worthless[19].

The precariousness of money in MO2 is just due to efficiency conditions, including rational expectations, and to the fact that MO2 does **not** permit economizing on the amount of information, if general efficiency is to be preserved. This point can quickly be seen in condition 14, or 18 for the conversion rate. These conditions hold, or equivalently allocative decisions under MO2 are as efficient as those under MO1, since information contained in all MO1 price vectors $[p^*_{ts}]$ is still available and embodied in $[p_{ts}]$ vectors. It seems that in order to understand what money does we must qualify time and uncertainty further.

Time cannot merely be a device for ordering goods, allocations and deliveries, one "inessential" to decision making, as it is in the MO1 setting. Broadly speaking, time becomes economically essential if it acts as a constraint on decision making. There may be three forms of time constraint: (i) decision making is time-consuming, (ii) knowledge and information are a decreasing function of the time horizon, (iii) decisions are irreversible. In the present context we may be little concerned with the first form, but we must be extremely concerned with the other two. Indeed, the move from MO1 to MO2 and the emergence of stores of value are closely related to time constraints (ii) and (iii). For the former implies that not all contracts on all possible future states are feasible, the less feasible the further away the time horizon is, while the latter implies that the feasible set of contracts at each date is constrained by the wealth carried over from the previous one. An "essential" role of time should entail **imperfect information**, and firstly **incomplete information**. This brings us to financial economies in which time imposes sequences of temporary, irreversible decisions made under imperfect information. In the remaining part of this chapter we shall see that these latter are likely to be economies which use money.

Let me first recall a well-established result in market efficiency theory. If information is incomplete, a well-defined mapping from all possible states of the world to market prices is no longer feasible. Agents may find it impossible to partition the future in a complete set of states, or to associate their preferences or other market conditions to each conceivable state. Among market conditions, state probabilities play an important role. As said above, efficient future prices should transmit to the market the probability-weighted marginal rate of substitution of goods across states; their absence deprives the market of a powerful instrument of convergence of subjective probabilities. In all these circumstances the non-existence, or incompleteness, of future markets and the related price vectors can be interpreted as a negative externality of individual unwillingness to engage in contracts on future states. Uncertainty is a contagious disease.

Whenever uncertainty takes the form of incomplete information, the security price vector is smaller than the possible states vector, then the financial economy is constrained to inefficiency. As was emphasized above, market general inefficiency can occur because of incomplete information even though some (or all) markets process local available information efficiently. To repeat, the point is that all available information may well fall short of the complete MO1 information signal. In this case, the efficient information hypothesis does not imply that security allocations at any one date should bear any necessary relationship with the MO1 allocations to consumption at the next date (see Hahn (1988, pp.961 ff.) and below sec.4).

2.2. Heterogeneous information.

The case of incomplete but efficient information is analytically useful in fixing some properties of financial markets; yet it appears rather weak a case after deeper economic considerations. Market IE turns out to have extremely strong implications, which are counterfactual (e.g. the absence of asset trading) or paradoxical (who is going to produce information if information is a public good?) or even non-economic (it is rational to behave as pure gamblers)[20].

We may say that a situation of deficient but efficient information is unstable. Deficiency of information is quite likely to generate private incentives to gather more information. For the very same reason that freely available information is initially incomplete, new information gathering will necessarily be costly[21]. Information seekers bear a private cost that must be rewarded; but if their information is fully revealed through competitive contracting no one will ever bear the cost of producing information. This point is better understood if one considers that informational efficiency may entail the impossibility of trades at equilibrium prices; those who have paid for information about an asset would not be able to adjust the asset's stock profitably by actually acquiring or releasing the asset[22]. One possible stable outcome is one where

(i) private information is unevenly distributed among agents, and

(ii) competitive prices do not reveal all private information.

This is currently defined as **asymmetric** or more generally **heterogeneous information,** which clearly implies that the market is **informationally inefficient** too (Grossman-Stiglitz (1980)). In general, at any given date t, agents trade a state-dependent asset (a_s) in function of observable current variables (say the price p_a) conditional upon the information set $\{I\}$; if the latter differs for the two agents (1, 2), then trade equilibrium obtains when

$$a_{s1}(p_a, I_1) + a_{s2}(p_a, I_2) = 0 \tag{15}$$

Clearly equilibrium prices and quantities will be other than those obtained under IE ($I_1 = I_2$).

Differences in information among different people seem an unassailable factual observation; yet many authors find it hardly believable that such differences can survive the massive, constant flood of public information currently available to economic agents at negligible costs. Nevertheless, the bulk of investment costs in financial businesses go to human capital and information gathering and processing. When information is scarce, the point at stake is not the amount of it available publicly, but the worth of the private further bit that one is able to secure for oneself.

However, it is true that the literature is rather silent on the causes and extensions of asymmetries, and imperfections generally, in information. The standard specification of imperfect information is an information set affected by a "white noise", which is quite useful, but cannot claim to be an explanation. This work cannot afford one; however -following von Hayek's seminal ideas- it should be said that the information issue cannot be kept distinct from the analysis of decision-making in general, of which information is only one dimension. The other dimension is the agent's frame of knowledge, or more simply his "decision model".

In general, human beings explore their environment by means of common procedures which start from the **selection and manipulation** of elements of the external world, and then proceed to the **construction** of a **model of the world**. Constructing models is certainly based upon experience, but the experience of each individual is nonetheless constrained by originals interests and skills; he or she can only explore a part of the whole network of all possible relations. Market organization reinforces this attitude since it elicits individual interests that are reflected in labour division, and labour division becomes knowledge division. Knowledge, being subjective, is a component of each individual's human capital; and each one tends to maximize one's asset specificity rather than homogeneity. Knowledge thus consists of a plurality of **subjective, heterogeneous and partial models**.

Under the heading of "rational expectations" we have seen the conditions thanks to which our daily struggle against ignorance can be fully successfull in terms of efficient economic decisions. But this, as far as the monetary economist is concerned, belongs to the class of Neo-Walrasian "strong but negative results". Research on rational expectations has fixed some firm methodological benchmarks; but these should be used under a set of hypotheses on knowledge and information which should be consistent with the economy under examination, and which possibly lead to operational behaviours.

2.3. Expectations under imperfect information.

With regard to these two requirements, the rational expectations hypothesis is liable to objection on two major points:

(i) the axioms of internal coherence of expectations,

(ii) the idea that expectations formed according to those axioms **ipso facto** guarantee

MGE.

Consider point (ii) first. The idea that the informational requirement of MGE is wholly contained in the sequence of past realizations of the market is now regarded as hardly viable. Indeed, as equation 14 shows, that idea is circular: rational expectations preserve MGE only if past market realizations have been efficient. We have a stochastic version of general equilibrium, but we still lack an explanation of how the informational requirement of general equilibrium can be satisfied. On the other hand, if one assumes that all necessary information is contained in $\{I_t\}$, as specified above, the move from MO1 to MO2 becomes inessential. Were all economic events like a lottery there would be no obstacle to implementing the full set of future contingent markets of MO1, and there would be no reason to resort to sequential decisions and engage in risky forecasts. Hence one should conclude that in as much as the rational expectations hypothesis is well founded and applicable it should drive money out of the economy, whereas that hypothesis simply cuts through the knots of expectations formation and expectational equilibrium in an economy where time limits knowledge and information effectively.

We thus come to the problems raised under point (i). These have recently been attacked on two main grounds:

(a) learning of the "true" structural model,

(b) convergence of heterogeneous beliefs[23].

These two issues derive from the admission that, in general, (a) agents do not have full knowledge of the economy, and (b) the knowledge and information they have is, at least **a priori**, subjective and unequal. Hence the general form of asymmetric trade (see eq.15 above) should be extended to include agents' specific knowledge or decision model (K):

(16) $$a_{s1}(p_a, I_1, K_1) + a_{s2}(p_a, I_2, K_2) = 0$$

Given many subjective models, the **existence of, and convergence to**, a unique conditional expectation of an economic event cannot be taken for granted. One easily understands the essential difficulty behind this point by taking the reduced form of the market structure 16, that is

$$p_a(I_1, I_2, K_1, K_2)$$

The reduced form is the form agents can use to learn the market structure and to correct their own model; but agent 1 can only know or observe (p_a, I_1, K_1) and so can agent 2 only know or observe (p_a, I_2, K_2). Full knowledge of the market would require each agent to know the information set and the subjective model of all the others. Firstly, full common knowledge of the market structure becomes an extremely difficult task as soon as the learning process is taken into account. A basic pre-condition of a viable learning process (say a Bayesian one) is the **stationarity** of the structure; but at the same time any learning process implies errors and revisions of the current model. Therefore, whenever agents cleverly revise their own (K's) they also compromise the structural stationarity of relationship 16 for themselves and for the others as well. Convergence of agents' beliefs to a rational expectations equilibrium is far from certain[24]. Secondly, even more problematic, if not hopeless, is the case that if convergence does take place, the market outcome will be the same as under conditions of MGE[25].

If one admits that decision models are suited to the local environment of agents, and that agents may change them if unsatisfactory, one realizes that the economic environment can hardly be stationary, and that such a thing as **the** general model of the economy is unlikely to emerge (this, of course, applies to economists as well). On the other hand, the positive analysis of economic decisions thus structured, and of their aggregate effects on the economy, is still in its infancy, and shows a number of problems of formidable complexity that fall outside the scope of this work. As tool users[26], we have not yet a ready-made range of micro- and macro- applications at our disposal. Nonetheless it seems to me important that, since we shall have to make statements about expectations, we should be well aware of the problems involved.

For most applications in this work the crucial assumption will be incomplete knowledge and information for the reasons previously explained in sec.2.2; formally, agents base their forward-looking decisions on reducedform partial models of their own market (to be defined), and hence the probabilistic correctness ("unbiasedness") of such decisions (i) is limited to the relevant information set and forecast model, and (ii) does not ensure MGE[27]. The efficient information hypothesis on asset markets (see ch.III, sec.3 and App.A.1) need not, and will not, be questioned in order to develop the so-called "fundamental analysis" of Part II. A step towards asymmetric information and heterogenous beliefs will be made in the last chapter in the context of exchange-rate analysis.

What should instead be emphasized as a general feature of the financial economy is that in the absence of perfect foresight, or of certainty-equivalent rational expectations, agents' (and our own) attention is drawn to **failures** (see also the Appendix to this chapter). Not only have agents to learn lessons from failures, they also have to take protection against them. This is by no means a negligible part of economic activity and decision making. It is indeed crucial to the use of money and other stores of value, as we shall see in the next section.

3. Money and securities in the financial economy

3.1. Holding assets. Precautionary behaviour.

To begin with, I shall develop the idea that the financial economy is a time-sequence economy which necessitates wealth carriers for wealth to be transferred across markets and through time. It is important to notice that, though different in other respects, spatial and intertemporal wealth transfers involve one and the same informational problem. Incompleteness of information was initially introduced as an increasing function of the time horizon, but there is no difficulty in considering it an increasing function of the market-space horizon too (not to mention the fact that searching across markets takes time). It can be shown that since uncertainty involves less-than-full insurance, asset holding obeys to **precautionary behaviour** instead of expected utility maximization.

Precautionary behaviour still lacks satisfactory analysis -and here we cannot engage ourself in such a task (see also the Appendix). Yet it seems to me correct, as the base step, to consider precaution as an alternative to expected utility maximization. First of all, the expected utility maximizer is able to diversify his contingent claims in such a way that he obtains the highest possible welfare in any possible contingencies. By contrast, the uncertain agent faces a situation where all relevant information is not revealed instantly and all eventualities cannot be insured against, so that it will be costly, if possible, for him to switch to the "right position" when the state is revealed (Jones-Ostroy (1984)). Here I shall exclude adjustment costs from the agent's consideration (e.g. such costs are non-discountable or infinite) and I shall draw on Knight's (1921, ch.VII) idea that **precaution is commensurate with the consequences of a finite, positive probability of error.**

A simple measure of this probability is proposed in the Appendix; the probability of an error of magnitude α [$\Pi(\alpha) = V/\alpha^2$] increases with the variability of prospects (V) and decreases with the individual's tolerance level (α), the most obvious measure of which seems to be his wealth. The opportunity to be cautious has crucial consequences upon the financial economy.

The first consequence involves an important phenomenon: wealth accumulation. In fact any specific state-dependent allocation (a_s) of a cautious agent is strictly conditioned by the payoffs (y_{as}), their variability (V_a) and the value of his wealth, or his "financial position" (A), that can back up those allocations in the event of adverse outcomes (a conclusion in line with new theories of financial non-neutrality e.g.Greenwald-Stiglitz (1987; 1988, p.251 ff.)). As is easy to see in the above formulation, one way of relaxing the constraint of fallibility is by raising the tolerance level a; in economic life this is basically done by accumulating wealth. In a general form,

(8) $$a_s(y_{as}, V_a, A) \qquad a'(y)>0,\ a'(V)<0,\ a'(A)>0$$

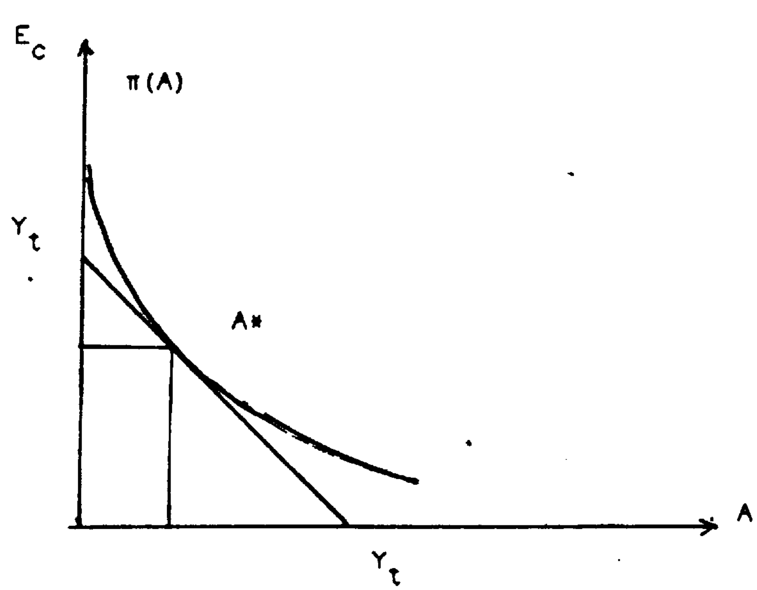
The better the financial position, the lower the individual probability of failure for given (y_{as}, V_a), the greater the allocations to specific uncertain states[28].

Precautionary asset-holding, as a response to uncertainty, performs two typical tasks: (i) carrying wealth across markets or through time, without commitment to specified consumption decisions or states; (ii) providing a buffer against adverse outcomes. It is not difficult to explain saving within a consumer's accumulation programme over A such that a desired A* is reached where the probability of default (cut in the expected consumption, or borrowing, or insolvency) for any given (y_{as}, V_a) is minimal. Consider (from Appendix) the case in which C_t are random consumption outlets of an agent, with mean $[E(C) = E_c]$ and variance $[V(C) = V_c]$, whereas Y_t are his income streams (for simplicity constant). In such a situation there exists a critical probability

(9) $$\Pi(A): Pr(C_t \geq E_c + A) \leq V_c/A^2$$

that the actual consumption outlet in t will exceed normal consumption by more than the available wealth. As a response, it is easy to find the desired value of A* which minimizes $\Pi(A)$ under the income constraint $(Y_t = E_c + A)$ (see also fig.1)[29].

Fig.1. The precautionary stock of wealth.



Obviously, if ($Y_t \leq A^*$) a programme of accumulation becomes necessary, for example ($\Sigma_t S_t = A^*$) where ($S_t = A^* - \Sigma_{t-1} S_{t-1} < Y_t$). The rate of saving and of consumption in each period are determined jointly; ($S_t/Y_t < 1$) yields the usual propensity to save.

Here we are not so much interested in the analytics of the saving- consumption pattern as in understanding the rationale of saving as a decision disconnected from commitments to future consumption. Quite clearly, unlike contingent claims or pure securities, actual securities are suited to that purpose. And it is precisely in virtue of such a desirable opportunity that, as Keynes would put it, to save today is not to buy tomorrow (1936, p.21). On the other hand, a serious problem of intertemporal coordination between consumption and production decisions opens up; this is perhaps the juncture where the financial economy most neatly departs from the Walrasian core, and we shall go back to it later on.

The reader will have noted that I have extended the precautionary motive to asset-holding as a whole, whereas it is traditionally limited to money-holding. This is a straightforward consequence of the definition of precautionary behaviour as the consumer's response to his not well-defined consumption decisions in the future. There is no clear reason why this response should be imputed to money hoarding only. The latter is the symptom of a more fundamental disease which other assets may alleviate but not defeat. What is specific to money is its role among assets.

3.2. Standard, currency and reserve. Liquidity preference.

We have seen that the financial economy wants means to transfer wealth across markets and through time. What we should look for is the special characteristic which distinguishes money from other wealth carriers.

As was said in section 1, the form of money we are interested in works jointly as reserve, currency and standard. It is well known that the above three functions of the monetary instrument are performed by virtue of the following key properties:

(i) to transfer purchasing power across markets,

(ii) to transfer purchasing power through time,

(iii) to have a fixed value in terms of itself for all dates and states[30].

Properties (i)+(iii) underly the function of currency; properties (ii)+(iii) underly the function of reserve. Monetary theory has generally focused on one function, and the underlying properties, separately from the other; moreover, the distinguishing property of money has been seen in (i) or (ii) with little, if any, connection with (iii). The perspective of human fallibility and precautionary behaviour gives a different view of the matter: monetary properties (i) and (ii) cannot be separated either one from the other or from property (iii); furthermore, it is property (iii) which underpins the other two; property (iii) in turn satisfies a particular form of precautionary behaviour that, in the tradition of monetary theory, we may call **liquidity preference**.

The cohabitation of money with other stores of value and claims to physical capital must be attributed to "essential" time and uncertainty, that is, decision making under imperfect information and less-than-full insurance. As a wealth carrier, money can hardly be understood by insisting on the artificial -however useful- separation of the problem of spatial from that of intertemporal wealth transfers (see above, sec.3.1). The moderns' emphasis on the latter function alone is as unsatisfactory as the classics' exclusive concern with the former (Laidler (1988)). Quite the contrary, the Hicksian triad (standard, currency and reserve) cannot be split. In fact, when money is used as currency one of the parties will accept it against goods because it is storable as reserve, that is to say, because one such party believes that money will be accepted as currency against goods (no matter how far in the course of time or in the space of markets). This fundamental point has led some scholars to think of the use of money as a Nash equilibrium (Hahn (1982, pp.21 ff.), Grandmont (1983)). However, this result does not explain why a particular wealth carrier among alternative ones has to be selected as **the** currency. The further point, which has perhaps fallen by the wayside, is that once only one currency exists, this has by constitution a fixed value in terms of itself (property (iii)), whereas all other marketable items have a variable value in terms of the currency. Therefore, when we come to compare closely money with alternative wealth carriers we should draw the conclusion that the fundamental difference, the difference underlying all the others, should be placed in the **exclusion of nominal loss** (Hicks (1967, ch.II))[31]

To understand this point let us consider the following quite simple, but general, problem of wealth transfer. As already explained in section 1, the securities available in the financial economy should in principle be provided by producers. In fact, in an orderly sequence of decisions we should first consider that producers have to advance production costs, and to this effect they should issue claims on future output. Such claims will work like pure securities if accepted by service suppliers. Let us consider labour as the sole factor on demand and supply. Labourers supply their service on the labour market and plan to buy goods for current consumption and, in the impossibility of contracting on all future states, securities to finance future consumption. Within this decisional frame, producers and workers contract a wage rate. The first problem relevant to the transaction technology of this financial economy is how the wage rate is denominated and paid.

Given one standard of prices and means of exchange, let $(p_1, ..., p_c, ...)$ be the monetary prices of goods, and w_1 be a wealth carrier consisting of w units of good 1 (or claims to good 1). The real purchasing power of w_1 is not known with certainty until all relative prices (p_1/p_c, all $c \neq 1$) are known. Now let the price index P_c (for all $c \neq 1$) and p_1 take S possible values; then the real value of wealth $(w_1 p_{1s}/P_{cs})$ will take (S^2) possible values. If held in standard units $(h_1\bar{p} = w_1 p_1)$ the real value of wealth ($h_1\bar{p}/P_{cs}$, $\bar{p} = 1$ for all states) will take (S) possible values only. The real value of wealth is never perfectly certain; however, the existence of one currency, as compared with marketable instruments, reduces uncertainty because it limits the variability of outcomes to the vector $[p_c$, all $c \neq 1]$ instead of $[p_c, p_1]$.

Now, it is not difficult to define the **liquidity of a wealth carrier as the complement of the probability of nominal loss**. Therefore, money is the perfectly liquid means to transfer wealth through time and across markets. The liquidity advantage of money vis a vis other stores of value through time manifests itself in exactly the same way as the liquidity advantage of money vis a vis other means of exchange across markets[32].

In this view, an economy which uses money has to be an economy where the possibility of nominal losses in wealth matters. Liquidity matters and may be desirable only in relation to incomplete information, and to incomplete contingent contracts, not to Arrow-Debreu risk; in particular **liquidity preference** may be thought of as a form of precautionary behaviour. In fact, according to our previous definitions, precautionary behaviour aims at minimizing the probability of adverse outcomes; given the desired amount of wealth and the agent's tolerance level, there remains a probability of loss in the expected value of wealth which grows with the nominal variability of capital value, which in turn increases as the liquidity of wealth decreases. Hence I view liquidity preference, like precautionary behaviour, as a general and preliminary attitude of agents towards uncertainty, and as the basis of asset choice and pricing in the financial economy.

3.4. Portfolio choice and asset prices under liquidity preference.

We now come to the connection between precautionary asset holding, liquidity preference, and two firmly established facts of the financial economy: (i) diversification across assets, (ii) positive holdings of monetary reserve.

One preliminary point is that the portfolio problem may be given various different specifications according to the characteristics of assets and to the objectives of the asset holder. In the first place, the problem looks quite differently depending on which objective is posited: expected utility maximization, liquidity preference, or, say, capital-gains maximization. It has long been noticed that portfolio theory has often blurred the differences among these objectives, which should instead be kept quite distinct, especially in the framework of imperfect information[33]. Under imperfect information expected utility maximization breaks down, and precautionary asset-holding emerges as an alternative. Given that the cautious asset holder sets a safety level of wealth (A^*), the consistent attitude is towards **uncertain nominal values of wealth** in the face of unexpected liquidity needs. The asset holder may be forced to sell and this may entail a capital loss if the market price of the stock has fallen. His problem is one of minimizing the probability of loss in the event of unexpected sales; this may be called a **"capital-value programme"**, which is substantially different from that of capitalgains maximization, or more generally from a **"capital-growth programme"**[34]. As explained above, the truly distinctive quality of money as store of value rests on its fixed nominal value against the **class of variable-price assets**. The monetary reserve is the most liquid, or in this view the safest, asset because it is free from capital losses[35]. Thus the portfolio choice we have to consider deals with price, rather than interest, variability of assets. It is not only a matter of changing a variable. The problem of portfolio selection can usefully be formalized as follows. Consider a menu of variable-price assets indexed with (a), and a time index (0 for the beginning, 1 for the end of one time unit). Each asset pays a nominal interest rate or unit dividend (i_a, for one time unit) and has a market price index ($p_a < 1$ if it is sold below the nominal value, $p_a > 1$ if it is sold above the nominal value). The one-period market value of the stock of wealth and the return rate to each asset are thus given, respectively, by

$$A_1 = \Sigma_a A_{a1} p_{a1}$$

$$r_{a1} = \frac{i_a + p_{a1} - p_{a0}}{p_{a0}}$$

It will be useful to distinguish between two components: the "effective interest rate" (i_a/p_{a0}) and the "capital gain (or loss)" ($\Delta p_a/p_{a0}$).

The simplest way of approaching the liquidity problem is to suppose that an agent has an initial amount of wealth A_0 while an Investment Trust offers an optimally sorted portfolio of the non-monetary securities available; let this be the k-th asset in the menu (A_k) with a given (or warranted) interest i_k but a variable market price p_k[36]. Given A_k, the initial nominal value of the Trust, if a short sale happens to fall one period later (to avoid the complications of compound interests) the cash flow to the holder will be $[A_k(p_{k1} + i_k)]$. The desired cash flow should be based on the purchasing value of the Trust $[A^* = A_k(p_{k0} + i_k)]$. Any discrepancy between the actual and the desired cash flow out of wealth is thus given by $[A_k(p_{k1} - p_{k0})]$, that is by price variations. A price fall ($p_{k1} < p_{k0}$) entails a capital loss and a cash flow lower than desired.

Now, in order to manage the capital loss intrinsic in the Trust, the holder has to assess expected prices. It is in the nature of his problem to consider that for any probability distribution of prices centered on $[E(p_k) = p_{k0}]$ there exists a finite, positive probability of capital loss[37]. By applying the methodology suggested in the Appendix, the obvious upper bound of the agent's tolerance to (eventual) capital losses seems to be his inital wealth, which, if the agent decides to place some wealth in the Trust, reduces to the share held in monetary reserve (let this be the n-th asset). Thus, the probability of default the agent bears is

(18) $$\Pi(A): Pr(A^* - A_{k1} > A_{n0}) \leq V_p/A^2_{n0}$$

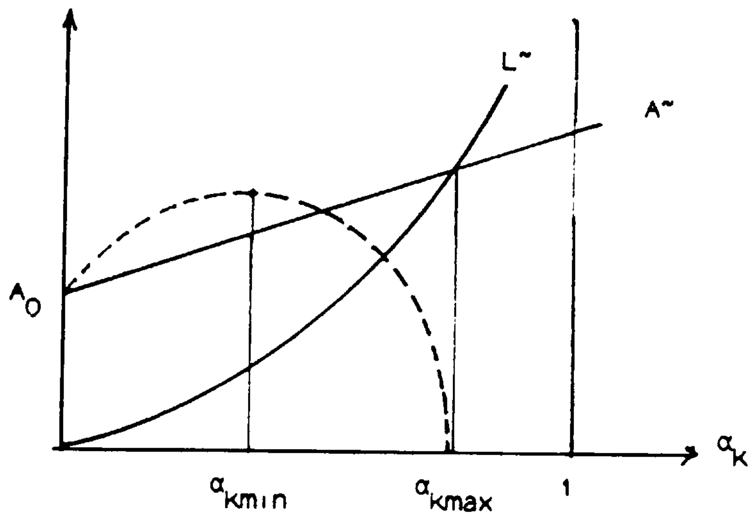
where V_p = price variance of the Trust. By rearranging the argument of the probability its meaning becomes more transparent: the probability that the actual capital value of the Trust plus the monetary reserve fall short of the safe level of wealth. Defining α_k the portfolio share placed in the Trust and A_0 the initial amount of wealth, reminding that the expected price is p_{k0}, expression 18 becomes

(19) $$Pr(p_{k0} - p_{k1} > (1 - \alpha_k)/\alpha_k) \leq V_p\alpha_k{}^2/(1 - \alpha_k)^2]$$

Now, in a capital value programme the correct comparison to make is between the prospective capital value $A^\sim$ vis a vis the intrinsic capital loss $L^\sim$ (rather than between the rate of return and its standard deviation; see Hicks (1967, pp.114-117)). The two variables are reproduced below from the above definitions and then plotted in fig.2.

$$A^\sim = A_k p_{k0}(1 + r_k) + A_{n0} = A_0 + A_0 r_k \alpha_k$$
$$L^\sim = A_0(1 - a_k)\Pi(A) \quad .$$

Fig.2. The choice of the monetary reserve in the protfolio.



Three observations are in order. The first is that capital safety is costly in terms of capital value; the former rises (L~ falls) at the expense of the latter as α_k is reduced; this is quite a traditional argument in portfolio theory.

The second observation is that whereas the traditional measure of risk -the portfolio variance- would be ($V_p\alpha_k 2$), here we have a probability of default that increases faster than the portfolio variance. This property points to a second noteworhty difference: here the choice of money is not a matter of tastes; for, as is clear in 18 and in fig.2, if there is no money in the portfolio ($\alpha_k = 1$) not only is the portfolio variance "high", but the probability of default tends to infinity. This is not merely a mathematical paradox: a portfolio with no monetary reserve is "almost surely" bound to default with respect to the safe level of wealth. Yet this commonsense principle, which plays so large monetary theory and practice, can only be given a consistent explanation when account is taken of agents' perception of being fallible tomorrow, rather than of their being right in the far future.

The third observation is the formal demonstration of the previous one. The best trade-off between capital value and capital loss in inherent in the variables (as shown, for convenience, by the dotted curve in fig.2); in fact there exists a value ($0 < \alpha_{kmin} < 1$) such that the difference ($A^{\sim} - L^{\sim}$) is at its maximum -below this share the capital value can be increased faster than the intrinsic loss, while above it the intrinsic loss grows more than the capital value. Thus (α_{kmin}) defines the share of the Trust in the safest portfolio[38].

At the end of this section on the general analytics of asset-holding under incomplete information, we are in the position to give more substance to the claim made in sec.1 that asset allocations will, in general, fail to secure MGE, regardless of whether they are more or less efficient from an individual or local point of view.

If "the consumer buys lemonade because he likes lemonade, the [asset holder] does not buy ICI because he likes ICI" (Hicks (1967, p.104)). The **amount** of financial wealth accruing in each period meets agents' desire to be "flexible", rather than to be "tied", with respect to future unclear consumption prospects. Then the criterion that agents follow in order to transfer wealth across markets and through time is liquidity preference; this mostly concerns the **composition** of financial wealth and asset prices. Any asset's nominal value is the issuer's promise to pay the specified amount of currency. If the market is informationally efficient, then such promises will be unanimously priced by the market, and wealth will be allocated to best promises according to such valuation. But because of liquidity preference, a necessary condition for positive holdings of non-monetary assets is that the latter should yield a return greater than the money interest. This differential is usually called **risk premium**[39]. There is no harm in the use of this technical term if one bears in mind that it has nothing to do with Arrow-Debreu risk premium. The latter measures the excess of actuarial consumption over certain consumption demanded by a consumer who is maximizing expected utility from bundles in all possible future states, whereas, as is clear from the above, the risk premium demanded under liquidity preference measures the increase in capital value (a sum of currency) necessary to compensate for the intrinsic capital loss (another sum of currency) in the event of **unanticipated** consumption payments (again a sum of currency) before maturity. The risk premium cannot, and does not, convey any information about the rate at which the consumer wishes to substitute certain consumption today (of that one good represented by that one asset) with state-dependent consumption tomorrow (of that same good). And if some asset holders buy ICI because they expect, say rationally, that someone else will like ICI products in the future, thus discounting a relatively higher flow of dividends, then they will push the asset price vector not towards Arrow-Debreu efficiency but even further -indeed, their preference for ICI is clearly affected by an externality (Stiglitz (1982)).

Consequently, in no way is there necessary connection between such valuations and general-equilibrium prices at the time promises will fall due. With reference to the formalization in section 1, agents have no full information on future efficient price vectors $[p^*_{ts}]$ for all t and s, so that the efficient price of securities (p^*_{jts}), or the "own interest rate" of the numeraire, is also missing. At any date t, securities will be valued by the price vector $[p_{at}]$ whose dimension and elements will in general be $[p_{at} \neq p^*_{jt}]$; this breaks the efficiency equivalence between the MO2 allocations and the MO1 optimal consumption bundle $[p^*q^*]_{t's}$ (for all t' > t, all s). Therefore, the MO2 (T + 1) budget constraints are no longer equivalent to the single MO1 budget constraint[40].

4. The international perspective

4.1. What is specific to international trade?

Demand for production and consumption goods and services may be satisfied either locally or by neighbouring or even distant areas. Contrary to the armchair anthropology of the Eighteenth century economists, long haul trades have generally predated the rise of local markets; in many cases, extra-community trades developed side-by-side with non-market intra- community organizations. However, it is not the experience of trades that may justify such a peculiar discipline as inter-**national** economics. What is specific to trades between Italy and Germany with respect to trades between a Milanese and a Roman?

The answer is hardly to be found in pure exchange theory -there is no room for such things as **nations** in it. In the Arrow-Debreu version of an exchange economy, items of exchange should be classified according to the date, state of nature and place of delivery. Transactions stem from different needs, preferences and endowments and are performed where and when they are most preferred. Independent, decentralized decisions are dictated by signals and constraints perceivable at the individual level. It is hard to give the distinction between "national" and "foreign" items any meaningful role in the set of decisional inputs of selfish and greedy individuals.

In fact, the classification of items can be refined at will, and there is no particular problem involved in distinguishing among goods (or even the same good) produced in Milan, Rome or Frankfurt. However, just as there is no Walrasian equation requiring that the amount of Christmas cake the Romans buy in Milan should be equivalent to the amount of cheese bought by the Milanese in Rome, so there exists no Walrasian equation requiring that the amount of beer the Romans buy in Frankfurt should be equal to the amount of cheese they sell there (obviously, this holds if each "locality" exchanges with at least two of all the others). Equilibrium conditions bring the sole requirement that (i) the **total** demanded and supplied quantities of each good should equal each other, (ii) the **aggregate** value of resources acquired through production and exchange should be equal to the initial endowment for all agents. These two conditions entail, **as a purely formal result**, that any particular subset of exchanges will show nil balance. In this context, that particular subset of exchanges labelled "foreign trade" has no special economic significance whatsoever.

The innovative outlook of international political economy has drawn our attention to the fact that international trade takes place across different monetary conventions (e.g. Kindleberger (1978, 1981)). This track brings us back to the issue of the use of money in a market economy that we have examined in this chapter. In section 1 we concluded that an efficient market economy may have a standard of value, but need not use a currency or a reserve. If different numeraire conventions exist, all that is needed is a conversion rate. This is a pure number, not a price, which assures the indifference of allocations across the monetary conventions. Markets for exchanges and exchange rates as prices will not exist. All equilibrium positions will be left unchanged. We are still in an economy where rational agents (and perhaps economists) need not bother with international trade -or at least with imternational payments.

However, we also concluded that an efficient market economy has a prohibitive, generally lacking, informational requirement. The signal conveyed by competitive prices may be clear but deficient. Not all future possible positions can be covered and this opens the question of carrying wealth across markets and through time, and possibly, in a world of differently-denominated wealth carriers. The same motives that induce agents to use money and non-monetary assets will create a market for currencies.

Hence, the key to understanding the special status of international payments and exchange rates is the same as the one that would disclose the nature of general means of payment and stores of value. But consequently, the study of international monetary relations has to be framed in a world of imperfect information with less-than-full insurance. In such a world, MGE can hardly be invoked, and one is only entitled to put forward more modest and limited propositions.

According to section 3, currencies are instruments tailored to satisfy liquidity preference in carrying wealth across markets and through time in the face of incomplete information about future states and prospects. Foreign currencies are accepted in view of their use on goods markets under different monetary conventions. But not only. Liquidity preference in the choice of the wealth carrier is -we have seen- complementary with agents' precautionary choice to transfer wealth to the future. Precautionary behaviour stems from agents' inability to pursue expected utility from future consumption; actual securities are tailored to meet agents' demand for flexibility. On the other hand, they scarcely alleviate the intertemporal coordination problem between consumers' and producers' decisions. The same patently extends to different monetary conventions. If wealth allocation to securities cannot be directly determined in function of expected utility maximization, specific allocation to titles to foreign currency may occur independently of commodity arbitrage. Of course, to paraphrase Hicks, Italians do not buy dollar assets because they like McDonald's hamburgers (in fact they don't). Dollar assets are appetizing for non-dollar portfolios in so far as they help to thicken the prospective capital value, or to thin the chance of capital loss. And even those who do buy McDonald's hamburgers (because they have to import them, if not because they like them) need hold dollar monetary reserves only if they have reasons to be cautious in view of future uncertain cash flow.

In fact, look at condition 12 above. If there is no sufficient information for all states on securities' returns and/or on the efficient relative price between the two currencies, the present value of the two securities in home currency may not be indifferent to the investor. Thus a genuine problem of allocation across currencies arises, and the exchange rate actually comes into play as an asset price. For the reasons already explained, the fact that the exchange market may be informationally efficient does not imply that today's exchange rate is consistent with general-efficiency prices at maturity[41].

4.2. Currency sovereignty and the exchange-rate regime.

We also found one property of money that seems hardly reducible to individual rationality: general acceptability has more the nature of a game-like social convention. The evolution of modern monetary conventions has been towards an openly artificial currency vouched for by the State (State paper money). This evolutionary path has also led to the two institutions that characterize international monetary relations: **currency sovereignty** and **the exchange-rate regime** (e.g. Hamada (1977)).

Currency sovereignty confers absolute power on the State to issue the national currency and to pursue independent monetary policy, and also full responsibility for limited means of international settlement[42]. On the other hand, currency sovereignty means that evolution towards the perfectly liquid currency at the world level is still on the way. The institution of State paper monies with fixed exchange rates in the whole area of market economies, after the breakdown of the gold standard, has been the most progressive step in that direction. A system of fixed exchange rates is, however, a hybrid creature between marketable currencies and prices fixed by authority. Such a system collapsed, too, when authorites were no longer able to guarantee convertibility at the going prices; since then it has been replaced by open multi-currency competition, with free market prices. Yet the tendency, propagating from Europe, now seems turned against currency competition, and may ultimately take the form of monetary union.

It is noticeable that several studies (e.g. Helpman (1981)) have concluded that general efficiency is equally preserved under a floating and a fixed rate regime. The irrelevance of the exchange rate regime may seem a surprising result in the light of the general idea that a fixed price should destroy efficiency (this is indeed one usual a priori argument in favour of floating rates). As Helpman and Razin (1982) have made clear, this strong result is due precisely to the assumption of perfect foresight, or complete future contingent markets, which implies perfect information. It should be added that these assumptions preclude the very existence of a market for exchanges and of exchange rates working as prices. Anyway, their conclusions echo those of the Hayek-Lange debate over the allocative efficiency of central planning vs. decentralized markets: the latter are superior only in the presence of imperfect generation and transmission of information (von Hayek (1945)). Advocates of flexible rates ought to base their arguments on some market imperfection, which rarely appears in recent models[43].

Finally, in a world whose future states are no less vague to authorities than they are to private agents, it is the institution of responsibility for the means of international settlement that lends economic significance to that accounting sheet on which the handsome edifice of our discipline is built: **the balance of payments**. In one respect, responsibility for the national monetary reserve against future external payments imposes onto monetary authorities the same problem that private agents face in the choice between present and future consumption. It is no surprise, therefore, that the balance of payments matters, and that authorities are champions of precautionary behavior because of uncertainty about the future states of the economy. In another respect, it is important to bear in mind that the balance of international payments is not a micro-constraint. It is a typical macro-constraint, that is, it is not perceived at the level of individual choices but applies (or is enforced) at the level of systemic rationalization. To that level of analysis we shall move in the next chapter.

Appendix

A.1. On precautionary behaviour.

Recent studies in decision theory have reassessed Keynes's precautionary motive for holding money and have given firm underpinning to Keynes's great intuition of the breakdown of intertemporal optimization. They suggest that precautionary behaviour should be considered a general attitude of the decision maker towards uncertainty generated by incomplete information. Studies on "flexibility" are particularly interesting in this respect. The field was pioneered by Koopmans (1964). As for recent developments and applications to monetary theory see Jones-Ostroy (1984); see also Hicks (1979, pp.91 ff.) and Hahn (1982, pp.26 ff.; 1988, pp.963-964; ed.,1989, and in particular the paper by Makowski). Laidler (1988) has strongly emphasized the precautionary component in the demand for money in this vein.

" The rationale for flexibility is the unwillingness to commit oneself to not well-defined future prospects in terms of payoffs or preferences or needs. "One position is more flexible than another if it leaves available a larger set of future positions at any given level of cost [...] This principle potentially applies whenever (i) there will be opportunities to act after further information is received, and (ii) current actions influence either the attractiveness or availability of different future actions" (Jones-Ostroy (1984, p.13)).

In the financial field, unlike contingent claims or pure securities or any forward contracts whatever, actual securities are currently accepted because they are flexible instruments: they give entitlement to a sum of currency without any prior commitment to physical goods or states. It should be noted that here flexibility arises from the entitlement to currency, that is, to the general means of purchase. Therefore, if access from the position in securities to the position in currency is costly, the latter offers further flexibility with respect to the former; this consideration seems to support the inclusion of money among assets.

However the mere appeal to transaction costs may, apart from being not new, be unsatisfactory if we admit that transaction costs matter to the extent that they are not discountable **ex ante**. In fact there is another, perhaps neglected, dimension of precautionary behaviour to consider. This is a dimension which is relevant to the transition from one position to the subsequent one where some uncertainty is resolved (or where transaction costs fall due). As pointed out by Knight (1921, ch.VII), precaution is commensurate with a positive probability of error, rather than with the first two moments of the probability distribution which dominate traditional risk-aversion theory. On the other hand, a positive probability of error is economically relevant if not all eventualities can be insured against. Knight concluded that it is just precaution in the face of "fallibility" that "prevents the theoretical perfect outworking of the tendencies of competition" (1921, p.232). This also seems the main message in the new literature on market inefficiency (Stiglitz (1985), Greenwald-Stiglitz (1987, 1988)).

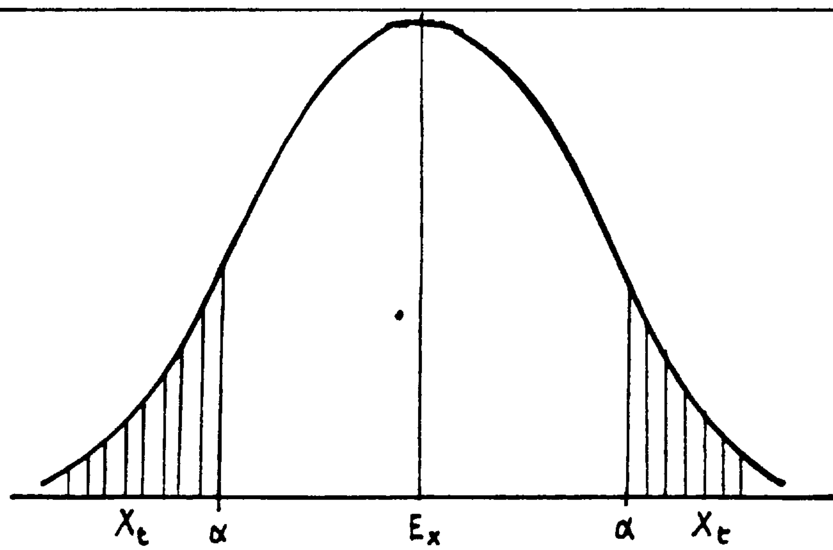
Decision theories centered on asymptotic measures -such as mean and variance- can only be acceptable on the explicit assumption of complete contingent markets and full insurance. Otherwise they are not operational. This can be seen clearly in the case of the axioms of rational expectations. Consider the random variable X_t with mean $[E(X) = E_x]$ and variance $[V(X) = V_x]$; let it represent payment streams of an agent, whereas Y are his income streams (for simplicity constant) and $(E_x = Y)$. Let the agent have a rational expectation of future payment streams $[E(X_t - E_x) = 0]$; the expectation is asymptotically correct, forecast errors are uncorrelated and orthogonal. Nonetheless such an agent does, for any actual (X_t), make forecast errors, and only a very naive idea of randomness can suggest that gains and losses will be "balanced" over any finite (possibly thin) slice of time (Lopes (1986)). Rational expectations do not rule out the possibility of strings of losses or gains and hence do not exonerate the economist from explaining how the agent copes with favourable and unfavourable outcomes. Precautionary asset holding is one possible response when contingent markets are missing.

The model of precautionary behaviour proposed here only captures a few basic aspects. It is based on a well-known technique of statistical decision which consists of a measure of fallibility and the choice of a means to minimize it (interestingly, this procedure is largely used in technological applications; see Ventsel (1983, par.64)). A concise measure of fallibility is given by Tchebycheev inequality which states that

$$\Pr(|X_t - E_x| > \alpha) < V_x/\alpha^2 \qquad \alpha > 0$$

That is to say, the probability f(a) of an error of magnitude a is equal to ($V_x/\alpha^2 > 0$). This measure holds true for any probability distribution. The interesting point of Tchebycheev inequality is the subjective parameter a. The assessment of fallibility is not only dependent on the variance, but also on the tolerance level a: the less the subject is tolerant, the smaller a, the greater his probability of error, the more cautious his behaviour. Fig.A1 represents the falliblity problem with a normal probability distribution.

Fig.A1. Tchebycheev inequality with a normal probability distribution.



In economic matters, it seems plausible that a will be set in relation to the subject's ability to withstand uninsured positions as measured by the subject's wealth. In our example in which X_t is a payment, setting a equal to wealth (A) gives the critical probability f(A)

$$\Pr(X_t \geq E_x + A) \leq V_x/A^2$$

that the actual payment in t exceeds the normal level of payments (and incomes) by more than the available wealth (this is a right-hand problem in fig.A1). This point has been developed in section 3.1. By taking the probability of negative deviations from the expected nominal value of wealth, one obtains another fallibility problem (a left-hand problem in fig.A1) that has been analyzed as a liquidity problem in sections 3.23.3.

Neither the tolerance level nor the variance of the probability distribution need be fixed or equal across agents, and both may be totally subjective parameters. For instance, an increase in the variance of outcomes increases the probability of error; as a countermeasure, the subject should raise his tolerance level, e.g. by enlarging his precautionary wealth.

The use of variance in uncertainty problems is notoriously controversial. In the present context we cannot address this problem, but there is no reason to reject statistical variance as an operational tool, while bearing the numerous caveats in mind. In particular that the statistical variance is a sample parameter; it is based on past occurrences and, as such, it is a consistent parameter only if the process is stationary over time. A number of reasons have already been given such that stationarity cannot be taken for granted. If we admit the sample variance as an operational approximation, we should be prepared to regard it as a subjective parameter within a subjective decision model yielding boundedly rational decisions. It is easy to become convinced of this just in the case asset prices; for it is well-known that an asset may have a positive short-sale price for the individual holder, but not for the market as a whole. As a subjective parameter, V_p is likely to be unstable, since it should change as agents perceive new "out of sample" events.

Notes

(1) Many textbooks tell that money "was born" in Lydia, Eastern Mediterranean Sea, toward the end of the VIII century B.C. Yet this is hardly more than a conventional agreement. The Kings of Lydia, perhaps the mythical Croesus, introduced the **State coinage of precious metals** in the Western world in order to regularize tributes from Greek towns. No doubt, this was an innovation which would enjoy long lasting success; nonetheless, it was but one of the many arrangements and innovations that, earlier and later, in Western regions as well as elsewhere in the world, organized communities adopted to measure, transfer and store claims to physical resources. For further development of this argument see such classical works as Polanyi (1957), Hicks (1969, ch.V), Ardant (1976, Part I), Kindleberger (1984, ch.II).

(2) See again Hicks (1935), and later, the attack by Clower (1967).

(3) The fundamental reference is to work by Patinkin (1956). Of Friedman's vast production mention should be made of one of the earliest expositions of his neo-quantity theory (1956). The Walrasian roots of the monetarist thought are clearly pointed out and discussed by Davidson (1982) and Hahn (1982).

(4) In part I the author tells us that his "suggestion" was largely inspired by Keynes's **A Treatise on Money** (1930, vol.I, ch.X).

(5) The issue "time and money" has been pursued not only in the Neo- Walrasian programme that followed **Value and Capital**, but also by the post-Keynesian school. The issue is obviously central to the **General Theory**, but the analytical structure adopted by Keynes made it rather opaque (see Hicks (1979, chs.VI-VII; Graziani (1988)). Keynes tackled the question of the timing of decisions more explicitly in his later writings (1937a, b, c). Following this line of reasoning, Post-Keynesians (Davidson (1972), Minsky (1975)) have emphasized the essential incompatibility between the use and the role of money according to the "Keynesian revolution" and the Walrasian foundations of the textbooks' neoclassical synthesis or of the "monetarist counter-revolution".

(6) It is well known that efficiency is only one possible characterization of general equilibrium. An efficient allocation is also Pareto-optimal and such as to maximize consumers' utility and production value.

(7) See Krouse (1986, p.82)).

(8) One such reason is the existence of "nations" and then the purely institutional fact that some exchanges are "international". In general equilibrium theory one can only say that goods are available in different places and distinguish them accordingly. See also below, sec.4.

(9) Note that r^*_0 gives the amount of commodity h for one unit of commodity f and therefore, for H markets, it corresponds to the usual definition of exchange rate.

(10) Moreover, analytically, general equilibrium theory does not afford a well-founded theory of disequilibrium price adjustments (Arrow (1959), Hahn (1977)). This lacuna extends to commodity arbitrage, or "monetization and demonetization" of standard commodities, which play such a large part in the classical theory of metallic circulation and purchasing power parity.

(11) See Krouse (1986, p.84).

(12) Note that by definition (p^*_{jts}) is the amount of today's standard per one unit of standard contingent on (t, s). Hence, ($1/p^*_{js}$) is an interest factor or, in Keynes's words, the "own interest rate" of the standard.

(13) See Krouse (1986, p.87) and Dreze (1987, p.123).

(14) For the full demonstration see Krouse (1986, pp.71 ff., pp.96 ff.).

(15) As is well known this issue was introduced in monetary economics by the Swedish school (Wicksell, Lindhal, Myrdal) and propagated by Hicks's **Value and Capital** (1939).

(16) See Samuelson (1965), Lucas (1978) and, for a general treatment, Sheffrin (1983).

(17) The methodological literature on rational expectations is now vast. See e.g. Sheffrin (1983, ch.I).

(18) The most representative are the so-called "overlapping generations models" inspired by Samuelson (1958); see Wallace (1980), and the critical analysis by Hahn (1982, ch.I; 1988). The foregoing argument equally applies to the older tradition that includes money balances into the utility function. Since the utility of the currency is the utility yielded by goods, the allocation problem to money balances boils down to the MO2 allocation problem to pure securities that has been examined so far. Following our formalization in sec.1, the traditional optimization problem truns out to be based on the MO2 (T + 1) budget constraints

$$(py = pq + M)_0, \ldots, (py + M_{t-1} = pq + M)_{ts}, \ldots \qquad t = 1, \ldots, T$$

where M = money balances = $p^*_j a$ for p^*_j = [1] all s. For the complete proof see Grandmont (1983, ch.V.5) who aptly adds that "the introduction of money balances in the trader's utility function is a valid procedure, provided, however that the utility of money is derived from the trader's intertemporal decision program which lies underneath" (p.32).

(19) See Hahn (1982a, pp.16-19; 1988, p.960)).

(20) These considerations have progressively gained the centre of stage thanks to the pioneering works of Knight (1921), Hicks (1935), Keynes (1936, ch.XII), Kaldor (1939), von Hayek (1945), up to the recent decisive contributions of Grossman and Stiglitz (Grossman-Stiglitz (1980), Stiglitz (1982, 1985)).

(21) Of course, there remains information which, however necessary to optimize decisions, is not obtainable at any cost whatsoever (think of the subjective uncertainty, or plain ignorance, about one's own future needs or preferences).

(22) Note that, as Hicks warned (1935, pp.77-79), the advantage in the actual possession or assignment of a title cannot be confused with, and may not be satisfied by, the change in the capital value of the existing stock which enters traditional asset-demand functions. If the interest in taking over a stock is at work, and no one contents oneself with a capital gain, the market may become unstable.

(23) Fundamental contributions are those by Frydman-Phelps (eds., 1983), Bray- Kreps (1986), Pesaran (1987).

(24) As shown by Bray and Kreps (1986), for agents' beliefs to converge a "rational learning model" would be necessary, such that the (*K*'s) are constantly updated to specify the effects of past estimated parameters on the structural parameters.

(25) Bray-Kreps (1986), Pesaran (1987, ch.IV). An intuitive explanation, based on modal logic rather than econometrics, is the following. Suppose common knowledge has been reached thanks to a so-called "fully revealing" market equilibrium (Grossman (1981)); then agents would get a common model which is some combination of the original ones, but since a combination of subjective models is no more than another subjective model, agents would display rational expectations without (necessarily) achieving the "truth" of market general efficiency (this is the well-known case of self-fulfilling expectations). In fact the usual strategy in models of "fully revealing" equilibria is that at least one agent has already got the "truth".

(26) Arthur C. Pigou used to distinguish economists between "tool makers" and "tool users".

(27) More on this methodology can be found in Frydman-Phelps (1983), Pesaran (1987, ch.IV).

(28) The above resembles Arrow-Pratt principle of decreasing absolute risk aversion. There are, however, substantial differences as explained in App.A.1.

(29) That is to say, df(A)/dA = -1, which yields $A^* = (2V_c)^{1/3}$. Note that this formulation gives the upper bound of the agent's tolerance to default; he is in fact minimizing the probability of losing his whole wealth. In practice, savers are likely to be far less bold. Nothing is implied as to the variance of consumption payments, which enters the measure of the probability of default -it may well be a totally subjective parameter.

(30) With this definition I wish to capture two peculiar characteristics of money. The first is that money is the only currency; hence monetary payments resolve contracts immediately and definitively, whereas private bills require further conversion into currency at the contractual terms or through discount. The second is that money has a fixed value in terms of itself in the broader sense of zero utility from consumption in all dates and states, whereas the monetary services of commodity standards may be "exchanged" for their services as commodities under particular states.

(31) It is interesting to observe that, according to the gametheoretic approach, the property of currency can hardly be explained in terms of individual rationality alone. Moreover, such enforcing devices as "gold" or "State" may be necessary to explain why the acceptance of gold coins or State paper, unlike private bills or promises to pay, need not be forced by means of a supply price lower than their nominal value, so that they bear no capital risk. The elimination of currency competition is thus the basic form of "protection" of the monetary convention which makes production and exchange feasible. This solution has been challenged by advocates of currency competition (such as von Hayek; see the debate in Claassen (1986)); but one immediately notices that their arguments are generally based on assumptions of perfect competition that ignore the informational problems we are considering here. Anyway, historical evolution seems to be in favour of a unique currency which, in modern monetary economies, is typically vouched for by the State. As a matter of fact, the last two centuries of history of money have been the history of waves of private monetary innovations followed by their statalization for the sake of a safer and safer monetary convention. For further developments see Ardant (1976, Part I and Part II).

(32) It is interesting to note that currency choice, instead of the more usual asset choice, was the point of entry of liquidity preference in the **General Theory** (ch.XVII, p.233 ff.) together with the highly controversial introduction of wages "fixed" in monetary terms. It seems to me that the foregoing account should make clear that **by definition** all monetary contracts are "fixed" in monetary terms, which is a characteristic quite independent of their being "rigid" in the face of changing economic conditions. On the other hand, the rationale of monetary contracts should be sought in the unwillingness to enter "crop-sharing" contracts in "real" terms, i.e. liquidity preference. However Keynes's treatment was quite ambiguous as he also seems to suggest that monetary contracts are liquid, and thus preferable, because they render monetary prices of goods stable, which may happen if monetary wages are in fact "rigid" (e.g., p.237). As already explained, liquidity preference has to be confined to the comparison of **nominal values**; it leads to the institution of a single universal currency, not to goods price rigidity.

(33) See e.g. Chick (1983, ch.X, App.). Such an unsatisfactory state of the theory can perhaps be traced back to Keynes's own work, in particular to his "demand for money" as an aggregate across a variety of "motives". No doubts, the **General Theory** and most Post-Keynesian writing have put greater weight on the "speculative motive" (i.e. capital-gains maximization) than on the precautionary one. However, it is no surprise that the idea of speculation as the "fundamental" inducement to hold money has led to an endless quarrel as to the anchor of speculators' expectations. Indeed, when he had to clarify the fundamental perspectives of his work before his critics, Keynes brought precautionary behaviour into full light (e.g. 1937c).

(34) The point was made by Hicks (1967, pp.114 ff.). I have taken those terms (capital-value

programme, and capital-growth programme) from the jargon of Common Trusts offers. One major branch of portfolio theory (following the seminal paper by Markowitz (1952)) is concerned with capital-growth programmes. That problem is one of optimally combining return and risk in the **class of variable-interest securities**. The standard deviation of the return around the mean value is usually used as a measure of risk of variable-interest securities. There is no explicit role of price variability in the objective function, and this can only be justified by the absence of unexpected short sales -i.e the absence of liquidity problems. The further contributions by Tobin (1958), Sharpe (1964) and Lintner (1965) grafted money onto that problem as the "riskless asset"; but there remained considerable obscurity as to the "risklessness" of money and the choice of money in the portfolio apart from agents' personal tastes.

(35) The usual contention that the monetary reserve undergoes the negative interest rate of inflation (and the inflation rate may also be uncertain) seems to fail to consider that any asset stock and interest is realized in terms of currency units; as a consequence, the inflation rate affects the real value of the stock of financial wealth but is neutral to the comparison among interest differentials. As already stressed in the previous paragraph, the liquidity problem has to do with uncertainty in nominal, not in real, payoffs.

(36) The portfolio offered is optimum according to Sharpe-Lintner "separation theorem": for the expected i_k, the portfolio minimizes the variance of dividends and interests.

(37) The fact that the problem assumes a probability distribution centered on the current price is tantamount to assuming static expectations, which is the standard procedure in traditional portfolio theory. Static expectations on asset prices are also rational if the market is a "fair game" (Fama (1970)). Note that, if $[E(p) = p_{k0}]$, the expected return rate is reduced to $[E(r_k) = i_k/p_{k0}]$ or to the effective interest rate; therefore, on the sole basis of asymptotic values, the liquidity problem would not exist while capital-gains maximization would be pointless.

(38) $$\alpha_{kmin} = 1 - [V_p/(V_p + r_k)]^{1/2}.$$

This result may be considered a further "separation point" in the spirit of Sharpe-Lintner separation theorem. Of course, there is still room for personal tastes, in the trade-off between capital value and capital loss, for less safe portfolios up to a value $(\alpha_{kmax} < 1)$ where $(A^{\sim} = L^{\sim})$. This point corresponds to the usual definition of "fair bet" or risk neutrality. The model could be made more precise by introducing the interest rate paid on the monetary reserve. However, as already explained, the circumstance whether money yields an interest or not is inessential to our argument.

(39) From the solution for α_{kmin}, see n.38, we have $(\alpha_{kmin} > 0$, for $r > 0)$. In fact the money interest in the model is zero. Consequently, r associated with α_{kmin} coincides with the risk premium demanded on the Trust. The risk premium can conveniently be expressed in terms of the desired stock of reserve $(\alpha_n = 1 - \alpha_{kmin})$ as follows

(40) See Hahn (1988, p.967). In more traditional terms this is the Wicksellian theme of "the natural interest rate". From what precedes, it is very difficult indeed to see how something like the natural interest rate on the standard commodity can survive in a financial economy (quite apart from well-known difficulties in equating marginal productivity across heterogenous capital goods). In the first place, whereas Wicksell and the neoclassicists used to assume uncertainty away, the latter implies that there must be as many interest rates $(1/p^*_{js})$ as possible states of the world at the maturity (or at least as the number of diversifiable assets). Moreover, were one tempted to pool the whole array of interest rates in the rationally expected value $[\Sigma_s \Pi_s (1/p^*_{js})]$, then there would still be the problem of the efficient marginal rates of substitution between the standard commodity today and in each possible state at the maturity, which cannot exist independently of all other commodities' marginal rates of substitution. Then, in the absence of intertemporal utility maximization, Keynes's conclusion follows that the interest rate cannot be determined by "real factors".

(41) On the detachment of portfolio efficiency from MGE consider, for instance, this instructive paradox:

"Suppose a country reduces money growth and this leads (as it will) to an increase in the interest rate on financial assets. Incipient capital flows will lead to currency appreciation and a current account deterioration financed by borrowing abroad. It is hard to argue that the current account deficit is a reflection of enhanced investment opportunities or increased time preference that, in an efficient and integrated capital market, would call for a redirection of lending toward the home country. On the contrary, the decline in demand will have reduced profitability of domestic real capital. It therefore would not be optimal for capital to flow toward the country with a tightened monetary policy." (Dornbusch (1983, p.26)).

(42) Of course, were means of international settlement unlimited, currency sovereignty would lose part of its **raison d'etre**. In a hypothetical pure metal system, the quantity of means of payment for each country is physically limited by the production of metal; the same applies, albeit indirectly, to a convertible system on metal base. In a purely paper system, international means of payment are limited if not all national currencies are freely convertible, or if not all currencies are acceptable in international settlements.

(43) To be true, the early Keynesian generation of proponents of the floating regime would argue that commodity prices are not as flexible as necessary to achieve general equilibrium in domestic and external trade. This argument survives in the "overshooting" version of the monetarist school. However, the modern wave of supporters rather make reference to general equilibrium models or asset-market efficiency models, and focus on the inefficiency due to authority's intervention in the exchange market. But as Helpman (1981) and Helpman-Razin (1982) have shown, exchange-market intervention cannot affect the competitive efficient allocation unless the Ricardian equivalence theorem fails -i.e. agents fail to discount the a priori information that the path of intervention must eventually sum to zero. See also the accurate discussion of the various arguments in favour of flexible rates by Dornbusch-Frankel (1987).

CHAPTER TWO

THE MACROECONOMICS OF THE FINANCIAL ECONOMY

Introduction

The informational perspective which we have followed so far, and which we shall keep following, enables us to lay deeper, possibly firmer, foundations of the macroeconomics wof the financial economy. This is the aim of this chapter, which is basically a methodological premise to the macroeconomic analysis that will follow in the subsequent chapters.

Since the financial economy lies in a sequential setting, time is the key element. It is time that brings uncertainty and money into the analysis in an essential manner. In fact, money becomes the device whereby today's commitments are tied to tomorrow's deliveries and settlements in an economy where uncertainty inhibits agents' willingness to take forward positions in physical goods or specific states; this is the essence of monetary contracting. Ch.I, sec.3.2 showed how monetary contracting involves the whole set of monetary functions. As was explained, "money" is nothing else than a set of economic funtions performed by ad-hoc instruments, each of which is more or less specialized, but each of wich shares with the others some fundamental properties. In modern market economies, misunderstanding of this principle may arise from the fact that monetary instruments usually have a low degree of "specialization"; our means of exchange, e.g. State paper notes, is also our means of payment as well as of reserve in bank deposits. Nonetheless, attention should be paid to the economic functions of money rather than to the material instrument used. Therefore it is desirable, at the cost of some lexical artifice, to label each money's function as if it were served by a specific, "fully specialized", instrument. Note that the same monetary instrument might well change name by simply changing hands or by moving from one side to the other of a balance sheet.

1. The economics of balance sheets

1.1. Basic monetary taxonomy and relationships.

In ch.I we related three monetary instruments -**standard, currency and reserve**- to the three economic functions of money -accounting, payment, and store of value. The **currency**, which takes on the functions of means of payment and exchange, consists of paper notes issued by a State agency. Hence, the **monetary standard** is nothing other than the unit of currency. The **monetary reserve** is any amount of currency held as store of value, according to the definition given in ch.I, sec.3.2. In a broader view, we may draw a distinction between currency, whenever money is exchanged against an equivalent value of goods and services, and **finance**, which embraces all instruments whereby money is exchanged against more money in the future (see e.g. Keynes (1930, p.217)). The amount of such claims held by an individual or by the totality of them may be defined **financial wealth**.

Let us now focus on that function of money which is the most easily understood but also the most easily overlooked: **accounting**.

In a sequential setting, accounting serves two fundamental purposes. The first, and the most obvious one, consists of recording current **receipts and disbursements**, thus providing the current budget constraint. The second, which is more important to us, consists of recording changes in future claims and commitments, otherwise known as **assets and liabilities**. The balance sheet of assets and liabilities gives information according to which decisions are linked from period to period. The essential function of such information can only be appreciated with reference to our definition of uncertainty and precautionary asset holding. In purely accounting terms, the capital account yields the net monetary amount of resources that add to tomorrow's budget constraint. Far more importantly, the financial position is an essential piece of information in the decision of how to invest or consume tomorrows' receipts, even though not a penny of today's financial wealth will be used tomorrow. In financial theory, "we have to concentrate on those forces which make assets and liabilities what they are" (Hicks (1935, p.75))[1].

Therefore, the balance sheet can also be given an analytical content. We may say that an agent cannot be held to be in **stock equilibrium** until he has achieved the desired asset-liability balance; at the same time, the same agent is not in **flow equilibrium** until he has achieved the desired cash- flow. These definitions imply that in full equilibrium, or stationary state in a static setting, all flows and stocks must be at the desired level and unchanging (this point will be developed further in sec.2 below).

Note, finally, that the balance-sheet is also a document which has, or may be given, legal relevance. An economy which so essentially lives on monetary commitments and claims can only work in so far as those commitments and claims are actually fulfilled as they fall due. This is such a vital principle of the monetary convention underlying market production that it has been safeguarded by a special branch of the Law. While current income constraints can be bypassed by getting indebted, solvency of liabilities is the very cogent constraint on agents' choices.

1.2. Decision units and their balance sheets.

Unlike in a perfect market organization, in the financial economy under examination agents are no longer undistinguishable. Since their knowledge and information is incomplete and unequal, individuals' original attitude towards uncertain economic activites leads them to genuine **specialization**. The latter is something different (and more) than a specific maximand function. Specialization also involves **the techniques** by means of which ends are pursued namely, the type and organization of the relevant information. Consequently, different economic ends relate to specific **organization of information**, and to specific **financial positions**. Thus, to recall ch.I, producing entails taking illiquid positions that sound saving would refuse. Our true microeconomic elements become economically distinct decisions, not the "anthropomorphic agent" (or "N featureless agents") that make them (Leijonhufvud (1968, p.361)).

It is remarkable that in real life economic activities and decision techniques are highly standardized. For those who are (justly) suspicious of "representative agents" I stress that decision techniques, not individuals, are standardized. We shall take four prototypes of decisions into account: **production and investment; consumption, saving and portfolio choice; monetary policy; fiscal policy.** It is convenient to associate each decision with a specific "decision unit", that is, **the firm, the household, the central bank**, and **the government**. This is done for expository purposes, but does not sharply conflict with economic practice[2]. A fifth unit -**the foreign** one- is added simply to point out the resident units' transactions with non resident ones. Such choices are by no means "objective"; they only claim to single out decisions which are determinant on macroeconomic performance. The latter is in turn far from being a "value-free" concept; it is centered on the maximization of goods and services available to the community; these are mainly manufactured goods and marketable services which make up the so called **Gross Domestic Product**[3]. Since GDP goes through the market, macroeconomists normally believe that its composition cannot be in sharp contrast with consumer preferences.

Each decision unit is qualified by a specific balance sheet of financial positions. Quite obviously there will be a good deal of simplification in order to capture the essential properties of the system. The top part of balance sheets records current receipts and disbursements, the bottom part shows the counterpart change in assets and liabilities. The sum of the two parts must be nil (taking an increase in assets as a disbursement and an increase in liabilities as a receipt), or

Receipts - Disbursements = Δ(Assets - Liabilities)

The Firm

Receipts	Disbursements
Sales revenue	Factors cost

Assets	Liabilities
Fixed capital	Net worth
Circulating capital	Monetary capital
	Long-term debt

The firm is a productive unit. It is endowed with a stock of fixed capital (plants, machines, etc.) and it buys services of labour and raw materials at the beginning of each production period on the expectation of a given amount of total sales at the end. Sales revenue is entirely distributed to production factors. Factors cost amounts to the cost of labour (wages and salaries), capital (profits and interests) and raw materials.

Labour and raw materials form the circulating capital of each period which adds up to the fixed capital to form the firm's assets[4]. Firms are not supposed to hold financial assets. On the liability side, at the beginning of each period each firm records the currency-equivalent of circulating capital as monetary capital (which amounts to a short-term debt). Fixed capital is owned by share-holders; the total value of shares is the firm's net worth. Liabilities also display a long-term debt (debentures and the like) which we assume to be towards the private sector or the bank. Additions to fixed capital (investment) are to be matched by an increase in liabilities (namely, equities or long-term debt).

The Household

Receipts	Disbursements
Personal incomes	Consumption goods
	Taxation
Assets	**Liabilities**
Durable goods	
Transaction balances	
Monetary reserve	
Bonds	
Debentures	
Equities	
Foreign securities	

The household is a consumption unit supplying productive services. Its receipts are given by personal incomes from services (wages, salaries and distributed profits). After deducting taxation from personal incomes, householders buy perishable goods that are consumed within the production period, along with durable goods (house, car, etc.) recorded as an item of their assets[5]. Households may display the whole range of assets, which may be monetary (transaction balances and reserve) or non-monetary claims towards the public sector or the private sector (bonds and debentures, respectively), firms' ownership (equities); non-monetary assets may come from the foreign sector as well. Households are not supposed to run liabilities; a consequence is that durable goods are bought out of current income or by reshuffling existing assets.

The Central Bank

Liabilities	Assets
Currency	Discount
Bank Reserve	Bonds
	International Reserve

As far as the monetary institutions are concerned, we shall have to make a few substantial, but useful, simplifications. There is one central bank, whose tasks are to issue the State paper currency, to hold government bonds and the national reserve of means of international settlement, and to offer deposit services. We shall simply disregard other private banks by considering the central bank's balance-sheet as the consolidated account of the monetary positions in the economy[6].

The central bank operates three windows: for the private sector (discount), for the public sector (government bonds) and for the foreign one (international reserve). As usual, the total amount of currency issued appears as a liability against these operations. It is also usual to emphasize that part of the emission which is held by the economy in the form of deposits; this part virtually flows back to the bank (bank reserve). In accordance with modern institutional arrangements, the banking institution is not allowed to hold firms' shares.

The Government

Receipts	Disbursements
Tax revenue	Public expenditure
Assets	**Liabilities**
State property	Public debt

The government is economically relevant as a transferor or as a buyer of consumption goods or of durable goods which add to the State property (it is neither a direct producer nor employer). Any excess of current expenditure over current tax revenue is financed by issuing bonds that accrue as public debt. Note, however, that the share of bonds purchased by the issuing bank becomes an equivalent issue of currency.

The Foreign Sector

Receipts	Disbursements
Exports	Imports
Assets	**Liabilities**
Foreign securities	Bonds
Official reserve	Debentures
	Equities

The foreign sector is a conventional record of exchanges of goods, services and assets with non-resident units from the point of view of resident units. We shall call a national economy **open** if there are no absolute legal prohibitions on the exchanges of goods, services, securities, and currency with non-resident units.

It is timely to specify just at the outset that our economy is assumed to be an industrial economy that imports basic goods and foreign manufactured goods in exchange for domestic manufactured goods. In most exercises it will be useful to consider imports as a component of consumption. For reasons that will be explained in due time (see Part II, ch.IV), it is convenient to single out receipts and disbursements due to trade in goods (the trade account) against changes in assets and liabilities (the capital account)[7]. Receipts and disbursements recorded in this balance sheet are parts of receipts and disbursements of other units. Exports and imports come from firms' sales (manufactured goods) and purchases (raw materials) abroad as well as from consumption by households. Financial transactions with foreigners are instead limited to households and the central bank.

The trade account of the foreign sector is by construction always in balance with the capital account, the official reserve held by the central bank being the most important compensatory item. The capital account also displays private assets (foreign securities held by resident households) and liabilities (resident firms' debentures and shares, and government bonds held by non-residents).

2. Macroeconomic equilibrium

2.1. The stock-flow matrix.

So far we have singled out a few economic units which make the crucial decisions in the economy, and we have written down their basic monetary and financial positions. Albeit rather simplified, such positions are closely interrelated; each unit's position depends on someone else's decision. The resulting interrelations are summarized in the following stock-flow matrix.

Tab.1. Stock-flow matrix

	Flows	|	Stocks 1.	2.	3.	4.	5.	6.
Firms	O-Y'-I	=	*			*	*	
Households	Y-T-C	=		*	*	*	*	*
Government	T-G	=			*			
Bank	0	=	*	*	*	*		*
Foreign sec.	M-X	=		*	*	*	*	*
	0	=	0	0	0	0	0	0

Flows: O = sales revenue, Y' = factors cost, Y = personal incomes, I = investment, C = consumption, T = tax revenue, G = public expenditure, M = imports, E = exports.
Stocks: 1 = monetary capital, 2 = currency and reserve, 3 = Public debt, 4 = Private debt, 5 = Equities, 6 = Foreign assets. (* = -) = increase in liabilities, (* = +) = increase in assets.
Memo: Y'= wage bill (W) + gross profits (R') + raw materials (L); Y = wage bill (W) + net profits (R); O = GDP = domestic sales (L + I + C + G - M) + exports (X).
To save on notation, all variables referred to asset stocks will hereafter be denoted by the numbers given in this table; asset holders will be denoted by H = households, B = central bank, F = foreign sector.

The column of flows displays the balance of receipts and disbursements; the columns of stocks display the corresponding changes in assets and liabilities for each decision unit. By construction (or **ex post**) all columns sum to nil. Note that the column of flows is the usual GDP identity; this obtains by aggregating the flow balances for each unit. The row of the foreign sector is the balance of payments. Consider for example this sector; when foreign receipts exceed disbursements ($M - X > 0$, the home country's trade account is negative) foreigners are accumulating deposits with the home country's bank (+2) or are buying the home country's public debt (+3), private debt (+4) or equities (+5), or alternatively, are buying back their own liabilities (+6). If this is the case, households or the bank or both are to be selling foreign assets (-6). Such sales have in turn to be compatible with other ongoing modifications in these units' stock position and, ultimately, flow position.

Analytically, the stock-flow matrix displays **ex post** magnitudes. To paraphrase Hicks, we have to understand why a given matrix is what it looks like. Such a task requires us to analyze how the set of independent economic decisions under consideration interact with each other and are eventually brought to mutual consistency. A few methodological preliminaries are necessary, however, before going into the analytics.

2.2. Micro and macro analysis.

It is now well understood that macroeconomics is not about aggregation; it is about systemic coordination. Aggregates matter not because they are entities with a life of their own, but simply because they are our "observables". If we agree that decisions are to be our microeconomic simplest elements, then, it is not decisions, even less individuals, but the effects of decisions that are the observables. And, in this perspective, the observable effects of the decisions of a single firm, or of a single household, even of a single "single", are macrophenomena, in the sense that they contain some systemic message[8].

Systemic coordination addresses the question: "How has the economic system solved the problem of inter-transactor communications?" (Leijonhufvud (1969, p.24)). One might perhaps wonder why we should think of an economic **system** instead of an economic chaos. A system obtains when the disposition of its independent elements obeys a given rule. In economics, the systemic constraint is usually the last equation of a general-equilibrium model, or equivalently (O = Y') in the stock-flow matrix. Such constraints are legitimated by basic rules of the game (such as "receipts = disbursements") but what is crucial is that they may not be directly pursued by the independent elements of the system (as explained in ch.I, sec.4, this is exactly the case with the "external constraint": X - M = 0)). Hence one has to explain how the systemic constraint is fulfilled.

The problem of systemic coordination in economics has been examined under two alternative forms: the Walrasian **tatonnement** vs. **non-tatonnement** coordination. The former applies to what we have called "market organization 1" -timeless, once and for all transactions; an instance of the latter is given by "market organization 2" -sequential, dated decisions and transactions (see above, ch.I). In MO1, which is the core of general equilibrium theory, transactions take place only when all individual and systemic constraints are fulfilled simultaneously; we know that a necessary condition is that all information must be freely available to all agents. Such a form of coordination sharply dichotomizes micro- and macro-constraints simply because individuals need not revise their actual plans (or need not "internalize" systemic signals); they are allowed to act as if they were atomistically alone. Accurate inspection of this mechanism has long concluded that it plainly eliminates the problem of how available information is actually communicated from one agent to another. If this has to happen through effective decisions that modify prices, then we are just shifted from tatonnement to non-tatonnement coordination[9].

The most important difference is that in the latter case systemic coordination is made effective by internalizing systemic signals into individual decisions. This happens not by authority nor by design, but merely because the effective decision of one individual impinges as an externality on other individuals' decisions. Individual i's consumption plan will be constrained by his effective (and perhaps prospective) income from firm j, while his consumption at the same time enters the budget constraint of non-j firms. A change in firm j's labour policy is transmitted to non-j firms through changes in i's effective demand; these firms will have to adjust their sale and labour policy accordingly, thus spreading the message to their own consumers and workers, and so forth. Now, the ultimate effects of the original decisions of firm j and of individual i can either be perfectly discounted by all the agents or not. In either case the systemic constraint (O = Y') emerges from a chain of micro decisions which, however, already contain the gene of systemic coordination. This important gene can easily be uncovered in any rational-expectations model, even in the most enthusiastically microfounded one; there consumer i, firm j and all other agents are supposed to act on the basis of a model that tell them the "true" (i.e. general equilibrium) consequences of their actions; such a model must, as every modeller knows, contain true systemic information which is the solution of "the" systemic model (say, the equation of the general price level; see e.g. Frydman-Phelps (1983, 1.2.1)). In the financial economy we are interested in, we know that agents are not endowed with systemic information and hence that their actions are fallible -if because of firm j's new labour policy individual i's effective demand falls, non-j firms will find their prices or quantities unexpectedly high, and will have to implement a restrictive sale policy. Thus it is through errors that the systemic gene works.

The much abhorred macroeconomic equations are nothing more than systemic constraints; they signal where micro decisions **must** eventually be reconciled. This leaves the question of what decisions will be reconciled to the others and by what means entirely open. On the other hand, one would say, this is the essence of economic analysis, since it is only in so far as some sort of order arises as a result of individual action but without being designed by any individual that a problem is raised which demands a theoretical explanation (von Hayek (1942, p.288)).

2.3. Modelling time. Discrete time and the norm of stationary state.

In reality if we had a stock-flow matrix of the economy updated in real time, we would observe chaotic, ceaseless changes in entries. But as already explained in the previous chapter, it is not continuous time the form of "essential" time for decision makers: it is discrete time[10]. Partitions of time mark out the horizon within which decisions are made and assessed. As we know, partitions of time are conventional; as a matter of fact, most economic decisions (and the relevant statistics) follow common time units (such as the week or the month for wage-earners, or the quarter for monetary authorities). Without loss of generality, I shall assume that our time unit (the **period**) is the same for all agents (when necessary, beginning-of- period variables will be denoted by the subscript (0), end-of-period variables by the subscript (1)). Thus there are "checkpoints" in time where the results of decisions are drawn and assessed[11].

Those who achieve results that disappoint their expectations will have to revise their policy (or perhaps even their decision pattern); such modifications are a major source of disturbance and motion in the economy. As a complement to this aspect, one should also ascertain the conditions under which agents need not change their policy (and the whole decision pattern), that is, the conditions of **equilibrium**. Although widely employed in economics, "equilibrium" is notorious for its lack of precise definition and its ambiguous uses by economists. However, in the field of macroeconomic analysis, there has been convergence towards the definition of equilibrium as **stationary state**[12]. An economy is said to be in stationary state (in its static version) when all flows and stocks are **invariant** and at the level **desired** by all agents. Two criteria are therefore involved:

(i) an **objective** one -the unvarying state of stocks and flows;

(ii) a **subjective** one -the satisfaction of agents.

These two criteria are closely connected and must be fulfilled together. In fact variations in stocks and flows entail a revision of the agents' economic position, while unsatisfactory economic positions will be modified thereby causing variations in stocks and flows. As already explained previously (see also above, ch.I, sec.2) the subjective criteria must also include the acceptance of the decision model employed.

Let us begin with stock-flow stationarity; the above stock-flow matrix will serve our purposes[13]. A first useful piece of information to be drawn from the matrix is that, whereas net changes in stocks are nil, the stationary state requires **each and all** stocks to be invariant (i.e. all * = 0)[14]. Stationary-state macroeconomic flows have to be consistent with those given stocks, namely, receipts and disbursements for all units must be balanced. I shall now make these conditions explicit for each period (t, t', ...) as follows:

(1a) $C^*_0 = Y_1 + G_1 - T_1 - M_1$

(c) $X^*_0 = X_1$

(d) $O^*_0 = C^*_0 + X^*_0 = O_1$

(e) $G_1 = T_1$

(f) $X_1 = M_1$

0 = beginning of period variables, 1 = end of period variables.

C^*, X^* = expected sales of consumption goods and export goods; O^* = planned GDP.

Memo: $O = Y' = W + R'$, $Y \equiv W + R$; Y' = factors cost, W = wage bill, R' = groos profits, R = net profits. The other variables are the same as in tab.1.

The model is simplified by the harmless assumption that labour and capital are the sole production factors (there are no purchases of raw materials; hence all imports come from households' consumption). Equations 2a-d give explicit account of the condition of fulfilled expectations; firms' revenue expectations correctly anticipate the other units' spending decisions. Equation 2d also implies that ($O_1 = Y_1 = Y'_1$, $R'_1 = R_1$, $I_1 = 0$, i.e. all profits are distributed, there is no investment), which is the condition of stationary GDP[15]. The last two equations complete stationarity for the government and the foreign sector. Therefore firms' sales revenue is entirely distributed to factors; investment net of capital maintenance must be nil. Households exhaust their incomes for current consumption and taxation, and do not save ($Y_1 = C_1 + T_1$, $S_1 = 0$). The government budget is balanced ($G_1 = T_1$), and so are the foreign current account and capital account (all external capital flows being absent: $X_1 - M_1 = 0$); then countries that receive (pay) a net permanent income will run an equal trade deficit (surplus). If we admit that agents want a given real value for the stock of financial wealth the appropriate deflator has to be stationary too. For the time being we simply take for granted that also prices are stationary.

It is instructive to compare very briefly the stationary-state conditions with some more traditional definitions of macroeconomic equilibrium. Let us consider the case of a Mundellian "external-internal" equilibrium in which the optimal public expenditure (G*) is partly financed by taxation and partly by foreign purchases of bonds; hence

$$G^* - T = \Delta F3 = M - X$$

All goods, labour and asset markets clear (for simplicity let it be I = S = 0); yet on the market for bonds it happens that foreigners are supposed to absorb the home country's public debt at the rate (F3) indefinitely; hence the above cannot be a stationary equilibrium. We should rather specify the terms at which foreigners absorb bonds as well as the possible repercussions of their growing stock on other stocks and flows[16]. These are in fact the fundamental questions which concern the current wave of macroeconomics; such questions, and their solutions, represent no doubt substantial progress over the traditionally exclusive concern with flows-and-money-stock equilibrium (i.e. the IS-LM methodology). Yet some reservations are in order.

New Macroeconomics has taken quite an extreme position according to which (i) flows matter to the extent that they alter stocks, (ii) altered stocks are re-adjusted to their initial stationary-state level. Such a position rests on the assumption that the stationary state (on the objective side) is synonymous with market general efficiency under rational expectations (on the subjective side). It will be seen that such an assumption is unwarranted. It is well known from traditional macroeconomics, and especially open macroeconomics, that stationary flows and stocks can equally obtain from quite different levels of flows -and in particular of GDP, or of personal incomes. The argument that if such flows and the underlying allocations are not those of general efficiency the economy cannot settle down is far from being obvious. In fact this argument crucially hinges on the informational structure of the economy; if information is less than perfectly transmitted across markets, then the "dissatisfied" may be unable to modify their own position. Therefore one should always keep stationary state conditions carefully distinct from their welfare gifts. In this respect, one would say that the current literature is often guilty of economic sience's original sin of associating equilibrium with a positive value judgement. This procedure is not only incorrect from a scientific point of view; it can also be misleading for economic policy.

This study will use the methodology of stationary state as a purely analytical tool. As in the little example given above, stationary state will serve as the reference point for the analysis of economies in which a few elements are varying. Variation, like motion, can be only perceived and assessed in relation to a reference point. I would like to add that most of the macroeconomic analysis that follows will be concerned with non-stationary states, their causes and their possible effects, rather than with the search for, and return to, a new stationary state. One reason is obvious: international capital flows do not pertain to a system in stationary state, not even if they are in balance with trade flows. "The real world is never in equilibrium" (Hicks).

Notes

(1) Hicks also developed this methodology of balance sheets in his **Critical Essays** (1967, esp. ch.III).

(2) This is not a concession to "anthropomorphism". The fundamental point remains that the microeconomic level consists of decisions distinguishable by function and by informational characteristics; yet our labels of decision units will help remind us that some important differences in information and decision patterns persist just because they belong to different individuals, business departments or organizations (think of the well-known separation between ownership and control in the firm).

(3) Were we interested in the creations of arts or in a healthy environment, we should probably concentrate on other decision units.

(4) We shall disregard stocks of processed output. See also assumptions on the foreign sector below.

(5) We shall not consider stocks of perishable goods. See also assumptions concerning the foreign sector below.

(6) To this effect it is sufficient that other banks' reserve/deposit ratio is equal to unity.

(7) The main difference from the usual balance-of-payments accounting is given by the item of net transfers of personal and capital incomes, that for the moment will be ignored.

(8) To a greater extent aggregates are the sole observables for all statistical and policy purposes.

(9) The basic understanding of this problem was prvided by Clower's 1963 paper; then see again the fundamental contribution by Leijonhufvud (1968, 1969), and the survey of the issue by Hahn (1973).

(10) The essential methodological arguments in favour of discrete time are those put forward by Hicks (1965, ch.VI).

(11) This point is obviously connected with the issue of uncertainty and expectations. The reader is referred to ch.I, sec.2. It should be clear that if there were no uncertainty, or if rational expectations were taken as an axiom, then there would be no room for "checkpoints" at all; expectations (and the underlying model) would be either true or false, but this would be disclosed at the end of times (dynamically, the economy would jump on either the saddle point or an explosive trajectory among all possible trajectories). In fact, dynamic models under rational expectations are generally worked out in continuous time. On the contrary, discrete time becomes essential if account is taken of expectations formation with the operational possibility of learning from errors.

(12) In the 1950s the macroeconomics of the open economy offered an instructive episode of fierce debate on the definition of equilibrium (which was acutely commented upon by Machlup (1958)). During the last decade the school of "New Macroeconomics", that arose out of criticisms of Keynesian and neo-Keynesian macro-models, has progressively imposed the norm of stationary state. The principles and results achieved by this methodology are well presented by Turnovsky (1981). An extremely stimulating critical discussion can be found in Tobin (1980).

(13) I wish to stress one subtle, but important, methodological point. It is not possible for the criteria of stationary state to have an absolute extension and validity. In fact, the economic variables that relate to the position of all agents, and the standards of satisfaction for the latter, are infinitely greater than our capacity to encompass them all. Therefore, any theory can only qualify **relative** to others according to those forces of change that it includes or, more importantly, it excludes from its domain -a choice that is always partial, often misleading and never objective. A fundamental contribution on this point has been

made by Hicks (1979); with obvious reference to the debate over the stationarity of Keynes's unemployment equilibrium see also Tobin (1980).

(14) Some authors (e.g. Turnovsky (1981, ch.XI)) relate stationary state conditions to the degree of asset substitutability and to the degree of sterilization of the balance of payments operated by the central bank. However it should be clear that these characteristics are irrelevant to the criterion of invariance of all stocks.

(15) A rigorous definition of stationary state should include fixed-capital maintenance, which should be paid out of gross profits thus leaving all the properties of the model unchanged.

(16) This point was first made at the end of the 1960s by McKinnon (1969) and others. Turnovsky (1981, ch.XI) provides a thorough analytical comparison of the two perspectives.

CHAPTER THREE

MONEY, FINANCE AND PRODUCTION

Introduction

A financial economy is an economy in which production and consumption decisions are made over a limited time horizon (conventionally defined as a **period**), and are linked by means of stores of value. The use of money as means of payment and store of value, in addition to its function as an accounting unit, indicates that the economy has to be less than perfectly informed and insured, which makes markets fail the conditions of perfection and general efficiency. As a consequence, decisions that entail commitments to physical goods or to particular future states, namely production and investment, are essentially conditioned by the financial position that can back up those commitments. Of course, in this perspective, money and finance "come first". This chapter is organized around three markets: the market for money (secs.12), the market for assets (sec.3) and the market for goods (sec.4); it ends up with the determination of GDP and macreconomic equilibrium as a result of the interrelated decisions made on these three markets. The aim of the chapter is not to set out a full-blown macroeconomic model, but to analyze each of these markets within the framework outlined previously, which in important points differs from today's standard macroeconomic framework. Some basic macroeconomic properties obtained here will be used in the subsequent parts of this work.

1. The money market

1.1. The money market in stationary state.

According to the methodology set out in ch.II there are four basic decision units to be analyzed: **the firm** (production and investment), **the household** (consumption, saving and portfolio choice), **the issuing bank** (monetary policy), and **the government** (fiscal policy) (a fifth fictitious unit -**the foreign sector**- records transactions with units resident abroad). These units' decisions intersect in a few basic junctions: **the market for production factors, the market for assets, the market for goods**. In all these markets transactions are mediated by a specific monetary instrument -the currency- which can also be held as an asset itself -the monetary reserve. Therefore there must be one further market whereby monetary instruments are injected by the monetary authority into the economy -**the market for money**. Transactions on this market are mirrored in the issuing bank's balance-sheet, which is rewritten here for the reader's convenience.

The Issuing Bank

Assets	Liabilities
Discount (B1)	Currency (CU)
Bonds (B3)	Bank reserve (B2)
International reserve (B6)	

There are three channels through which currency is circulated:(i) a **private channel**, whereby the bank discounts claims of the private sector; (ii) a **public channel**, whereby the bank buys government bonds; (iii) an **international channel**, whereby the bank is committed to exchange foreign currencies for national currency. Against these operations, the bank entitles the beneficiary to a corresponding bank deposit which thus results in an increase in the bank's liabilities (bank reserve). Since agents are assumed to keep their monetary reserve in bank deposits, the bank reserve always amounts to the monetary reserve of the economy. As depositors withdraw from their deposits to make purchases, and the corresponding receipts are not re-deposited, the bank's liabilities record a reduction in the bank reserve offset by an increase in the currency actually in circulation.

From the foregoing market organization we obtain the usual definition of the stock of **monetary base**, at any moment (t), as the liabilities of the issuing bank:

(1) $$H_t = CU_t + B2_t$$

From the definition of the bank reserve, since we are considering one single centralized bank, it follows that the monetary base is always equivalent to the definition of the stock of money as (currency + deposits, $CU_t + H2_t$)[1].

But of course, the stock of money is also equivalent to the assets of the bank towards the private sector, the public sector and the foreign one.

This latter definition points directly to the issue of the "creation of money" ,and, as is customary, let us start by imposing stationary state conditions; equations 1a-e in ch.II, which are reproduced below, ensure balanced budgets and stationary stocks for all units.

(2a) $C^*_0 = Y_1 + G_1 - T_1 - M_1$

(b) $X^*_0 = X_1$

(c) $O^*_0 = C^*_0 + X^*_0 = O_1$

(d) $G_1 = T_1$

(e) $X_1 = M_1$

Now, the classical assumption is that the existing money stock is due to the bank's cumulated stock of public debt ($H_t = B3_t$; e.g. Grandmont (1983, ch.1.6)). However this assumption raises some conceptual difficulties. In the first place it is not clear why other potential sources should be disregarded; and secondly it is necessary to suppose that stationarity suddenly starts after a past of public spendthriftness. After all a monetary economy should be able to work even without "the naive old tale of 'spendthrift and warlike princes'" (Cipolla). Such difficulties can be overcome if we frame the money market operations within a consistent sequential setting limited to private, domestic units and the issuing bank.

In fact a private channel through which the bank can immiss currency exists: the bank can lend on discount. On the other hand, given the stock of fixed capital and the technology, planned output at the beginning of each period generates a demand for production factors on the part of firms, which, with no net investment, consists of circulating capital only (labour and raw materials; the latter are now excluded). Labour suppliers wish, for reasons of liquidity preference, monetary contracts at the going market rates, which the firm then has to cover with an equal amount of monetary capital. Now it would seem natural to turn to money holders, namely households; yet there are two further difficulties. The first is that we would be forced to posit that a stock of money already exists (say, households' monetary reserve: $H_t = B2_t = H2_t$). The second is a bit more profound and interesting: householders should lend money to the entrepreneur now on the promise that they will eventually have it back as wages; but to the extent that production is uncertain, this operation would correspond to an exchange of certain for uncertain which is exactly what the contractual monetary wage is enginereed to avoid[2]. Therefore it seems logic to conclude that a monetary economy comes to existence when firms can find the monetary capital they need; plausibly, monetary capital has to be supplied by the issuing bank through its private window[3].

From the foregoing two important monetary relationships derive that must hold in each period. The bank's private discount covers the wage bill ($B1_0 = W_0$); this is credited to firms (workers) as a deposit and amounts to the money stock for the period ($B1_0 = H2_0 = H_0$). This is the basic opening operation of the money market and can be synthetized in the following general form:

(3) $$H_t = W_t(O^*_t)$$

which emphasizes that the money stock is, via the wage bill, a function of planned output for the period (O^*_t).

Moreover, the stock-flow equilibrium conditions of firms ($O^*_0 = O_1 = W_1 + R'_1$, see eq.2a-c) entail that the bank also achieves stock-flow equilibrium at the end of each period: firms' revenue is exactly suffient to pay for capital income and to redeem the bank discount ($O_1 - R'_1 = W_1 = B1_0$, $B1_0 = -B11$); the bank ends up with the same reserve, or money stock, it issued at the outset ($-B1_1 = B2_1 = H_1 = H_0$). Then a new production round can start exactly equal to the preceding one (provided that the bank grants the same amount of monetary capital to firms)

1.2. The creation and circulation of money reconsidered.

In a stationary sequential economy the creation and circulation of moeny displays some noteworthy characteristics that are at variance with traditional pictures (of various schools), and hence are of some relevance to the modelling of a monetary economy.

First of all, the currency flows into the economy through a well- defined market operation with the private sector, rather than being mysteriously "endowed" to it in form of transaction balances. The money market is the market for monetary capital. The terms themselves "demand for and supply of" money gain in clarity. Their conventional meaning in economic analysis (addition to and subtraction from existing stocks) can only be applied to monetary capital. For from this point onwards no one can increase or decrease the stock of money as a whole: one can only make use of it, one possible use being to hold a reserve. Individually, the money stock may be higher or lower, and such choices are extremely important, but the money stock of the economy in each period is no more, no less, than that determined on the money market between firms and the bank.

By the same token, disequilibrium changes in the money stock are not such obvious phenomena as they appear to be in the current literature. At the beginning of each period the money stock is always equal to the monetary capital obtained by firms. The amount of monetary capital results from a market transaction: it may be lower than the initial demand, but no central authority can force more money into circulation than the quantity entrepreneurs are prepared to use. As for households, they receive as much money as the wage bill; to them "excess" money would strictly mean that the wage rate is in excess of the contractual one, and such a circumstance seems to make little sense. Unfortunately, no one can get money in excess of how much one is prepared to give in exchange, whether the sweat of one's brow or more money in the future. What does matter, then, is the uses of money.

We thus come to a third, quite important consideration. The uses of money in the economy mostly concern firms, their ability to achieve flow equilibrium (receipts = disbursements) as well as stock equilibrium (the redemption of monetary capital). We have seen that one condition to this effect is that households should spend the whole monetary income (Y), and in the way they are expected to. Traditionally, money holdings have been regarded as the most serious threat to this condition; firstly because they interfere with Say Law, secondly because they render unexpected changes in the pattern of expenditure easier. Classics and Keynesians alike agreed that transaction balances are a crucial element in this respect, with the lonely exception of Hicks (1935; see also above, ch.I, sec.1.2)[4]. Indeed, in an orderly sequential analysis under stock-flow equilibrium conditions transaction balances turn out to be a false track; simply, their equilibrium stock must be nil. The plain logic behind this result is that transaction balances will sooner or later be spent by the end of the period, which, after all, conforms to the old rational argument that transaction balances ought not be held for their own sake. This obtains quite trivially in stationary state, but it is not limited to such a state, which only implies that the monetary reserve is also nil.

I shall take it for granted that we agree on a well-made measure of transaction balances (say cash, CU). An important point is that those who at any moment (Θ <0,1> for all periods t) hold (CU_θ) are doing so in order to cover the planned stream of payments of the current period (t). Consider the firm first. Its stream of payments is given by purchases of circulating capital, and this is initially covered by the monetary capital. The firm's stock equilibrium only requires it to pay back the initial monetary capital; as soon as it has accomplished this commitment by means of the period cash-flow, the firm's balances fall to zero. As for the household, it receives monetary incomes that are spent according to the consumption plan by the end of the period; then the household's equilibrium stock of transaction balances falls to zero too. Therefore for the economy as a whole, at the end of each period, ($CU_1 = 0$). The stationary state only implies that ($H2_1 = 0$) too.

It should be concluded that transaction balances are not a permanent subtraction from monetary income: they are monetary income. More precisely, at any given moment (θ) they are the temporary stage of the adjusment process of a stock which is being driven towards zero, namely the stock of currency received as monetary income at the beginning of period and set apart for consumption and other current transactions. All in all, the quantity equation cannot be a supply-demand equation as it claims to be. At the of each period it is an identity (see eq.3), while within each period it shows how the given monetary income flows out of consumers' pockets (the left-hand side) into suppliers' (the right-hand side).

Put another way, the transaction motive is not a use of money relevant to the coordination problem among decision units. In particular such parameters as the velocity of circulation are of little concern to the issuing bank, since transaction balances as a whole are unlikely to reside outside the coffers of the banking system most of the time (apart from abnormal currency/deposit ratios). For the same reason, such a phenomenon as "an excess demand for (supply of) money for transaction purposes", which is so pervasive in textbooks, is hardly understandable. If firms anticipate correctly the other units' expenditure decisions, the existing money stock is always sufficient to fulfill those units' transactions; if say households wish to consume more out of the given monetary income then they are **dissaving**, they are generating a **real** (intertemporal) shock, not a monetary one, and as such, it is transmitted to firms, not to the issuing bank. What really concerns the bank is firms' ability to redeem the initial loan. But as the stationary state equations show intuitively, velocity of circulation and the like need not enter the firm's forecast model; to ensure equilibrium, that model must capture the pattern of the demand for domestic goods period by period, regardless of the rhythm of this demand within each period[5]. Accordingly, the sole use of money that matters is when money is "chosen against other things" (Hicks), against physical goods, or against financial assets, that is, the use of money as reserve, which is to be analyzed out of the stationary state.

To sum up in view of further stages of analysis, we may say that the **payments system** determines

(i) the in-period pattern of adjustment of transaction balances towards zero;

(ii) the velocity of circulation of money;

whereas **macroeconomic equilibrium** depends on

(i) the conditions of the money and asset markets;

(ii) the (expected) conditions of the goods markets.

1.3. The monetary policy and the discount rate

The conditions of the money market result from the production policy of firms, on the one hand, and the monetary policy of the issuing bank on the other. Firms demand monetary capital on discount of private claims, the issuing bank supplies it in form of State paper currency. Let us now focus on the supply side of the money market.

According to the canonical taxonomy of Gurley and Shaw (1960), the market organization we are considering has **inside money** as well as **outside money** available, the former coming from bank operations with the private sector and the latter from operations with the public sector. The core of monetary theory is concerned with outside money, but we have seen a number of reasons why this exclusive approach is highly unsatisfactory (especially under stationary state conditions) and should rather be reversed, so that inside money is taken as the starting point. It is very important to note that the specification of the money market organization is a prerequisite to the the modelling of the monetary policy -many controversies have only been fed by people's talking about different worlds (Leijonhufvud (1983)).

Although economic modelling is rarely committed to realism, the traditional concern with outside money is often justified as appropriate to the modern **State paper regime**, whereas inside money is regarded as limited to the older **convertibility regime**. Accordingly, the former requires a policy of **quantity control**, while the latter leads to a policy of **price control**, and the two policies correspond to quite different subject matters (Leijonhufvud (1983)). However, it is not entirely true that the establishment of the State paper regime has dissolved all traces of the convertibility regime. The substitution of State paper currency for metallic currency has set the issuing bank free from the legal commitment to convert metals into paper, but cannot keep the banking system from participating in the conversion of private paper into State paper. Since the ability of the private sector to design and print private paper has proved to be virtually unlimited, it is even doubtful whether the policy of quantity control has gained or lost effectiveness in the modern regime. This is seen most clearly as soon as one considers the traditional problems of control of the foreign channel of money creation; and there is no reason to posit that the market power of the issuing bank should be any greater with the domestic private sector than with the foreign one[6].

The market organization outlined here could thus be called a **discretionary convertibility regime**. It has the advantage of placing the issuing bank in the position of choosing the target variable (albeit with less than full control on both): either the quantity of currency, thus leaving the discount rate to the market, or the discount rate, with the market determining the quantity of currency. The same choices are open on the market for foreign currencies, where the former corresponds to a flexible exchange-rate regime and the latter to a fixed exchange-rate regime[7].

Stationary state conditions constrain monetary policy options in a way that reveals some important properties. Since stationarity must obviously extend to all prices, both prices of domestic and foreign currency must not change. Hence the issuing bank is confined to the pure convertibility regime on both markets by pegging the discount rate and the exchange rate. At these rates, it is committed to providing firms with the same amount of monetary capital period by period and to clearing import and export operations in foreign currencies. Given that the foreign sector keeps a balanced monetary position, the basic question is how the bank chooses the discount rate and how the market determines the quantity of currency.

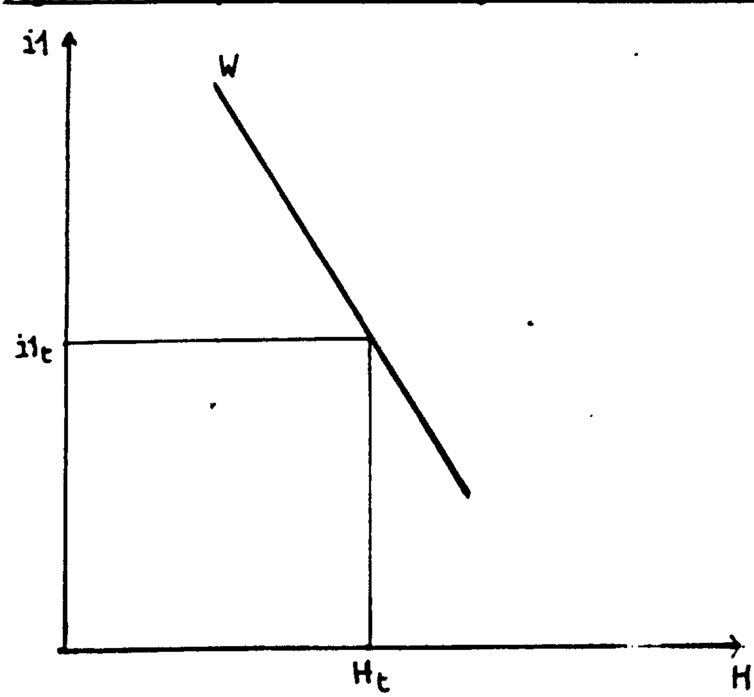
As a first step let us examine the bank's own budget constraint. The bank should in any given period (t) keep assets and liabilities in balance; since the equilibrium stock of transaction balances is null, it must be that ($B1_t = B2_t$). The traditional "microeconomic" reading of this equality constraint is that the bank cannot lend more than the reserve, i.e. deposits are the source of the money supply (Tobin (1963)). But this principle turns out to be a typical microeconomic optical illusion. In fact, firstly there cannot be a monetary reserve of the private sector unless money is already available in the economy; secondly, in stationary state the private monetary reserve must be null too. As any textbook on banking teaches, deposits are not the source of the money supply; rather, the reverse is true, according to the so-called "deposit multiplier" (Turnovsky (1981, ch.2.3)). We have already verified that in our model the money supply coincides with the bank discount (there is no "credit multiplier") and that the bank fulfills its budget constraint anyway; therefore, the bank enjoys an unconstrained supply schedule at the given discount rate, while the discount rate can be set independently of the public's in-period supply of deposits[8].

An important conclusion is then that the discount rate is a free instrument variable that the monetary authority can attach to some objective, which must of course be consistent with stationarity of the economy[9]. This is a point that cannot be examined at this juncture; for the time being let us assume that the discount rate ($i1_t$) has been fixed by the authority. Then the money-market equation 3 can be rewritten in a form where the bank's supply is unlimited at ($i1_t$) and firms' demand is negatively sloped with respect to ($i1$), since it represents a variable cost to them (this schedule will be derived rigorously in due time),

(3b) $$H_t = W_t(O^*_t, i1_t) \qquad W'(O^*)>0,\ W'(i1)<0$$

Hence the period money stock will be determined by the demand side to the amount (H_t) as explained above (see fig.1)[10].

Fig.1. The money market in stationary state



Finally it is interesting to observe that, in order to obtain stationarity, it is the interest rate on deposits (i2) that must be adjusted to the discount rate ($i2_t = i1_t$). In fact the discount rate is a component of variable costs for firms, which must pay $[W_0(1 + i1_t)]$ to the bank (say out of gross profits, $R' - R = W_0 i1_t$). Consequently, factors cost would exceed personal incomes by ($W_0 i1_t$), thus violating firms' flow equilibrium, unless personal incomes were proportionally increased by ($W_1 i1_t$) by the end of the period.

2. Money in the expanding economy

2.1. Investment and saving.

Let us now relax the conditions of stationary state. Stocks will be free to be cumulated or decumulated at agents' will. Householders display a positive porpensity to save out of current income; firms demand new capital goods, the government is allowed to pursue an active fiscal policy. The determinants of saving and portfolio choice are those expounded in ch.I, sec.3. Investment and fiscal policy will, for present purposes, be regarded as exogenous changes in demand. Focus will be on comparisons among flow equilibrium conditions and the related modifications on the money market, with no consideration at all of the underlying price and quantity dynamics; it is easy to understand that this section is a prelude to the analysis of asset markets in the expanding economy.

As a first stage it is convenient to constrain the public and the foreign sector to stock-flow stationarity. Let us write the equations of flow equilibrium under the new conditions (compare with system 2a-e in the previous paragraph):

(4a) $C^*_0 = Y_1 + G_1 - T_1 - M_1 - S_1$

(b) $I^*_0 = I_1$

(c) $X^*_0 = X_1$

(d) $O^*_0 = C^*_0 + I^*_0 + X^*_0 = O_1$

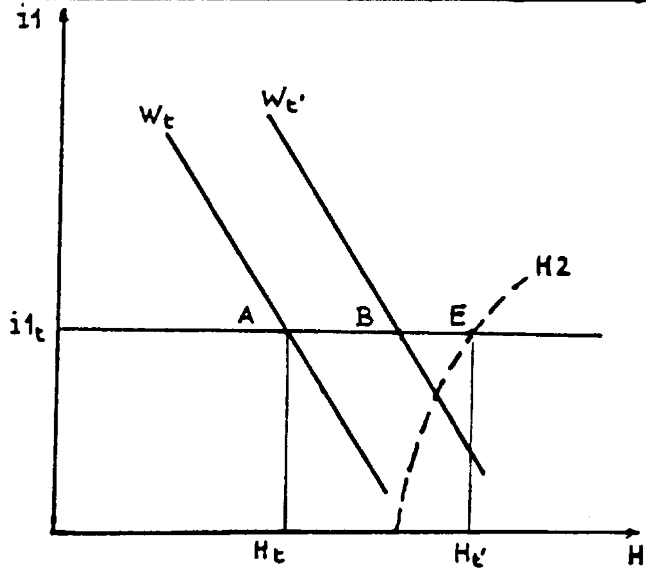
(e) $G_1 = T_1$

(f) $X_1 = M_1$

Only one comment. Firms achieve flow equilibrium because it is as usual assumed that all firms correctly anticipate all others' expenditure decisions (equation 4d). In particular, note that now there appears a particular inter-firms decision: producers of capital goods have to forecast all other producers' demand for capital goods (call them **investors**). On the other hand, producers of consumption goods now have to discount householders' decision to save (S). Thus our quite simple web of decisions shows a threefold coordination problem: savers do not demand capital goods directly, but their decision concerns the consumption goods market; investors send instead a signal to the capital goods market. Given that it must be ($O_1 = Y'_1$), a well-known implication of firms' flow-equilibrium equation is ($I_1 = S_1$), that is to say, investment must be equal to saving. For the moment we shall not examine how this problem is solved, but we shall instead concentrate on the creation and circulation of money in this economy.

The basic question is how the investment decision affects firms' demand for monetary capital. In order to give a correct answer, the two sides of an investment - likewise any other transaction- should be kept well distinct: the purchasing power of the demander, on the one hand, and the production cost of the supplier on the other. Whereas financing investment is investors' business, capital goods producers only need raise the means of purchasing circulating capital just like any other producer. Therefore the sole direct effect of investment on the money market is that firms' demand for monetary capital is increased by the amount of the planned cost of circulating capital (under the going assumptions, the wage bill) in the production of capital goods. In fig.2, which reproduces fig.1, $W_{t'}$ is the new locus of equilibrium demand for monetary capital after positive demand for capital goods has been anticipated.

Fig.2. The money stock in the expanding economy



What are the possible responses of the central bank? In the first place it is obvious to observe that in the very first period of expansion of the economy, the bank reserve in existence (the one inherited from the previous period) will be insufficient to meet the enlarged demand. Hence, the issuing bank enjoys the full range of monetary policies: (i) pure price control (the money supply expands to clear the market), (ii) pure quantity control (the discount rate rises to clear the market), (iii) a mixture of the two. Case (i) is the simplest: all firms' plans are satisfied at the going discount rate. The other two cases give rise to a complicated adjustment, since firms have to adjust their plans to a smaller monetary capital available and to a higher money cost (for instance it is not clear whether consumption or capital goods production will be curtailed the most); it may happen that capital goods production has to be reduced, but note that this would be a fall in investment supply, not in demand like in standard macroeconomic models.

For the moment let us limit ourselves to case (i), with ($i1_{t'} = i1_t$, $H_{t'}$) the unchanged discount rate and the new money stock, respectively. Recall from equation 3 that ($H_{t'} = W_{t'}(O^*_{t'}, i1_{t'})$). The bank then pays interests to depositors by the amount ($W_{t'}i2_{t'}$, $i2_{t'} = i1_{t'}$), which add to their personal incomes. Provided that firms' plans are correct, it is still true that the money stock will be sufficient "to buy" the period GDP;

from equation 4d firms' aggregate revenue is sufficient to pay for net profits and the initial provision of monetary capital [$O_1 = R_1 + W_1(1 + i1_{t'})$]. Hence, as in the previous analysis of stationary state, the crucial point seems to be firms' ability to anticipate the expenditure pattern in the economy. This result deserves closer inspection because now householders are allowed not to spend the whole monetary income on the goods market.

To begin with, consider the extreme case in which householders choose money as the sole asset (i.e. $S_1 = \Delta H2_1$). In this case they materially buy consumption goods only, and do not finance investors directly. Since aggregate payments to firms allow them to return [$W_1(1 + i1_{t'})$] to the bank, at the end of the period the bank reserve, net of interest payments, amounts to ($B2_1 = W_1 + H2_1$) **vis à vis** initial assets ($B1_0 = W_0$). The missing item for the bank's asset-liabilities to be kept balanced is clear: **investment finance**. In an efficient financial economy investment finance is indifferent for both firms and householders (see above ch.I, sec.2.1 or the well-known Modigliani-Miller theorem). This is not the case under precautionary behaviour and liquidity preference: assets (liabilities) are not perfectly substitutable for households and firms. There are two distinct sources of exogenous investment finance to be analyzed: (i) debentures bought by the central bank, (ii) equities bought by households; remarkably, in either cases the bank will achieve asset-liabilities balance. In case (i) because bank assets are increased by exactly ($I_1 = H2_1$); in the other case because bank liabilities are decreased by exactly ($-H2_1 = I_1$).

Recall that the conditions of the money market are relevant to the determination of planned output, consumption goods and capital goods alike. Investors' demand instead derives from the expectation of future demand, and their present ability to issue liabilities. The latter is exerted on the asset market, not on the money market, although if the central bank decides to buy investors' debentures it parallely increases the money stock. But whose money is this, and for what purposes is it held? This additional money stock has nothing to do with transaction balances, exogenous shocks and the like: it is households' equilibrium monetary reserve. In fact investors have spent the debentures revenue with producers; these have paid for labour, physical and monetary capital;

workers and capital owners have fulfilled their consumption plan and have decided to hold a monetary reserve rather than buy back investors' debentures. Figure 2 depicts an intermediate situation where at ($i2_{t'} = i1^*_{t'}$) saving is partly allocated to monetary reserve and partly to capital assets; thus the money supply initially increases from point A to point B, but the final equilibrium level of the money stock ($H_{t'}$) depends on savers' portfolio policy (which is represented by the traditional upward sloping curve (H2)). At point D the whole period saving would go to monetary reserve, with full monetization; the segment BE measures the equilibrium stock of monetary reserve, but, as we know from liquidity theory (above ch.I, sec.3.2), neither the stock nor period additions to monetary reserve can ever fall to zero, however small the interest rate. On the grounds of pure monetary relationships, what the central bank is doing when it "monetizes debt" is allow someone else, not to be more spendthrift, but to be more liquid by holding a greater monetary reserve in the portfolio.

Note, however, that as soon as householders are free to hoard assets and a monetary reserve, the central bank ceases to be the sole supplier of investment finance; it loses full control over investment demand, while monetary policy may affect capital goods supply through the supply conditions of monetary capital. Thus the central bank finds itself in a rather uncomfortable position when the economy is expanding: if householders are high in liquidity preference, the central bank faces a higher demand for money through investment finance; if householders are low in liquidity preference and are willing to hold capital assets, the central bank faces a higher demand for money directly from production[11].

A final important issue is that flow equilibrium in the expanding economy hinges on the saving-investment equality. Open macroeconomics is witnessing an enthusiastic revival of the neoclassical flow theory according to which the amount of investment depends on the amount of saving via the real interest rate (see Frenkel-Razin (1987, Part II) for all). On the contrary, and consistently with the theory of effective demand (see above ch.II, sec.2.2), the present sequential framework makes it transparent that investment "comes before" the additional saving of the period, and that the latter can be neither a source nor a constraint to the former[12]. This is not a matter of hours and minutes, but of the sequential dissemination of market signals in an economy in which assets are accumulated and selected under uncertainty. The first important consequence bears upon the choice of saving. The period rate of saving can be explained with no commitment to future consumption, but within an accumulation programme aimed at minimizing the probabilty of default (entailing a cut in the normal level of consumption, or borrowing, or insolvency) by means of an adequate stock of wealth. **Ceteris paribus**, additional saving is a **flow decision** that can only come from additional personal incomes, and these can only come from additional output; the latter is in turn a supply decision that must be based on some market signal from the demand side; such a signal must contain the terms on which investors' liabilities are accepted in asset-holders' portfolios, and this is a **stock decision**. It is in this sense that capital goods demand must be made effective "before" additional saving is generated, and consequently, the rate of investment is not a matter of flow equilibrium with saving, but of stock equilibrium with money. This brings us back to the coordination problem outlined at the beginning of this paragraph, and to the crucial role that the asset market plays in it.

The traditionally oriented reader may ask whether "the" return rate to capital assets may still be given a role to play in the accumulation programme of our cautious saver, thus providing a coordination device between investment and saving. The general answer should be no for two main reasons.

In the first place there is a whole array of return rates precisely because there is a variety of assets available for choice, and equilibrium among return rates can be expected to be established by raising some rates while lowering others; as a consequence, it is not clear which group, if any, will influence households' decisions to save.

In the second place, the precautionary accumulation programme entails foregoing some consumption today. Hence greater wealth growth rates, at the given level of normal consumption, should be preferred. Therefore, if asset return rates have to affect saving, this may happen with a negative, rather than positive, sign: high return rates ensure a greater wealth growth rate, and hence allow for a lower propensity to save or a faster accumulation programme. Anyway, the effects of return rates on saving would pass through the saving-consumption pattern, thus reacting back on planned output and personal incomes. I shall henceforth exclude direct effects of return rates on saving, and I shall instead concentrate on the allocation of wealth among different assets.

A final remark here. As far as a single-period flow equilibrium is concerned, the solution, as stated at the outset, lies in the goodness of producers' forecasts of the **current** expenditure pattern in the economy. Saving-investment equality, however it is reached, indicates only that condition; it by no means indicates that investors' forecasts of **future** expenditure patterns, and their related adjustment of output capacity, is correct. This crucial difference between one-period and intertemporal coordination should become clear once the implications of saving as a precautionary choice are borne in mind.

2.2. Government deficit spending.

Government deficit spending is here considered an exogenous decision, with no further investigation on its size. Its direct impact on flow equilibrium conditions is shown by equations 5 (which imply nothing as to changes in the aggregate value C^*_0 with respect to equations 4):

(5a) $$C^*_0 = Y_1 + D_1 - M_1 - S_1$$

(b) $$D_1 = G_1 - T_1 > 0$$

Now firms' flow equilibrium must include the correct forecast of the government budget policy. When this is the case, the private deficit spending decision -investment- happens to be commensurate with the excess of private saving over public deficit spending ($I_1 = S_1 - D_1$). Note that such a forecast problem is producers', not investors', business. The latter are, as before, only concerned with the future evolution of demand, whereas the former have to anticipate consumers', investors' and the government's current net expenditure.

It is worth noting that the analysis of the relationships of the government deficit with the money market is essentially the same as that of private investment. The direct impact takes place through producers' demand for monetary capital (say an increase).

Then the government has to provide the means of covering excess expenditure; this it generally does by selling bonds. Bonds can be purchased by the issuing bank or by households. The former operation results in a parallel increase in the bank's assets ($\Delta B3_1 = D_1$); the latter leads to a reduction in households' monetary reserve ($-\Delta H2 = D_1$) or other non-monetary assets (of course intermediate cases will display a mixture of the two results, but they do not change the essence of the problem). Again, if firms' expectations are correct, the bank will achieve flow and stock equilibrium whatever the portfolio policy of households may be. Yet this conclusion does not imply that the bank has full control on the creation of money, nor does it mean that government deficits inject money into the economy in any of the simple ways told in textbooks.

If government deficit spending is translated into greater planned output by firms, then the money stock is increased by the amount producers obtain from the issuing bank at the market discount rate (W_1), according to the process of creation and uses of money described in the previous section. Although is true that if the bank accepts government bonds, the end-of- period money stock will result to be increased by the same amount ($\Delta B2_1 = W_1 + D_1$), this is nothing else than the phenomenon of "debt monetization" described in the previous paragraph: the central bank allows households to allocate marginal saving to monetary reserve rather than to public bonds. In this view, the bank's financing private or public debt bears exactly the same monetary consequences.

Just as saving is not the source of investment, so public and private deficit spending do not compete for the in-period **amount of saving**: they compete for **portfolio shares** for any given stock of wealth. As already explained, the flow of saving is always sufficient to buy public and private debt issues[13] provided that producers, not investors, correctly forecast the current pattern of expenditure in the economy. Accordingly, competition for finance does not reflect itself in the the propensity to save but in the structure of asset prices. Viewed from this side, open-market bank interventions mostly affect the asset market conditions, and hence asset prices and return rates, by relaxing or tightening asset demand **vis à vis** private and public suppliers of liabilities.

2.3. External imbalances.

As I have repeatedly warned, the foreign sector is a fictitious decision unit. Its accounting book -the balance of international payments- is not kept by any individual private agent but by the monetary authority.

Consequently, it is an outward manifestation of what is a systemic constraint -one which is notoriously quite cogent. Formally, the balance of payments is the natural candidate as the "closing equation" of the system in flow equilibrium. In fact flow equilibrium of the expanding economy entails an important relationship among the budgets of the private, the public, and the foreign sectors. The economy expands from a stationary state when investors, the government, or both, entertain a deficit spending policy. Then from equations 4 we know that in flow equilibrium

(6) $$(S_1 + T_1) - (I_1 + G_1) = X_1 - M_1 \qquad \text{or equivalently}$$
$$S'_1 - D'_1 = Z_1$$

Let us call the two terms on the left-hand side **"national saving"** and **"national deficit spending"** respectively. Hence if the trade balance has to be balanced ($Z_1 = 0$), national deficit spending must equate national saving. Consequently, if one of the two domestic sectors is in surplus (e.g. $S_1 > I_1$) the other must be in deficit ($T_1 < G_1$). On the other hand, imbalances between national saving and deficit spending are parallely mirrored in external imbalances. External deficits may well correspond to excess private expenditure ($S_1 < I_1$), to excess government expenditure ($G_1 > T_1$) or both. It goes without saying that at the present stage we do not know how this happens, only that it must.

Now recall the stock-flow matrix in ch.II. If a domestic unit is running a deficit spending policy, it must at the same time be shifting its financial position towards liabilities; if ($Z_1 < 0$), either the deficit spending unit is placing liabilities (reducing assets) abroad or the issuing bank is reducing its own foreign assets. Then the usual identity of the balance of payments follows:

(7) $$Z_1 + F_1 \equiv \Delta B6_1$$

where Z = trade account, F = capital account (changes in private assets and liabilities with non-resident units: + = capital inflows, - = capital outflows), ΔB6 = official settlements (changes in the central bank's means of international settlement: + = increase, - = decrease).

The squaring of the balance of payments is due to the institutional commitment of the central bank to exchanging foreign for domestic currency. Technically, the central bank acts as a clearing house, and, note, this must be the case even in stationary state, when the trade balance is nil. For if it were not, domestic exporters would have growing foreign assets (while domestic importers would have growing foreign liabilities), and this state would violate the condition of stock stationarity, regardless of whether all net balances were zero.

Official settlements have to take place whenever private demand and supply of foreign currency do not clear at the going exchange rate, although it may be in the power of the bank to let the exchange rate equate demand and supply. As already explained in sec.1, the choice of the exchange rate regime is analogous to the choice of the domestic discount regime (while bearing in mind the many qualifications already advanced). The general principle is that imbalances of private international payments impinge on the money market and the money stock only if the central bank pegs the exchange rate, and to the extent that the central bank does not "sterilize" them through offsetting open-market operations. In the market organization under consideration here, this principle is still valid though with some important qualifications.

If the central bank operates under a fixed exchange-rate regime, official settlements are, as a first impact, fully transmitted to money circulation. Consider the case of excess receipts from abroad; bearers of foreign currency (or equivalent bills) obtain a bank deposit in domestic currency in exchange (hence, in any moment θ, $\Delta B6_\theta = \Delta CU_\theta + \Delta B2_\theta = \Delta H_\theta$). But the final equilibrium level of the money stock will depend on a particular circumstance: whether suppliers of foreign currency are themselves debtors of the bank or not. The former circumstance clearly occurs in the case of firms, when they wish to convert receipts from sales abroad; these receipts are in fact part of the expected cash flow that must pay for the period discount with the bank (hence, $\Delta B6_1 = -\Delta B1_1, \Delta H_1 = 0$). That is to say, when excess supply of foreign currency is backed by domestic debt, official settlements are **ipso facto** sterilized. On the contrary, official settlements have a one-to-one impact on the equilibrium money stock when the central bank cannot offset excess supply of foreign currency with the outstanding domestic discount. This is the case of the government or investors who wish to convert receipts from sales of liabilities abroad; then what happens is exactly the same as if the bank decided to "monetize" public or private debt: domestic asset-holders are allowed a greater monetary reserve in their portfolios, $\Delta B6_1 = \Delta H2_1$ (see above, par.1, and fig.2 where let (A1') be the locus of equilibrium demand for monetary capital in view of $(S'_1 < D'_1)$; then the segment $BE = \Delta B6_1$). Therefore, the monetary effects of official settlements will be quite different depending on whether payments imbalances arise from the trade side or from the financial side. Indeed, the latter is the most interesting case.

The other basic principle of open monetary economics -that a flexible exchange-rate regime insulates the money stock from the foreign channel- has to be briefly reconsidered too. Consider now the case of excess trade payments which are kept in balance with excess financial receipts through movements of the exchange rate. As we know, flow equilibrium of other sectors imply that national saving falls short of deficit spending (for simplicity say that this happens both in the private and the public sector); the saving gap is equivalent to foreign capital inflows, that is, foreign units are buying liabilities issued by domestic units up to $(F_1 = D'_1 - S'_1)$. The domestic monetary circulation follows exactly the same channels as those described in previous paragraphs, and accordingly, the final level of the money stock will depend (i) on the composition of national saving, and (ii) on possible open-market operations of the central bank. National saving consists of taxes and the possible uses of private savings (mainly net purchases of domestic assets $(S_1 = D'_1 - T_1 - F_1)$ or bank deposits $(S_1 = \Delta H2_1)$). The money stock is insulated from the foreign channel to the extent that domestic householders wholly employ saving in domestic assets; if they instead wish to hold a greater monetary reserve, and the central bank interevenes to buy domestic assets, the money stock will result parallely increased.

All in all, in a discretionary convertible regime the monetary effects of external imbalances, in relation to different exchange rate regimes, are by no means mechanical or given once and for all. The central bank of an open economy in a world of free circulation of goods, assets and currencies has a limited control over the creation of money under whatever exchange- rate regime. The most important difference is that if the bank pegs the exchange rate, official settlements are equivalent to monetizations of private and public debt, whereas, if the exchange rate is fully flexible the bank can refrain from such monetizations -although it seems quite difficult to fully avoid monetization when savers wish to add some marginal saving to the monetary reserve.

3. The asset market

3.1. Again on saving and portfolio choice.

The analysis of flow equilibrium in the expanding economy of the previous section was based on the composition of three key decisions: investment, public deficit spending and saving. A fundamental distinction was drawn between saving, as a **flow decision**, and portfolio selection, as a **stock decision**. Contrary to neoclassical flow analysis, it was stated that the rate of national deficit spending is not dependent upon the flow of saving but upon the allocations to asset stocks. At the same time, such allocations also determine the evolution of the money stock in the economy. We shall now go deeper into the analysis of allocations to asset stocks.

The "core" asset market examined here retains the property of processing information efficiently, but it is endowed with incomplete information relative to the Arrow-Debreu requirement (on this distinction see above ch.I, sec.2; the efficient information hytpothesis is analyzed below, App.A.1). Three distinctive features of the asset market are to be explained:

(i) the set of equilibrium return rates;

(ii) diversification across assets;

(iii) positive holdings of currency reserve.

The above three issues fall in the domain of portfolio theory. This has been one of the outstanding developments in modern monetary theory, becoming a cornerstone of Neo-Keynesian macroeconomics and even of later currents. The characterization of the financial economy given here (and, one would say, in Hicks's 1935 seminal ideas) entails some major qualifications with respect to the current uses of portfolio theory in macroeconomic models (see above ch.I, sec.3.3). Given a desired safety level of wealth, the asset holder faces a **liquidity problem** to the extent that he is uncertain over the cash flow out of wealth in the event of unexpected short-sales. We saw that such a problem has two fundamental characteristics:

(i) the liquidity problem is a problem of positive, finite probability of deviation from the expected nominal value of wealth (the asset holder has a less than asymptotic horizon);

(ii) the liquidity problem leads to a "capital-value programme" instead of a "capital-growth programme".

The problem **sub** (i) is due to the class of price-variable assets. The probability that the market value of wealth falls short of the desired value by more than the tolerance level increases with price variability and with the share of price-variable assets. Money is eligible for the status of the anchor of the wealth value since it is free from capital loss. Therefore, a capital-value programme is one which combines price-variable assets with the monetary reserve so as to obtain the highest prospective capital value with the lowest intrinsic capital loss. The general findings of ch.I, sec.3.3 can easily be applied to our menu of six assets ($a = 1, ..., 6$). Each asset pays a nominal interest rate or dividend (i_a), has a market price (p_a) and yields a (realized) return rate ($r_a = i_a/p_a + \Delta p_a/p_a$). The share of non-monetary assets (combined into a seventh asset, the Investment Trust with warranted interest rate (i7) and market price (p7)) will be greater the greater is their (expected) return rate ($r7 = i7/p7$) and the smaller their price variability [$\alpha 7min = 1 - (V_p/V_p + r7)$]. An important result that we obtained is that the share of monetary reserve in the safest portfolio (number 2 in the menu, $\alpha 2 = 1 - \alpha 7min$) is not a matter of tastes, as it is instead in traditional Markowitz-Tobin capital-growth programmes; there must be a positive monetary reserve for the eventuality of default not to grow "almost sure". Given nominal interests and dividends on non-monetary assets, the price established by the market determines the return rate to each of them and hence the prospective capital value. In equilibrium, prices will be such that return rates on non-monetary assets pay a **risk premium** proportional to asset-price variability and inversely porportional to the desired stock of monetary reserve [$\rho = V_p(1/\alpha 2^2 - 1)$].

The asset market considered here provides two important services for asset traders. On the demand side it allows asset holders to achieve the desired amount and composition of wealth within their accumulation programme. On the supply side, the asset market conveys two fundamental pieces of information to deficit-spending units: (i) the terms at which their outstanding liabilities are valued, (ii) the terms at which issues of new liabilities are acceptable. How the asset market achieves stock equilibrium will be analyzed in the next paragraph, while the way in which asset-market information affects deficit-spending decisions will be examined in the final section of this chapter. However, the information conveyed by the prices at which assets are accepted by the market, when prices (or risk premia) are set under liquidity preference, is of little guidance, if any, to the **amount** and **composition** of future consumption, and hence to optimal planning of future production (or current investment). The service the asset market offers to asset traders may be efficient, whereas the one it offers to the economy as a whole is generally not.

3.2. Asset stock equilbrium.

We can now turn to establish asset stock equilibrium as an allocation mechanism governed by the foregoing principles. The stocks of non-monetary (i.e. variable-price) assets and of monetary reserve for any given level of wealth are determined jointly. Stock equilibrium is established whenever the existing stock of each asset (at the going market price) is equal to the desired one. Therefore asset market equilibrium can be represented by means of the following system:

(8a) $$A^*_t \alpha_{at}(r_{at}, V_{pa}) = A_a p_{at} \qquad A'_a(r_a)>0,\ A'_a(r_a)<0,\ A'(V_{pa})<0$$

(b) $\Sigma_a A_a p_{at}/P_{ct} = A^*_t$

where P_{ct} = goods price index, $\Sigma_a \alpha_{at} = 1$, $\hat{a} \neq a$.

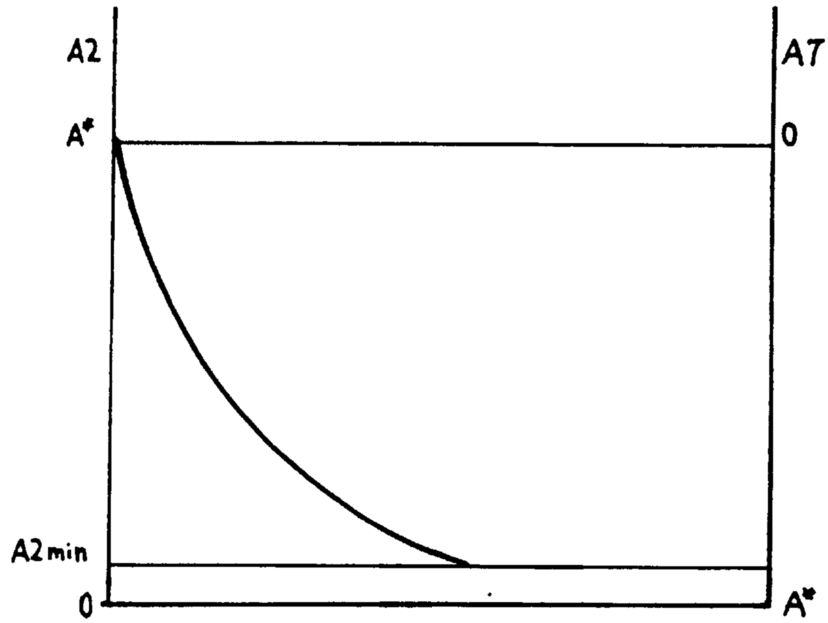
The endogenous variables in the system can be identified with asset prices. In fact, given the the vector of interest rates $[\mathbf{i_a}]$ (along with expected prices and their variability), demand equations 8a determine the vector of asset prices $[\mathbf{p_a}]$; hence the vector of return rates $[\mathbf{r_a}]$ is established accordingly. The wealth constraint 8b allows for one degree of freedom in the solution vector: this corresponds to the price of the monetary reserve which is fixed at 1; thus the solution vector consists of the prices of non-monetary assets and the quantity of monetary reserve. It is important to bear in mind the two main channels through which asset prices are supposed to bring demand and supply into balance:

(i) **an interest effect**: a fall (rise) of the asset price increases (decreases) the return rate to the asset, and hence raises (lowers) demand;

(ii) **a wealth effect**: a fall (rise) of the asset price decreases (increases) the nominal value of the existing stock of the asset, and hence fosters (dampens) demand.

There are two widely-used synthetic representations of asset stock equilibrium which are worth reporting here. One shows the relationship between the monetary reserve in the safest portfolio and the return rate to non-monetary assets (say our Investment Trust). From the solution for (a7min) such a relationship must be negative in sign and asymptotic to (r7), since the monetary reserve can never be nil (see fig.3). Note, moreover, that an increase in asset price variability imposes an upward shift to the curve. Each point (A2, r7) on the curve represents a stock equilibrium point of the reserve, and correspondingly, of the Trust (A7 = A* - A2).

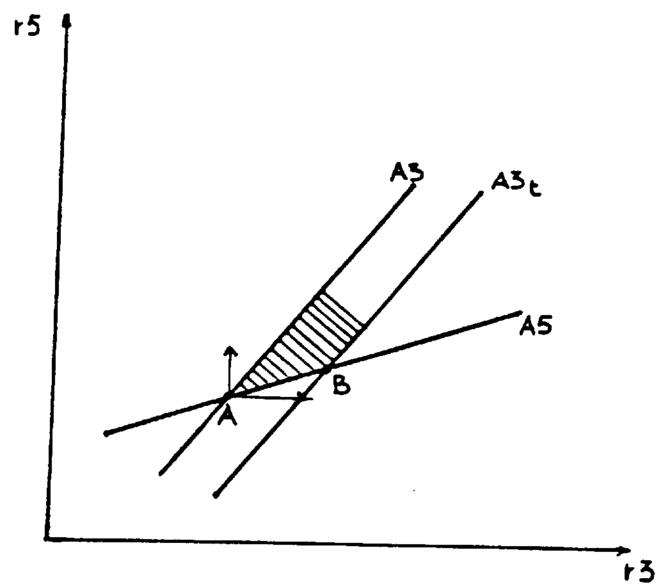
Fig.3. The stock equilibrium schedule of the monetary reserve



Clearly, excess supply of non-monetary assets requires a higher return rate. It should be noted that deficit spending units in the expanding economy are concerned with the allocations of **marginal** wealth (i.e. the saving of the period ΔA^*). In this case, excess supply of (A7) only occurs when ($\Delta A7 > \Delta A^*\alpha 7min$); therefore, the initial portfolio share and the period saving (all other portfolio determinants being unchanged) determine the expansion of non-monetary assets that can be accommodated without changes in return rates. But since, at the end of period, ($\Delta A^* = \Delta A7$) and ($\alpha 7 < 1$), the general result will be (i) an increase in return rates and/or (ii) a central bank intervention as explained in section 2[14].

The second standard representation of asset stock equilibrium considers the equilibrium schedules of non-monetary stocks one against the other. Such schedules are expressed in terms of asset return rates (i.e. the total differentials of equations 8a set equal to zero). This viewpoint is the complement to the previous one, since it concentrates on the return rates which are combined in the Trust (by constraint 8b, the remaining asset, the monetary reserve, is adjusted endogenously)[15]. Let us consider for instance the case of equities (A5) against government bonds (A3) (the two financial counterparts of national deficit spending) in fig.4. The two schedules (A5, A3) yield, given the respective stocks, the pairs (r5, r3) such that the stock is held willingly; movements along the schedules show the relative change in return rates (dr5/dr3) necessary to keep the stock unchanged. Asset stock equilibrium obtains at the intersection of the schedules.

Fig.4. The stock equilibrium schedules of equities against bonds



The relative change in return rates basically depends on the degree of substitution among assets, which in turn embodies price variability[16]. The standard result is that (i) the stock equilibrium schedules between two assets, one being relatively more risky than the other, both display a slope greater than unity, and (ii) the schedule of the riskier one is flatter. In fact, supposing that A5 is riskier than A3, if r3 is rising, r5 must rise more than r3 for asset holders not to shift from A5 to A3. On the other hand, an inducement to increase A5 given A3 must raise r5 to a greater extent than the inducement to increase A3 given A5.

This latter usefully portrays the case in which one asset is being supplied out of portfolio balance with the other -a most likely case in the expanding economy, as explained previously. To allocate liabilities, both the government and investors have to promise higher yields or have to offer lower prices. The competition between the two components of national deficit spending for the share of non-monetary assets in households' wealth is represented in fig.4 by the relative extent of the two arrows, the vertical one for A5 and the horizontal one for A3; as a result, the two rates have to soar within the shadowed area.

The adjustment may take two main forms. To keep the analysis of this important point simple, let us isolate the excess supply of one single asset (say A3), the other being given.

The first pattern of adjustment involves prices only. Given excess supply, a rightward shift of A3, the new equilibrium will be at point B. Excess supply of bonds has been allocated by means of a higher return rate (a lower stock of monetary reserve); concomitantly, an inducement to shift from equities to bonds has been engendered, which has been nullified by the fall in equities' prices (that is a full wealth effect, since no one succeeds in selling equities when the market demands bonds). This is the standard solution in asset market theory, and is the necessary solution under the efficient information hypothesis (see below App.A.1), that is if

(i) asset holders have the same preferences,

(ii) information is the same for all agents, and

(iii) asset supply is fixed for whatever price (Hicks (1935, pp.77-79), Grossman-Stiglitz (1980)).

The second pattern of adjustment comprises the possibility that quantity exchanges, that is to say redistribution of existing assets, actually take place. We shall see that this possibility, which remains almost unexplained under market efficiency, is in fact an extremely important aspect of asset markets. The resulting equilibrium will be at some point within the shadowed area, where movements of the schedules indicate effective trades which dampen the escalation of rates relative to the previous case.

Quite clearly, our understanding of the dynamics of asset prices and quantities crucially hinges on the specification of the market structure.

3.3. Asset stock equilibrium with foreign assets

The extension of asset market analysis to the foreign channel deserves special emphasis, since the latter is such a crucial part of the open financial economy.

First of all let us single out the two key variables concerning foreign assets, the one-period domestic value and return rate of the stock (number 6 in our asset menu):

$$A^*_1 \alpha 6_1 = A6_1 p6_1 e_1$$

$$r6_1 = \frac{i6 + p6_1 - p6_0}{p6_0} \; \frac{e_1}{e_0}$$

With respect to the general expressions of those variables for domestic assets, there appears a new crucial variable: the exchange rate (e). The domestic value of the foreign asset is obtained by applying the exchange rate to its foreign market value. The rate of return to the foreign asset must take into account the initial conversion from domestic to foreign capital ($A^*_0 \alpha 6_0 / e_0$) and the final reconversion from foreign capital value to the domestic one ($A6_1 p6_1 e_1$). Quite clearly, holding foreign assets incurs a specific source of uncertainty due to possible changes in the exchange rate; this is usually called **foreign exchange risk**. It is also clear that such a source of uncertainty has the same nature as asset-price uncertainty, since it affects capital value in the event of unexpected short sales. Appreciation (a fall of the price of foreign currency, $e_1 < e_0$) amounts to a capital loss; depreciation (a rise of the price of foreign currency, $e_1 > e_0$) amounts to a capital gain. It goes without saying that foreign exchange risk arises to the extent that exchange rates are not perfectly fixed.

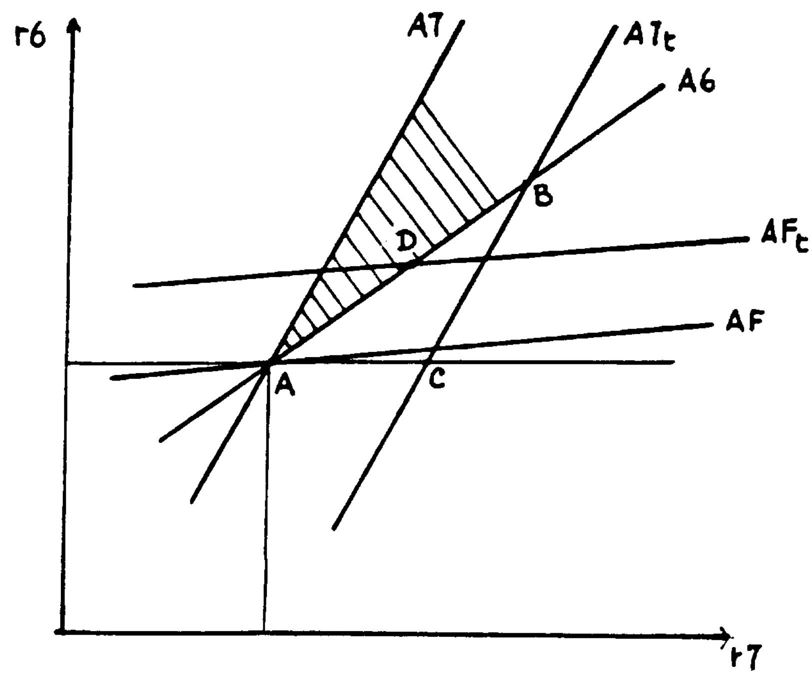
International portfolio theory has followed in the footsteps of pure portfolio theory. Early models, and the majority of those currently in use, have been based on Tobinian return-risk optimization[17], thus propagating that unsatisfactory mixture of expected utility maximization, capital growth maximization and liquidity preference. More recent models have in fact been founded neatly on expected utility maximization, and on the apparently solid argument that the latter, if consumption embraces foreign goods, implies holdings of foreign assets[18].

When we looked at the key characters of the financial economy from the international standpoint (above, ch.I, sec.4) we concluded that there should be a substantial lack of information and of market general efficiency behind international diversification and the exchange rate as an asset price (or even as a price generally). In fact both phenomena could never arise unless agents made an "essential" use of money, that is a use intended to cope with incomplete information on all possible future states. The degree of substitutability between domestic and foreign assets cannot be assumed a **priori**, as some sort of physical property, independently of the specification of the informational conditions of the market. In a perfectly informed market all assets, for the same date and state, would be perfect substitutes, regardless of the risk attitude of agents, simply because there could not be false trades. On the contrary, when the market is imperfectly informed, and false trades are possible, any kind of agent is far from being indifferent towards assets, unless these bear the same expectation of return and price variance for the same date -which would be rather peculiar. The inclusion of foreign monetary as well as non-monetary assets in the scope of portfolio choice is then straightforward, not because of expected utility maximization, but because of liquidity preference principles. As a matter of fact, those who hold foreign securities are not necessarily planning to buy goods on foreign markets; foreign asset diversification may be advisable for the mere precautionary purpose of reducing portfolio variability (Tobin (1981), Levy-Sarnat (1983)). In a capital-value programme under liquidity preference, the status of foreign assets essentially depends on their specific price variability and on the exchange rate regime.

Fixed exchange rates. If exchange rates are perfectly fixed, agents are able to distinguish the class of foreign non-monetary (price-variable) assets from the foreign currency as a perfectly liquid asset (i.e. bank deposits abroad). Then, in the problem of the choice of the monetary reserve, the former can simply be pooled with domestic non-monetary assets in the optimum Investment Trust (if they contribute either to raising the resulting yield or to lowering the price variance). Foreign currency is directly substitutable with home currency; the former is worth being held to the extent that it pays a higher interest rate. If this is the case, the foreign currency can simply be included in the Trust as one further asset (in fact it offers a definitely positive effect by raising the compound yield without increasing the variance)[19].

What is more interesting is the direct comparison between domestic and foreign non-monetary assets. Exchange rates being fixed, all assets are distinguishable in terms of their own price variability. Thus the analysis of stock equilibrium between domestic and foreign non-monetary assets runs in exactly the same way as that of stock equilibrium between domestic ones expounded above (sec.3.2). Now let agents compare the Domestic Trust (A7) as defined previously with a Foreign Trust (A6), an optimally sorted bundle of foreign assets. By plotting the stock equilibrium schedules one against the other we obtain fig.5. The two schedules are in terms of the domestic (r7) and foreign (r6) return rate. The figure is drawn on the usual assumption that foreign assets have a lower degree of substitution with respect to domestic ones[20]; thus, if (r7) increases, (r6) must increase more than proportionally for asset holders to accept the existing stock (A6). Moreover, A6 is flatter than A7.

Fig.5. The stock equilibrium schedules of domestic and foreign assets under fixed exchange rate



The relative positions of the two schedules and of the two rates in fig.5 have, quite obviously, a counterpart in the international position of the country. Although this is matter of Part II, here a few basic introductory concepts are in order.

In the first place, equilibrium return rates obtain at the intersection of the two schedules, that is, when both stocks are willingly held at the going market prices. Therefore, in stock equilibrium neither domestic nor foreign units must be supplying their liabilities; the international capital account will then be nil along with each and all asset trades. If this condition holds through time the economy will be in stationary state, but the same condition must (ideally) hold at the end of each period, though asset demand and supply are allowed to change period by period (see the treatment of stock-flow equilibrium in ch.II above).

As in the market for domestic assets, the most important source of disturbances is competition among liability issuers, in this case domestic vs. foreign ones. Such disturbances hit the market with two well-known types of disequilibrium pairs (r6, r7). Those above A7 correspond to "high" return rates abroad; those below A6 correpond to "high" return rates at home. The former generate excess supply of (existing) domestic assets in order to switch to foreign ones; the latter bring about the opposite phenomenon. In either case, return rates must go up (prices must go down) within the shadowed area. Again, the adjustment may take two forms, by price, with an important qualification, or also by quantity.

Let us focus on excess supply of domestic assets (A7 shifts rightwards). First comes the canonical solution of "magnification" of return rates at unchanged stocks (a movement along the given schedule A6), with the "low" foreign rate chasing the "high" domestic one until the two converge (since the schedules are differently sloped, i.e. the two assets are not identical for demanders). The equilibrium level of rates will settle down at B. A noteworhty implication of this price adjustment is that international trade of existing assets will never emerge, not even as a stock adjustment phenomenon.

Moreover there is a widely-used variation on the foregoing adjustment with regard to the so-called "small country", a country such that

(i) domestic assets are not tradable abroad,

(ii) bids are unable to modify asset prices abroad.

Portfolio management in the small country is constrained by the straight dotted schedule in fig.5. When the supply of domestic assets grows as high as C, no one is able to sell foreign assets, while their prices (return rates) are given exogenously, then at C the stock and the return rate of domestic assets would disrupt portfolio balance relative to the foreign ones. The only stable solution is then the original level at A, or the well-known idea that a small country is unable to modify the domestic rates (and the composition of portfolios) unilaterally. Note, however, that the domestic rate of the small country need not be exactly equal to the foreign one (as many textbook models state); rather, the one must be in a relationship with the other given by asset holders portfolio choices (the differential being imputable to a risk premium).

In Part II we shall have to deal with less **ad hoc** a world where anyone has access to world financial resources, albeit not on the same terms; in such a world allocations of issues of liabilities abroad must keep the center of the stage[21]. In this respect, the standard modelling strategy is unsatisfactory in that (i) international asset trades are aggregated into changes in the country's account of "Net Foreign Assets", and (ii) domestic asset supply is reduced to "outside assets", i.e. government bonds. On the contrary, it will prove to be of the utmost importance to distinguish between changes in assets or liabilities with foreigners; at the same time, even admitting that financing private deficit spending is neutral to the extent that it remains within the private sector, it cannot be disregarded to the extent that it involves foreign lenders (Tobin (1981, pp.121-122)). A rigorous procedure would require us to specify the foreigners' equilibrium schedule for the Domestic Trust (say AF, as the foreign holdings of A7). This is by no means an easy task since it entails aggregating over attitudes of asset holders dispersed worldwide (see e.g. Frankel (1983, 3.3.2)). Having excluded any direct connection between asset-holding and consumption patterns, an elementary form of the foreigners' equilibrium schedule should contain the same arguments as those in the residents' one. Thus, if we accept the traditional argument that international allocations are (subjectively) regarded as riskier, we obtain an upward sloping schedule, flatter than the other two, like AF in fig.5. Therefore part of the issue of domestic liabilities can be accommodated abroad, while return rates escalation will stop at a point like D. Fig.5 shows that the final equilibrium pair (r7, r6) will depend on (i) the share of domestically issued liabilities allocated abroad (the upward shift of AF), (ii) the attitude of foreigners, relative to that of residents, towards the home stock (A7) (i.e. the relative slopes of AF and A6). Assets will actually be transferred internationally, and the balance of payments will record an inflow of foreign capital. Furthermore, we move from one scenario where residents are reducing foreign assets to another where they are actually increasing external indebtedness; anyone sees that this fact makes substantial difference as to wealth distribution and the longer-run perspective of the economy.

A final remark. We know from sec.2 that under fixed exchange rates the central bank is forced to "monetize" external imbalances originating from placements of domestic liabilities abroad. That is, the central bank's clearing operations (in our example purchases of foreign assets from the domestic private sector) will work in exactly the same way as the surge of demand of foreigners for domestic assets.

Flexible exchange rates. The first considerable consequence of the exchange rate liability to change is that foreign assets, **vis à vis** with domestic ones, bear a further specific source of price variability. This specificity shifts them definitely towards the far end of the liquidity spectrum. Parallely, the foreign currency ceases to be perfectly substitutable with the domestic one in the role of reserve; in spite of its perfect liquidity on the foreign asset market, the foreign currency is perceived as a true price-variable asset by home agents. To the extent that foreign assets are included in the Trust optimally, that is after exchangerate variability has been discounted, the problem of the choice of the domestic monetary reserve is not essentially modified (see e.g. Levy-Sarnat (1983)); once again we can concentrate on the comparison between domestic and foreign non-monetary assets; analysis will be kept at an introductory level for further use in Part II.

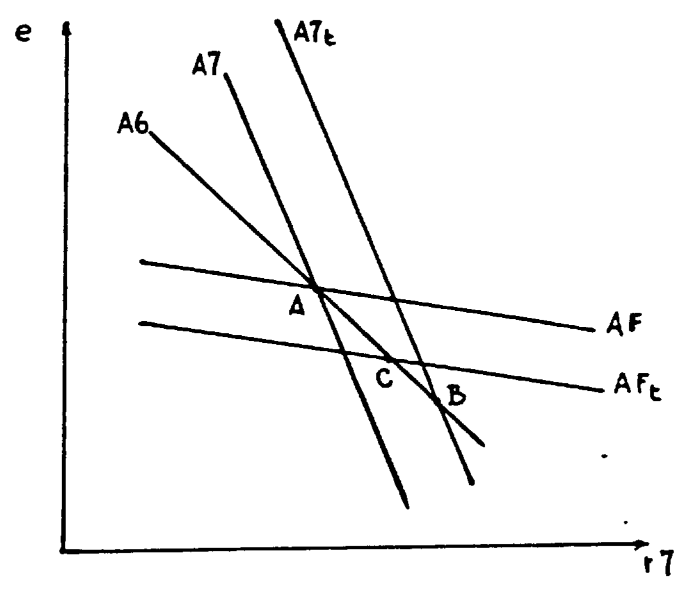
Let us begin by going back to the definition of the one-period value and return rate of the stock of foreign assets. Since the capital-value programme is one which is centered on the probability $[e_1 - E(e) = 0]$ for an expected exchange rate $[E(e) = e_0]$, we see that, unlike the asset's own price, the purchasing exchange rate does not affect the return rate of the asset. The channel through which the going exchange rate affects the demand for foreign assets is the market value of the stock; in fact I wrote

(9) $$A^*{}_1\alpha 6_1 = A6_1 p6_1 e_1, \text{ or}$$
$$e_1 = A^*{}_1\alpha 6_1 / A6_1 p6_1$$

Thus, formally, e instead of p6 is usually included in the solution vector of the asset-market equations 8[22]. That is to say, according to the well-known aphorism, "the exchange rate is an asset price", the price at which the stock of domestic assets is willingly held in relation to the stock of foreign assets.

To see this in detail, it is sufficient to redraw fig.5 by expressing the stock equilibrium schedules (A6, A7) in terms of (e, r7) (see fig.6, and Branson (1977, pp.72-73)). The analytics are exactly the same; the two schedules are now negatively sloped because changes in (r7) must now be offset by wealth effects due to the exchange rate. The relative slope of the two schedules derives from the fact that A6 is ranked riskier than A7. Thus, as the home economy expands (rightward displacements of A7), r7 rises, e must fall to reduce the market value of the foreign asset stock as much as necessary to dampen the incentive to switch from A6 to A7. This happens as asset holders try to sell foreign assets thereby pushing the exchange rate down.

Fig.6. The stock equilibrium schedules of domestic and foreign assets under flexible exchange rate



The process just described has attracted the greatest attention in both theoretical and applied developments of portfolio theory in the present era of floating rates. Even at first glance, such a process reveals a number of strong assumptions and limitations which will be discussed in due time. Just as an introductory remark I wish to remind that movements along the schedules imply that the adjustment process is borne by prices alone, with no trades of existing assets. This is generally accepted as a corollary to the assumption of "small country", despite having little to do with the international size of the economy. Within such a traditional taxonomy, it is usually concluded that the most important difference deriving from a flexible exchange rate concerns the small country; for adjustment of the exchange rate, in the place of foreign asset prices and rates that are given exogenously, re-establishes full autonomy of domestic-units' portfolio policy.

However, under floating rates, no less than under fixed rates, external placements of liabilities are of paramount importance in the present analysis. Expliciting the foreigners' equilibrium schedule of the stock of home assets (AF, i.e. the foreign holdings of A7), as suggested in the previous paragraph, changes the picture. If foreigners regard the home stock as riskier than home residents do and still buy a share of the increase in the home stock, then the exchange rate will appreciate while the domestic return rate will rise by less than it does in the "small-country" case. Moreover, what is more important in a loger-run perspective, the distribution of wealth is crucially different, since the exchange rate appreciates, not because residents are selling assets, but because they become indebted.

4. The goods markets, quantities and prices.

4.1. The demand for consumption goods. Private and public components.

As sec.1 of this chapter showed, macroeconomic flow equilibrium depends (i) on the conditions of money and asset markets (ii) on the (correct anticipation of) conditions of the goods markets. The previous three sections mainly analyzed the markets for money and assets. In essence, the former determines the discount rate at which production units can obtain monetary capital to start off current production; the latter determines the prices at which deficit spending units can raise financial means on a debt or equity basis. Asset prices are a fundamental bit of information in the decision processes leading to so-called "exogenous expenditures", namely investment and, albeit to a more limited extent, government deficit spending. On the other hand, the discount rate enters firms' costs and hence their supply function.

Therefore, we have now to focus on part (ii) of the problem. This part comprises a number of crucial issues in macroeconomic theory, which are mostly still hotly debated and which will, by necessity, reduced to few essential models. In particular, we shall begin with modelling consumption and investment decisions, passing then to production and pricing decisions, and ending up with the basic analytics of GDP determination as macroeconomic flow equilibrium.

Demand for consumption goods is a traditional starting point in macroeconomic theory. Beyond time-honoured considerations on the "consumer sovereignty", consumption decisions in the economy represent a basic input to firms' production and investment plans. We need first of all to frame consumption decisions into the characteristics of the financial economy.

In a workable sequential setting, individual consumption plans can be constrained within one single period, so that they can be fulfilled by the output of the same period (or current production). The consumer's attitude towards future consumption is embodied in his saving decision for the same current period. Ch.I, sec.3, gave detailed explanation of why the consumer's time attitude cannot be derived consistently from intertemporal utility maximization, but from a precautionary accumulation programme. In a very simplified form we can re-write:

(9) $$E_y = E_c + [A^* - (\Sigma_{t-1} S_{t-1}/P_{ct})] + u_t/P_{ct} \qquad \text{for each period } t$$

E_y = expected disposable income (real), E_c = normal desired consumption (real), A^* = desired level of wealth (real), S_t = period saving (nominal), u_t = unexpected shocks (nominal).

Unexpected shocks (u_t) may equally impinge on current income ($Y_t = P_{ct}E_y - u_t$) or on current consumption outlets ($C_t = P_{ct}E_c + u_t$). The consumer's aim is to have enough wealth as to meet such eventualities as ($C_t > P_{ct}E_c$) or ($Y_t < P_{ct}E_y$) without curtailing E_c or resorting to borrowing (which is quite a different matter from committing himself to consuming specified goods in specified future states). The term in parentheses yields the period rate of saving in the accumulation programme[23].

As far as macroeconomic flow equilibrium is concerned, the important point is the consumption-saving pattern within the time horizon of the accumulation programme. To keep the point as simple as possible, notice that the accumulation programme (in real terms) is based on a wealth-income norm ($E_y/A^* = \sigma$) and a wealth-consumption norm ($E_c/A^* = \gamma$), where normally ($0 < \gamma < \sigma < 1$)[24]. As long as the desired wealth amounts to multiples of income flows and consumption outlets, the basic accumulation programme will be

$$S^*_t/P_{ct} = A^*(\sigma - \gamma)$$

The corresponding **average propensities to save and consume** will be, respectively,

$$s = S^*_t/P_{ct}E_y = 1 - \gamma/\sigma, \qquad c = E_c/E_y = \gamma/\sigma$$

The following **saving-consumption norm** is also implied ($S^*_t/P_{ct}E_c = \sigma/\gamma - 1$)[25].

The above relations assure us that a stable consumption-saving pattern can be detected under households' precautionary behaviour. The next step is examination of **marginal propensities to save and consume**, that is, the adjustment in actual consumption and saving as the period income changes. It is now customary to distinguish between a temporary shock (i.e. $u_t = 0$) and a permanent shock leading to a revision of E_y. This distinction is undoubtedly important, but as one moves towards the macro level its importance loses considerable force; one is only interested in incomes changes that spread through markets, and when this happens, the chance of facing an individual random shock (or the chance of mistaking a random for a permanent change) is extremely low (Leijonhufvud (1969, ch.VII)). As a matter of fact, industrial economies bear no evidence of insensitivity of consumption over the business cycle (Okun (1981, ch.V), Greenwald-Stiglitz (1988)). In the precautionary decision model, marginal propensities are stable and coincide with average ones in so far as households have no reason to revise their desired wealth, that is, until they also perceive greater **variability** of future prospects. A fall in income translated into a lower (E_y, **cet.par.** a smaller s) works as a parallel displacement of the income constraint 17, given A^* (see also ch.I, fig.1); this should lead to a "Keynesian" proportional fall in normal consumption and saving[26].

We have so far considered constant prices. Clearly, price changes in 9 make the income constraint rotate; for instance, inflation makes it flatter and gives rise to effects qualitatively similar to a fall of E_y. A once and for all step-up in the price level (P_{ct}), however, appears a bit more complicated phenomenon. For now the consumer is likely to desire more nominal wealth; by combining a fall in purchasing power with a higher accumulation programme the correct response should be a stronger cut in real consumption in favour of greater nominal saving, that is, a rise in the marginal propensity to save[27].

The foregoing considerations can be synthetized into the following general expression of the demand for consumption goods (nominal and real):

$$(10) \qquad C_t = P_{ct}Q_{ct}(Y_t, P_{ct}, A_t) \qquad Q'(Y)>0,\ Q'(P_c)<0,\ Q'(A)>0$$

where, generally, changes in income operate at constant propensities while prices and wealth operate through changes in propensities. The above specification is open to two important qualifications which will now be only outlined.

The first qualification regards the composition of consumption. Q_{ct} (as well as P_{ct}) refer to a basket of goods. The amount of nominal consumption allotted to each period within the consumer's accumulation programme represents a budget constraint; the composition of the basket of goods purchased is clearly a matter of relative prices. For our purposes, the most important difference among the goods in the basket is the one between **domestic and foreign goods**. Household consumption is one source of imports from abroad (see ch.II, sec.1.2). The relative price ruling the relative weight of domestic and foreign goods in the consumption basket is the so-called **real exchange rate** (e_tP_{mt}/P_{dt}, P_{mt} = foreign price index, P_{dt} = domestic price index). Parallely, the consumer price index will be defined as ($P_{ct} = \omega_m e_t P_{mt} + \omega_d P_{dt}$, $\omega_d + \omega_m = 1$). On the other hand, the real exchange rate will produce reciprocal effects on foreign demand for domestic goods. As usual in demand theory, it will be useful, but not always safe, to keep income effects distinct from relative-price effects. An income variation transmitted to the consumption budget will impinge on domestic and foreign goods proportionally. But, for instance, changes in the exchange rate will affect directly both the relative price of foreign goods, and hence their share in the basket, and the consumer price index, and hence consumers' general purchasing power. For instance, from the above discussion of the effects of higher consumer prices, it follows that we should expect Laursen-Metzler effects of nominal devaluation; in fact, as e_t rises, P_{ct} also rises, and hence consumers should display both greater marginal imports and marginal savings.

The second qualification of the consumption function has to take into account fiscal policy. We shall consider the government in its very basic functions of public consumer and transferor (see ch.II, sec.2.1). Therefore, the channels through which fiscal policy affects consumption-goods demand can be deduced from the **government budget constraint** in each period:

(11) $$G_t + (H3_t + F3_t + B3_t)i3_t - T_t = \Delta(H3_t + F3_t + B3_t)$$

Public expenditure (G_t) is a net addition to (nominal) demand 18. Interests payments on the outstanding internal debt ($H3_t i3_t$) are a positive transfer to households, the tax revenue (X_t) is a negative transfer. For simplicity it is convenient to keep interest payments in the background as a component of consumers' accumulation programme; the tax revenue instead directly hits personal incomes (Y_t), and hence the period consumption budget. ($F3_t i3_t$) are transfers abroad. Imbalances between expenditure and net transfers are reflected into changes in the public debt (#A3) financed by households, foreigners or the central bank. The right-hand side of 11 thus creates an intertemporal accelerator of the public deficit; a constant primary deficit (G_t - T_t) feeds period-by-period growth of the overall deficit by ($\Delta A3_t i3_t$). This phenomenon, in the precautionary model, could have a direct impact on private consumption to the extent that consumers' accumulation programmes were modified[28].

On the other hand, the government may have not a flow but a stock target; in this case, the primary deficit will be constrained, given each period interests payments, and so will consumption demand either via G_t or via T_t. Since the interest rate on bonds is one of the determinants of interests payments, here is one important way in which asset-market conditions may affect fiscal policy and its impact on demand.

5.2. The demand for capital goods.

The essential micro- and macro-characteristics of investment in the financial economy have already been set out in previous parts of this work. In ch.I, sec.3, and ch.II, sec.4, it was shown why investment and saving are to be regarded as two distinct decisions, conveniently attributed to different decision units (the investing firm and the saving household), which pose a crucial intertemporal coordination problem for the economy. Again, in ch.I, sec.3, and ch.III, secs.2-3 it was stressed that the arena of the coordination problem is not that of expenditure-saving flows, but that of asset stocks. We also concluded that, because of incomplete information, the problem is scarcely alleviated even by an asset market in which prices were set efficiently. Here, specification of the investment function will be on the conventional "net present value" (NPV) basis. Onto this kernel of the investment function it is relatively simple to graft the elements of uncertainty and precaution surrounding the investors' decision, thus pointing out the forces whereby asset-market conditions can impinge onto the level of investment in the economy.

The fundamental force driving the enlargement of production capacity today is the expectation of the profit streams from sales in the future. Therefore, the investor in a specific capital good enters a future long position in that specific good obtained from that specific process. In the absence of complete future markets such a position is taken or refused on the basis of a rational calculus based on indirect market signals; as such, market signals are surrounded by uncertainty. The well-known basic elements in the investor's decision model are the expected stream of (gross) profits $[E(R'_k) = E_k]$, a discount factor (i_t), and the price of the capital good (P_{kt}). Uncertainty can be concentrated in the profit expectation, which requires the investor to forecast future output prices, quantities, and input costs; consequently, he will perceive a given dispersion of possible profits $[V(R'_k) = V_k]$. Let actual profits in any future period be

$[R'_{kt'} = E_k + u_{t'}, u_{t'}$ i.i.d. $N(0, V_u)]$. NPV of the project (k) of life T is

$$NPV = \Sigma_{t'} R'_{kt'}/(1 + i_t)^{t'} \qquad t' = t+1,...,T$$

taking the expected present value of the projetc (and recalling that $\Sigma_{t'}(1/1 + i_t^{t'}) \to 1/i_t$ for $t' \to \infty$) we obtain (E_k/i_t). The profitability condition of the project is that the expected present value at least covers the cost,

$$EPV = E_k/i_t \geq P_{kt}$$

Now, since $(r'_k = E_k/P_{kt})$ is the rate of profit on the capital good k, the profitability condition also implies that $(r'_k \geq i_t)$, i.e. that the rate of profit be at least equal to the discount rate. So far I have simply refreshed well-known elements in investment theory, which, as such, are common to all schools. It is generally agreed that the profitability of an investment project is inversely related to the discount rate and to the capital-good price. However, much more must be said when investment uncertainty and asset-market liquidity preference are explictly brought into analysis.

Equity-constrained investment. What is the appropriate discount rate of the project? Or, does investment finance make any difference in the demand for capital goods? The answer of the neoclassical tradition (the Modigliani-Miller theorem, see also above ch.I, sec.1.3) to the latter question is no, so that the former question is redundant -there is only one discount rate on the market. As a further consequence any profitable project is virtually unconstrained up to the point where the profitability condition is equalized. It is now well understood that those answers hold if the asset market is embedded in a perfectly informed economy with market general efficiency; but then the asset market would be redundant with respect to complete future contingent contracts.

By contrast, consider first equity finance under asset holders' incomplete information and liquidity preference. Remember from sec.3 above that equities are expected to pay a nominal dividend i5 and are quoted at p5, thus yielding a return rate (regardless of capital gains) $(r5 = i5/p5)$. Admit that, as a rule, equities are floated at a price equal to the expected present value of the project $(p5_0 = E_k/i)$; evidently, $(i = r5)$

and ($r'_k = r5$) only if ($p5 = p5_0$, $i5 = E_k$), that is to say, only if shareholders hold the same probability distribution of profits as the investor's, and equities are sold at the floating price. Even if one accepts the former condition (a quite generous extension of the efficient information hypothesis), one cannot neglect that shareholders face a specific liquidity risk due to equity price variability; they will demand an additional risk premium such that ($p5/p5_0 < 1$)[29]. If this happens, then equity finance entails a cut in the profitability of the project. Since the value of the emission falls to (EPVp5), there exists a well-defined interval of the equity price ($P_k/EPV \leq p5 < 1$) below which the project cannot be financed on the equity market. It is to be stressed that the above argument does not describe the usual downward slide along the schedule of the marginal efficiency of investment as "the" interest rate is rising (or Tobin's "q" is falling); it depicts an asset-market equilibrium situation where a certain class of investments is "equity constrained" (or, if one likes, a discontinuity in the investment function)[30].

The precautionary behaviour of the investor. The existence of a constraint to investment finance on the equity market yields a solid rationale for the opening of an alternative market: **the market for debentures**[31]. For obvious reasons, the new market is viable to the extent that finance suppliers demand a risk premium at least lower than households do. This goal is usually accomplished with the help of specialized funding institutions which, in our simplified economy, are represented by the long-term window of the central bank (above, ch.II, sec.2.1). It makes the analysis more definite and fruitful to assume that all investment is normally financed by long-term debt, while the equity market is asked to finance the redemption of the outstanding debt[32].

This new pattern of investment finance introduces a major modification in the investor's decision model. On the one hand he is certain of the cost of finance (or the discount rate of the project); on the other, he commits himself to repaying the principal and interests at a specified date. He (with the bank) faces the unfavourable eventuality that, at the due time (say $t' = t+1$), [$R'_{kt'} < P_{kt}(1 + i4)$]. Such an event can be translated into a probability of default by noting that, if the project is valued correctly, then in t' $[P_{kt}(1 + i4) = E_k]$; hence $Pr(R'_{kt'} - E_k)$ is the usual fallibility measure in the probability distribution (E_k, V_k); given a tolerance parameter, the present value of the investor's net worth being the most widely used, the probability of default is then

(12) $$Pr(R'_{kt'} - E_k \leq A/(1 + i4)) \leq V_k(1 + i4)^2/A^2$$

The probability of default grows with the interest rate i4[33] and shrinks with the "collateral" (A); these are well-known results in the new theories of capital markets under imperfect information[34]. Technically, the investor's decision is similar to the asset-holder's (above, ch.I, sec.3.3). Given the parameters (E_k, V_k) for unit of capital, the scale of investment is constrained by the capability to withstand the intrinsic loss at stake. There will be an investment/collateral ratio where the difference between EPV and intrinsic loss of the project is maximal. The market value of the collateral at the time the project is being financed sets an upper limit on the scale of investment. On the other hand, higher interest rates or greater prospective variability of profits raise the probability of default and should lead to a reduction in the scale of investment. Combining the determinants of EPV and of the probability of default we may write the following general specification of the investment function:

(13) $$I_t = P_{kt}Q_{kt}(E_k, V_k, P_{kt}, i4_t, A_t)$$

$Q'(E_k)>0$, $Q'(V_k)<0$, $Q'(P_k)<0$, $Q'(i4)<0$, $Q'(A)>0$.

A final comment on the investment function and the asset market. On the financial side, the crucial arguments of equation 13 are $(i4_t, A_t)$. The former is established by demand and supply of long-term debt, essentially outside the canonical equity market. In this way the long-term interest rate plays a direct role in the investment function, perhaps a more meaningful role than in the textbook Keynesian function. However, since i4 affects the probability of default, there will be an upper limit to debt-financed investment, though plausibly higher than the one constraining equity- financed investment. Is there anything left for the equity market to do? "The daily revaluations of the Stock Exchange, though they are primarily made to facilitate transfers of old investments between one individual and another, inevitably exert a decisive influence on the rate of current investment" (Keynes (1936, p.151)). In equation 13 the channel through which the equity market conditions investment is mainly A, through the provision of fresh capital and the valuation of the existing one; but this is an indirect channel, not the exclusive one it happens to be in efficient portfolio theories[35]. By indirect channel I do not mean weak; I mean that it concurs with alternative financial channels. This consideration casts a different light on the international enlargement and integration of capital markets. To the extent that equity prices across world markets are not perfectly correlated, and that long-term interest rates are not perfectly equalized either, the demand for investment finance may profitably cross the boundaries in the search for less stringent equity constraints or less tight interest rates. One important reason for openening capital markets seems to spring from their being imperfect. As will be seen, open, imperfect capital markets, with their effects on expenditure decisions, offer an important contribution to explanation of the performance of the open financial economy.

5.3. Production and pricing.

This section addresses the modelling of output and price determination. No doubt, this is one of the most challenging issues in the research on the microfoundations of macroeconomics. While leaving many controversial issues in the background, this section extends the sequential approach to the firm's decisions as to the quantity and price of output; this immediately entails substantial departure from the traditional theory of perfect competition. As was recognized a long time ago, in an economy of sequential decisions unassisted by tatonnement or an auctioneer "there exists a logical gap in the usual formulations of the theory of the perfectly competitive economy, namely, that there is no place for a rational decision with respect to prices as there is with respect to quantities" (Arrow (1959, p.380)).

Here the treatment of the problem will be in the line of recent approaches whose most interesting trait is the abandonment of competition as optimal choice dictated by given parametric signals towards analysis of firm's genuine decisions within a process of production, pricing, sale and consumers' shopping[36].

The environment of the price maker is notably more complicated than that of the price taker. We shall consider an industry of J "small" firms producing a homogeneous product. From the firm's point of view a sequence of decisions may be devised and defined "the production period". Given fixed capital and the related productive capacity, the production period divides into three stages: (i) production planning and employment of factors, (ii) production and pricing, (iii) sale of output. Let us begin with the stage of production planning. The budget constraint of the firms was introduced in ch.II, sec.2.1. The firm purchases factors at the beginning of period on the basis of: (i) the actual prices of factors, and (ii) the expected demand at the end of the production period. Given technology, (i)-(ii) together should determine the production scale and the unit supply price. Output is then sent to the market. The firm's flow equilibrium requires (iii) expected proceeds to be equal to actual proceeds; actual proceeds are then wholly distributed to factors. The firm's objective is to maximize expected one-period profits. The critical step is clearly (ii), which involves a problem of expectations formation.

In the first place, following ch.I, I assume that entrepreneurs have incomplete knowledge and information, that is, they do not base their forecasts on "the" fully specified structural model of the economy, but on the reduced form of their own product market. We shall see how they can obtain probabilistically correct demand forecasts[37].

Equations 14 describe the basic elements in firm's j individual plan of production for any one good (the good's subscript is omitted): (a) is the input-output function for each variable factor h, (b) is the total cost function, (c) is the market demand function, (d) is the equilibrium condition in the market.

(14a)	$N_{hj0} = N_h(q_{j0})$	$N'_h(q)>0$
(b)	$W_{j0} = \Sigma_h w_{h0} N_{hj0}$	
(c)	$D_1 = D(P_1, \mathbf{u}_1)$	$D'(P)<0$
(d)	$\Sigma_j q_{j0} = D_1$	

N_{hj} = factor input scale, w_h = variable factor unit cost, D = market demand, P = market price, $\mathbf{u}$ = vector of exogenous variables of demand; (0) = planned (beginning of period) variables, (1) = realized (end of period) variables.

The specification of the individual firm's plan highlights the first important point. At the stage of planning (14a-b), neither the equilibrium price nor the equilibrium quantity (14c-d) can be "taken" from the market. The profit-maximizing firm should set output to equate the marginal cost (MC) with the expected marginal revenue (EMR). How is the latter obtained?.

The firm's decision has to be based on its information set and the relavant market signals. The former, broadly speaking, contains knowledge of the market structure; there are firm-specific elements as well as elements of common knowledge. In a competitive market, for instance, it seems correct to assume that:

(i) Market conditions in general are common knowledge and the same for all competitors in the same industry (D_{-t}, P_{-t}, N(.), w_0; for all $-t<0$). Let the market demand function be of the CES type and the production function be represented by a vector of inputs [**n**] for each level of output. [w_0] is the vector of unit factor costs.

(ii) Production decisions and errors are firm-specific (q_{j-t}, p_{j-t}, z_{j-t}, q_{j0}, p_{j0}).

That is to say, competitors know the market but do not know each other. At the same time, assumption (i) can be regarded as a barrier to entry in the short run.

It is rational for competitors to use all common information they have access to **plus** all private information. Preliminarily, consider the log-linear specification of the market demand function,

$$D_t = a - bP_t + u_t$$

define, for all past ($-t < 0$), P_{-t} as the price such that realized sales (S_{-t}) are equal to demand,

$$D_{-t}(P_{-t}) = S_{-t}$$

and define individual realized sales as the difference between output and a stochastic error

$$s_{j-t} = q_{j-t} - z_{j-t} \qquad \text{all } j$$

Then by simple substitutions we can say that each supplier has experienced that

$$\text{(15)} \qquad \begin{aligned} s_{j\text{-}t} &= a - bP_{-t} - S_{\hat{j}\text{-}t} + u_{j\text{-}t} \\ &= a - bP_{-t} - Q_{\hat{j}\text{-}t} + z_{j\text{-}t} \end{aligned}$$

$\hat{j}$ = non-j firms, $S_{\hat{j}\text{-}t} = \Sigma_{\hat{j}} s_{\hat{j}\text{-}t}$, $Q_{j\text{-}t} = \Sigma_{\hat{j}}(q_{\hat{j}\text{-}t} - z_{\hat{j}\text{-}t})$, $\Sigma_{\hat{j}} z_{\hat{j}\text{-}t} + z_{j\text{-}t} = u_{-t}$, $(z_{\hat{j}\text{-}t}, z_{j\text{-}t}, u_{-t})$ are normal random variables i.i.d. with zero mean.

In words, firms face both parametric and strategic uncertainty[38]. In fact, in each period each firm experiences output decision errors; these errors are assumed to be randomly distributed among all firms and show up in a random error in aggregate supply. According to our informational assumptions, the j-firm is unable to specify equation 15 in disaggregate form; it rather perceives its sales as residual, given market demand, non-j firms aggregate output and its own specific output error. Let us concede that repeated occurrences of 15 make up a stationary stochastic process of the form $\{s_{j\text{-}t}(P_{-t}, Q_{j\text{-}t}, z_{j\text{-}t})\}$; hence, if no one makes systematic errors, each competitor can obtain the correct estimation of eq.15. Therefore the decision problem of the profit-maximizing firm can be represented by two equations in **two variables** -planned output $[q_{j0} \equiv E_j(s_j)]$ and supply price $[p_{j0} \equiv E_j(P)]$

$$\begin{aligned} &\max\ [q_{j0}p_{j0} - w_0 n_{j0}] \\ &\text{s.t. } q_{j0} = a - bp_{j0} - E_j(Q_{\hat{j}}) \end{aligned}$$

First notice that the above formulation yields the following EMR function[39]:

$$\text{(16)} \qquad EMR = p_{j0} - q_{j0}(1 + \sigma_{j0})b^{-1} \qquad\qquad \sigma_{j0} = \partial E_j(Q_{\hat{j}})/\partial q_{j0}$$

This expression for EMR makes the crucial point. Rational, competitive price-making inevitably involves a degree of strategic uncertainty, represented by the parameter σ_{j0} (Arrow (1959)). The correct specification of EMR would require each competitor to know **at the stage of planning** how all other competitors would alter their **plans** as he alters his own. As has been aptly noted, σ_{j0} is **conjectural** and there is no unique "true" value given by the market (Pesaran (1987, pp.54-55))[40].

Is there a conjecture that is logically consistent with the informational structure of a competitive market? According to the informational assumptions (i)-(ii) it would seem plausible for each firm to conjecture that its own production plans are not observable and are not influential on other firms' production plans, or to select a Cournot-Nash conjecture ($\sigma_{j0} = 0$)[41].

If the above is true, under the traditional competitive assumption that market shares are all equally small, given the number of firms (J), it follows that j perceives [$E_j(Q_j) = E_j(D)(J-1/J)$, and hence $q_{j0} = E_j(D)/J$]. This implication of the Cournot-Nash conjecture is important because j's output forecast porblem is thus reduced to the forecast of the market demand as a whole, regardless of non-j's output decisions. If all firms adhere to the same conjecture, the correct pricing policy for all is

$$
\begin{aligned}
(17) \qquad & EMR = MC \\
& p_{j0} - E_j(D)/bJ = w_0 n'_{j0} \\
& p_{j0}(1 - 1/bJ) = w_0 n'_{j0} \\
& p_{j0} = w_0 n'_{j0} \mu_j \\
& \mu_j = b_j/b_j - 1
\end{aligned}
$$

where $w_0 n'_{j0}$ is the marginal cost of producing q_{j0} out of $E_j(D)$. We have thus reached the well-known pricing equation of monopolistic competition, b_j being equivalent to an individual demand elasticity at the point q_{j0}. Since the CES demand function is assumed, it also follows that ($b_j = bJ$ and $\sigma_j = \sigma$) for all firms and for any quantity supplied[42]. All values ($| b | > 1$) that yield ($p_{j0} > 0$) also imply that ($\mu > 1$) or that the price is set above the marginal cost.

It should be noted that here m emerges not from product, but from information specificity combined with output-price "trials and errors"[43]. In fact, demand forecast errors manifest themselves at the time output has to be sold (the end of the production period) in the form of a price scatter; individual supply prices can only differ if firms bear different marginal costs, that is, if they have different production plans. As Arrow pointed out, if each firm's market information is incomplete, the missing information being other firms' plans, then, until market equilibrium is established, the single firm will not experience an individual demand infinitely elastic at the price it has set, unless it is the sole outlier. However small the market share, the single firm will experience a definite relationship in the sale process between quantity sold (ds_j/dq_{j0}) and sale price (dp_j/dp_{j0}) such as to reveal the elasticity of market demand (see also Rotschild (1973, sec.II-III)). Consequently, "as has been understood since the days of Cournot and emphasized in more recent times by Chamberlin and Joan Robinson, the competitive firm is a monopolist with a special environment" (Arrow (1959, pp.383-384)). I wish to stress that the result obtained here is common to a whole class of firm's decision models showing that demand uncertainty in an otherwise competitive market will itself give firms the power to set prices, and that such prices will generally be higher than marginal costs (see again Rotschild (1973)). Since this kind of market power does not spring from traditional sources of imperfect competition (product differentiation or "small" number of firms in the industry), the market could still be defined "competitive", albeit imperfectly so. Interestingly, this view of competition, if not the analytical apparatus, is akin to the one Kahn called "**polypoly**" at the time of the Cambridge debate (1929, ch.I). This term seems quite appropriate to define such a situation where a competitive firm enjoys some market power left over by other firms' forecast errors; if all firms are fallible, which seems quite reasonable, market power over "small" market shares becomes pervasive.

A digression on further aspects of price-making. The measure of each competitor's market power [$E_j(D)/bJ$] is stable and reliable in forecasting demand in so far as all other competitors' behaviour, and notably market shares, are stable. This is a typical problem of composition of rational decision models with a strategic conjectural component: the resulting decision is the correct one in so far as nobody deviates (Hahn (1989)). Here we cannot go deeper into this point; if only a broad observation is permitted, one would say that structural stability, which is the crucial factor to mutually successful decision making, is like a public good which requires each market participant to move with the market, not against it. This situation, which seems closely akin to the perception of competition by businessmen, engenders strong inhibitions against indvidual moves to exploit the market, the most remarkable case being the use of the price to clear the market.

An instance of this is the following. Since in the present model all firms make use of the correct forecast equation 15 and follow the same pricing rule, it turns out that $[P_1 = E(p_{j0}), j = 1...J]$, that is to say, price decisions are on the average (cross-section and through-time) correct so that aggregate supply will be sold at an average price greater than marginal costs. Put differently, P_1 is the price a consumer may pay with the highest probability. Whether the price scatter will eventually collapse onto a single market price is entirely an open question, whose answer is highly sensitive to the behavioural and informational characteristics of the search-arbitrage process on the part of consumers (Rotschild (1973)). We have by now an abundant and well-founded literature which shows that cost- based pricing with quantity adjustments, instead of full price market clearing, emerge as a rational response to the "odds of the market" among competitors with insufficient strategic information facing consumers with incomplete information and costs of search[44].

There is another important reason why full price adjustments may be unprofitable, a reason which relates to the financial position of the firm. Any firm has normally to serve some debt out of current proceeds, whether the short-term bank discount for current production or the long-term investment debt; as we know, the flow equilibrium of the firm requires it to sell the planned quantity on the marginal cost schedule, whereas full price correction of errors imposes onto it to sell off the marginal cost schedule. As a consequence of excess supply cleared by price reduction at the market place, the flow of proceeds would fall short of the expected level; some factor (presumably the physical or monetary capital factor) could not be paid as expected. The possibility of a fixprice policy emerges with a clear financial component: stocked unsold output is recorded as a firm's asset vis à vis an equivalent outstanding debt (say unrepaid monetary capital to the bank). Creditors may accept a longer asset-liability balance against a certain cut in capital income. In a forward-looking perspective, the present value of this asset does not fall in so far as the discount rate does not rise and the selling price will not fall in the future either[45].

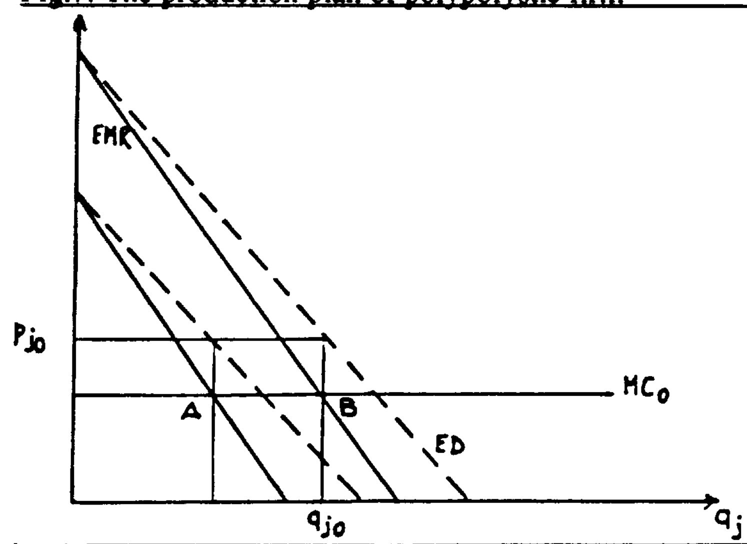
Variable costs, mark-ups, and the price-quantity trade off. The optimal pricing rule 17 is equivalent to marking-up variable costs. Moreover m is not arbitrary, but is dictated by (experienced) market conditions, in the particular sense intended above. In this sense, it rationalizes the feeling among businessmen that the mark-up they charge is consistent with the existing market shares. On the other hand, the common use of variable costs, to the extent that a competitive market actually equalizes them, reduces strategic uncertainty in each firm's policy[46].

Unit variable costs are given by the sum of the costs of the marginal input of each variable factor. Total variable costs are obtained by applying the scale of production. An important aspect of variable costs in the financial economy is that they are raised through the bank discount window (above, ch.II, sec.2.1, ch.III, sec.1.1). The discount rate is thus a factor cost itself, and the flow of proceeds must pay for all factors; the vector of factor prices becomes $[\mathbf{w}(1 + i1)]$.

If the firm is to draw up a consistent plan, it must know the vector of factor costs. As a first approximation, one should think of the firm as price maker on the goods markets and quantity maker on the factor markets; factor prices are thus determined by the supply side of the market (Hart (1982)). For the purposes of this work we need not model factor markets explicitly; we may limit ourselves to taking factor prices as given in any production plan. Let factor contracts be struck at the beginning of period for at least one period. The single firm has now enough information to draw a MC schedule and a EMR schedule for different output levels. The plan q_{j0} is chosen at the intersection of the two schedules. Given the technology and a stable market structure, the impact of anticipated demand on the supply price is compellingly positive only if the technology requires increasing marginal inputs, or if factor prices have been changed procyclically; in this case the trade-off between price and quantity is given by the slope of EMR. It seems more sensible, however, to model an industrial sector in which variable costs are based on constant average productivity, the real labour cost is stable, while both nominal labour cost and output prices are (sluggishly) procyclical[47].

Given these specifications, the plan of the competitive firm facing an expected increase in market demand is drawn in fig.7 in the (p_j, q_j) space. For any given expected demand schedule ED, output expansion is constrained by a downward sloping EMR; given the market mark-up parameter (m) the supply price is governed by MC, which is constant (equal to average variable costs). As a result, the increase in output from A to B can be supplied at a constant price up to a change in unit factor costs. The trade-off between price and quantity, for any given level of demand, is given by the slope of EMR.

Fig.7. The production plan of polypolystic firm



On the other hand, factor prices (say the wage rate) do not affect employment directly, either in nominal or real terms, but only indirectly through the price effect on expected demand discounted by the firm[48]. As has been repeatedly argued in the Keynesian view, when some workers are not hired at the going wage rate, "the problem is not that the real wage is too high; it is that the demand for output is too low" (Okun (1981, p.20)).

4.4. Gross Domestic Product and macroeconomic equilibrium

In contrast with current macroeconomic theory, the present framework does not admit macroeconomic equilibrium as the solution of the optimization problem of a representative agent. As was widely discussed in ch.II, macroeconomic equilibrium should instead emerge through market coordination among different choices made by different agents using limited information relevant to their own markets. GDP springs from basically two output markets which serve two crucially different purposes -

consumption and investment. The modelling strategy expounded in this section can be summarized as follows.

In our consumption function there appeared factor incomes (Y), consumption prices (P_c) and wealth (A). As long as goods prices do not change, the crucial determinant of consumption is factor incomes. Income changes should affect consumption at constant propensities, and if such changes are random, marginal propensities should coincide with average ones. Wealth effects should be positive, since they allow the consumer to shift onto a higher consumption path in his precautionary accumulation programme. As to investment, this was found to depend on the parameters of the probability distribution of future returns to the capital good (E_k, V_k), on its current price (P_k) a discount factor (i_k) and wealth (A). In the absence of price effects, the traditional interest effect on investment predominates only if it is jointly assumed that the probability distribution of future returns is stationary, and that positive wealth effects on the probability of default do not predominate themselves. We may admit the former condition, but we shall have to pay attention to the latter. For simplicity, r7 (the return rate to the domestic composite asset) can be taken as the investment discount factor. GDP at the current prices should be equal to factor incomes. In conclusion we may write the following functions[49]:

(18) $P_{c0}O_{c0} = P_{c0}Q_{c1}(P_c, Y, A)$ $\qquad Q'_c(P_c)<0,\ 0<Q'_c(Y)<1,\ Q'_c(A)>0$

(19) $P_{k0}O_{k0} = P_{k0}Q_{k1}(P_k, r\ , A)$ $\qquad Q'_k(P_k)<0,\ Q'_k(r\ )<0,\ Q'_k(A)>0$

(20) $Y_1 = P_{c0}Q_{c1} + P_{k0}Q_{k1}$

The markets for consumption and investment goods might be regarded as two industries with a large population of polypolystic firms as those described in par.3. The two industries as a whole are linked by a crucial asymmetric externality to the extent that consumption demand depends directly on factor incomes, and hence on incomes in the investment industry, whereas investment demand does not. Given independent production plans by the single firms in the two industries (p_{jc0}, q_{jc0}; p_{ik0}, q_{ik0}), there exists one single value of factor incomes which satisfies macroeconomic flow equilibrium

20; this will be, as in Keynesian theory, a multiple of planned investment value over the share of factor incomes not spent on consumption (Hart (1982), Solow (1986)). In fact, if c is the consumption-income norm (see above, par.1), the consumption industry as a whole cannot expect to sell more than $[c(P_{c0}Q_{c1} + P_{k0}Q_{k1})]$ and hence to produce more than $[(c/1\text{-}c)(P_{k0}/P_{c0})Q_{k1}]$. It follows from 20 that

$$Y_1 = (1/1\text{-}c)P_{k0}Q_{k1} \tag{21}$$

Two observations are in order. The first is that each single firm in the consumption industry is so small that it should take the income component of demand as given (Hart (1982); there is no difficulty in identifying income effects as the scale component (a) in the log-linear demand equation 15). Put differently, if knowledge and information are limited to their own product markets, firms will hardly be able to discount the macroeconomic externality at the individual planning stage; rather, macroeconomic equilibrium will be established through mostly unanticipated demand surprises due to income effects, to which workers and firms will respond via short-run quantity adjustments (see above, par.3). The second observation is that polypolystic price-making may leave employable resources at the single firm and market level, which ensure the possibility of quantity adjustments; it is no surprise to find the same result at the aggregate level. Equation 21 implies nothing as to the level of employment of resources; as we know from par.3, the trade-off between quantities and prices basically depends on the response of factor markets. That equation does, however, imply something as to the determinants of the employment of resources. The fundamental driving force is realized investment; consumption is ancillary, since it only amplifies additional demand; prices simply reflect productivity and factor costs; factor costs, and mainly labour cost, play tortously -they may affect prices and demand on the one hand, but they also counter-affect income on the other; in any case, their actual effect springs from the balance between those two forces in the expectations of entrepreneurs.

Appendix

A.1. The exchange rate as an asset price and the efficient information hypothesis

This Appendix shows some important implications of the efficient information hypothesis (EIH) concerning asset market equilibrium and asset price dynamics that have been mentioned in previous chapters. The model that will be used is derived from the general form of asset market equilibrium 8a-b that I reproduce here:

(A1) $A^*_t \alpha_{at}(r_{at}, V_{pa}) = A_a p_{at}$ $\qquad A'_a(r_a)>0,\ A'_a(r_{\hat{a}})<0,\ A'(V_{pa})<0$

(A2) $\Sigma_a A_a p_{at}/P_{ct} = A^*_t$

A few operational assumptions are necessary in order to obtain a model specification comparable with standard efficiency models of the asset market. First, the price variance of all assets is constant. Third, all base-period (0) nominal magnitudes are set equal to 1; the consumer price (P_c) and the desired stock of wealth A* are given; A* is equal and small for all agents. Third, it will be useful to express the total differentials of eqs.A1 in terms of rates of change of the variables $d(.)/(.)_0$ and denote them by $\delta(.)_t$ (hence the level of each variable in t will be $[1 + \delta(.)_t)]$). Finally, the total differentials of eqs.A1 are assumed to be of the CES type (for instance, this results from both the conventional maximization of exponential expected utility with constant absolute risk aversion and the safest portfolio choice considered in this work, ch.I, sec.4). Therefore from eqs.A1-A2 we obtain for (i = 1,...n) agents:

(A3) $\delta A_{iat} = a_{ia}(\delta i_{at} - \delta p_{at}) + a_{i\hat{a}}(\delta i_{\hat{a}t} - \delta p_{\hat{a}t}) + b_{ia}(\delta p^*_{at'} - \delta p_{at})$

$a_{ia} > 0,\ a_{i\hat{a}} < 0,\ b_{ia} > 0;$

(A4) $\Sigma_i \delta A_{iat} = 0$

The first term in A3 measures the own-rate effect net of the price wealth-effect, the second term the substitution effect, the third term the (expected) capital gain effect (t' > t). The linear coefficients (a, b, i.e. elasticities) reflect the degree of asset substitution according to the exposition in the text. The signs are obvious. The a's should differ from the b's if the agent prefers a certain increase in the effective interest rate ($\delta i_{at} - \delta p_{at} > 0$) than an uncertain capital gain of the same amount ($\delta p^*_{at'} - \delta p_{at} > 0$). We also know that the demand elasticity for a risky asset is in relation to its variance; hence ($a_{ia} < a_{i\hat{a}}$) if p_a is more variable than $p_{\hat{a}}$.

Our focus will be on the demand for the foreign asset, which was shown to be

(A5) $A^*_1 \alpha 6_1(r_{at}, V_{pa}) = A6_1 p6_1 e_1$

and consequently on that particular asset price which is the exchange rate. However, our conclusions carry over to all types of assets in the above class of asset demand functions. As usual in asset-market models of the exchange rate, asset price variations will be ignored; the foreign asset A6 is distinguishable from the domestic one A7 only because of exchange-rate variability (i.e. $a_{i6} = a_{i7}$), while the choice between the two is ruled by changes in the foreign interest differential ($\delta i6_t - \delta i7_t$) and by the expected rate of depreciation of home currency ($\delta e^*_{t'} - \delta e_t$). Therefore, eqs.A3-A4 can be rewritten as follows (the asset identification numbers is dropped):

(A6) $k_{it} = a_i y_t + b_i(\varepsilon^*_{t'} - \varepsilon_t) - \varepsilon_t$

(A7) $\sum_i k_{it} = 0$

where $k_{it} = \delta A_{it}$, $y_t = \delta i6_t - \delta i7_t$, $\varepsilon^*_{t'} = \delta e^*_{t'}$, $\varepsilon_t = \delta e_t$.

Equation A6 yields the i-th agent's demand or supply (the change in the asset stock $k_{it} > 0$, $k_{it} < 0$, respectively) as a function of the change in the return rate. The desired stock of the foreign asset increases if the foreign interest differential increases ($y_t > 0$) or if expectations of capital gains arise ($\varepsilon^*_{t'} - \varepsilon_t > 0$). Given one or both of these conditions, the exchange rate will be bid up (domestic currency will depreciate) ($\varepsilon_t > 0$); this will inflate the current value of the stock, thus damping demand, up to the compensation for capital-account risk.

Let us now turn to the information structure of the market. The EIH imposes that:
(i) the decision variable y_t is the same for all agents,
(ii) information y_t is instantly and costlessly available to all agents, (iii) all agents form the same expectations of future rates ($\varepsilon^*_{t'} = 1 + \varepsilon^*_{t'}$).

Further, in order to exclude any discoverable pattern in y_t, it is assumed as usual that:
(iv) y_t follows a stochastic process described by $y_{t'} = y_t + u_{t'}$, where $u_{t'}$ is a random variable i.i.d. $N(0, V_u)$ (i.e. y is a martingale).

Finally, it is important to add that EIH is not irrelevant to the thorny question of the specification of agents' risk attitudes -i.e. whether demand elasticities across agents differ or not (Arrow (1986)). It is a well-known result in general equilibrium theory that for any given aggregate excess demand function (like that in system A6) the underlying (unobservable) map of maximand individual preferences is not unique; yet a sensible definition of EI should admit that the (observable) relationship between the decision variable(s) and the market outcomes is common knowledge, and to this effect, such a relationship must be stable and unique. To solve the dilemma, efficiency market models are generally compelled to the strong restriction that all agents have the same risk attitude. In the precautionary portfolio model examined in ch.I, where the safest portfolio is independent of agents' tastes, the equivalent restriction has to be imposed onto agents' assessment of price variance. In any case,
(v) $a_i = a$, $b_i = b$, for all i.

Under the above conditions, system A6 yields, for any (y_t, $\varepsilon^*_{t'}$) the equilibrium solution for the current change in the exchange rate and the asset stock adjustment (ε_t, k_{it}):

(A8) $\varepsilon_t = a(1 + b)^{-1} y_t + b(1 + b)^{-1} \varepsilon^*_{t'}$

$k_{it} = 0$ for all i

follows (the asset identification numbers is dropped):

(A6) $k_{it} = a_i y_t + b_i(\varepsilon^*_{t'} - \varepsilon_t) - \varepsilon_t$

(A7) $S_i k_{it} = 0$

where $k_{it} = \delta A_{it}$, $y_t = \delta i6_t - \delta i7_t$, $\varepsilon^*_{t'} = \delta e^*_{t'}$, $\varepsilon_t = \delta e_t$.

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Under the above conditions, system A6 yields, for any (y_t, $\varepsilon^*_{t'}$) the equilibrium solution for the current change in the exchange rate and the asset stock adjustment (ε_t, k_{it}):

(A8) $\varepsilon_t = a(1 + b)^{-1} y_t + b(1 + b)^{-1} \varepsilon^*_{t'}$

$k_{it} = 0$ for all i

account. The absolute change in capital account is given by $(e_{t'} - e_t)$. The EIH implies that there must be only one "objective" conditional expectation of future values of $e_{t'}$, that is, from (ii) $[E(e_{t'}) = E(1+\varepsilon_{t'}) = 1+ \varepsilon_t = e_t]$. The axiom of rational expectations restricts individual forecasts to be $[e^*_{t'} = E(e_{t'})]$ for all agents. Therefore, the rational expectation of changes in the exchange-rate level at the maturity has to be $[E(e_{t'} - e_t) = 0]$. In so far as oscillations in the interest differential, or more generally in fundamentals, and hence in the exchange rate have no drift, the desired stock of the foreign asset should only vary in response to the current interest differential.

3. Stock equilibrium is maintained by pure price adjustments with no effective trade in assets. This is an important implication of asset-market equilibrium models under the EIH (Hicks (1935, pp.77-79), Grossman-Stiglitz (1980), Arrow (1986)), including the first generation of exchange-rate models. I have already been explained why the principle that different risk valuations are a condition to trade cannot be accepted without restrictions. Suppose $(y_t > 0)$ under EI conditions (i)-(v): whatever the risk valuation, there will be no suppliers and bids will continue until e_t has totally offset the demand incentive y_t (which is in fact another definition of EI).

The unprofitability of forward and speculative transactions. A forward exchange contract for one period (t,t') is feasible if, given the current exchange rate e_t the current domestic interest rate $i7_{tt'}$, and the current foreign interest rate $i6_{tt'}$,

$$e_t(1 + i7_{tt'}) > f_{t'}(1 + i6_{tt'}) \qquad \text{or}$$

$$\text{(A10)} \qquad \frac{i7_{tt'} - i6_{tt'}}{1 + i6_{tt'}} \geq \frac{f_{t'} - e_t}{e_t}$$

The latter is the well-known "covered interest equation". The left-hand term is the domestic interest differential, the right-hand term is the "forward premium". To close the model, all spot and forward transactions should be considered simultaneously (for a general treatment see Kaldor (1939), McKinnon (1979, ch.VII)). To this effect, a forward market equation should be added to system A6-A7, where the parameter c measures the deviation from perfect covered parity. Defining the so-called "swap rate" $[s_{tt'} = (1+i7_{tt'})/(1+i6_{tt'})]$, and remembering that $(e_t = 1+\varepsilon_t)$ system A6-A7 now determines one further endogenous variable:

$$\text{(A11)} \qquad f_{t'} = e_t[c + (1 - c)s_{tt'}] \qquad 0 \leq c \leq 1$$

Note that A11 does not contain forecast variables; the forward contract is totally free of risk (Levich (1985, p.1027)). The usual covered interest parity holds when $(c = 0)$. $(c > 0)$ entails that arbitrageurs have some monopolistic power to charge brokerage fees; transaction costs have long been recognized as a cause of imperfection in the covered interest parity. Nonetheless, the evidence cumulated in the years of declining barriers to capital mobility suggests that transaction costs tend to become relatively small and that covered interest parity works reasonably well (McKinnon (1979, ch.VIII), Levich (1985)). However, if by absence of transaction costs one means that the asset holder himself is free to take a covered position by enjoying the same swap rate used by forward dealers, then it would be hard to find any comparative advantage in the existence of a forward market.

The EIH has much stronger implications as to the forward rate. As we know from the theory of futures markets (above, ch.I, sec.1.3), if the EIH holds on the spot market, it must also extend to the forward market in such a way that the forward rate is set equal to the corresponding expected spot rate [$f_{t'} = E(e_{t'})$]. As a consequence, the forward premium (discount) should reflect the expected rate of depreciation (appreciation) and the home interest differential. Now, consider property (ii, point 1 above): the asset holder's rational expectation of future rates should be equal to the current rate [$E(e_{t'}) = e_t$]. If $f_{t'}$ is set efficiently, a sequence of "buy spot and sell forward" is perfectly equivalent to one single "buy and hold". There is no gain from trading forward.

It should be stressed that standard efficiency theory establishes that the above market efficiency conditions should hold continuously through instant price adjustments. Some authors would rather view market efficiency conditions as the outcome of a process of arbitrage and/or speculation, in the course of which spot and forward positions are not indifferent(e.g. Bray (1985)). In fact, if all agents are risk-averse, even assuming transaction costs away the forward premium will fail to reflect the expected depreciation rate exactly; suffice it to compare eq.A10, set to equality, with eq.A8, where, at the equilibrium value for ε_t, the expected depreciation rate ($\varepsilon^*_{t'} - \varepsilon_t$) instead exceeds the home interest differential [$-(1+y_t)$] by a positive risk premium given by coefficients (a, b). The traditional efficiency argument is that if a class of risk-neutral agents exists (usually called "speculators") informational efficiency can be re- established since they will find it profitable to buy forward in so far as the forward premium lags behind the expected depreciation rate. Parallely, risk-averse asset holders will be able to cover their position by selling forward, and hence the forward market will operate effectively. However, a straightforward result from the above properties is that the expected gain from speculation (spot as well as forward) will be [$E(e^*_{t'} - e_t) = E(f_{t'} - e_t) = 0$], that is to say, there will be no rational (i.e. profitable) speculation either. This is simply a restatement of the "fairness" of the market, which is in turn a stochastic reformulation of the old principle that "in a world of perfect foresight nobody could make a speculative gain; speculators would be non-existent" (Kaldor (1939, p.18)). It should perhaps be stressed that the EIH implies the absence, or at most the neutrality, of speculation, and gives no role to play to the other old principle of "stabilizing" speculation, which predicts that only stabilizing speculation is profitable. The reason should be obvious: in efficiently informed markets prices need not be stabilized.

All in all, it would seem that opening the forward market is useful in so far as either information is not efficiently used or opportunity costs are not negligible.

Notes

(1) The same result would be obtained by imposing a unit reserve ratio on private banks.

(2) See again the explanation of liquidity preference in ch.I, sec.3.1. Clearly the possibility that firms pay a fixed interest to wage earners is immaterial; for firms should then borrow a greater monetary capital.

(3) If this happens, as it does, it means that the bank should pursue a less liquid position than its depositors. The very existence of banking suggests that such a service cannot be a neutral intermediation between demand and supply of money. "The significant thing is that the person who deposits money with a bank does not notice any change in his liquidity position; he considers the bank deposit to be as liquid as cash" independently of the bank's liquidity position (Hicks (1935, p.72)). If banking must act a wedge between households' (high) and firms' (low) liquidity preference, this has ultimately to be reflected in the structure of interest rates. This point will be treated below.

(4) This holds true for Keynes's **General Theory** too, since transaction balances were rescued in the demand for money. When in the vintage 1937 theory he came to explicitate firms' demand for monetary capital (his "finance motive"), Keynes was still convinced that it was to be treated as an addition to other motives, and so it was in most Post-Keynesian models (see Graziani (1988)).

(5) Of course, in practice, the production period may not coincide with the consumers' expenditure pattern, so that firms may find themselves short of cash or with excess cash at the moment of starting a new production round. Such practical problems are tackled with the help of banks, and in no way should they be confused with the determinants of monetary equilibrium. For instance the conclusions of the Radcliffe Report on the velocity of circulation are worth repeating: "We have not made more use of this concept because we cannot find any reason for supposing, or any experience in monetary history indicating, that there is any limit to the velocity of circulation; it is a statistical concept that tells us nothing directly of the motivation that influences the level of total demand [...] The more efficient the financial structure, the more can the velocity of circulation be stretched without serious inconvenience being caused" (1959, par.391).
(6) The modern author who has most forcefully supported the idea that the quantity of money is endogenously determined by the private sector is certainly Kaldor (see e.g. 1982). In his view, the capacity of the private sector to have private paper converted into State paper totally outweighs the formal power of quantity control of the issuing bank, which is in fact locked into a pure convertibility regime. There is one way in which the monetary authority can enhance its power of control domestically, namely by administrative measures -which I do not consider here. However, the historical experience of integrated markets teaches us that resident units can easily bypass administrative controls through the foreign channel; in practice, the market power of monetary authorities seems to be very low, and declining, on both fronts (see e.g. De Cecco (1987)). For extended technical analysis of money creation and control through the banking sector in the inside money approach see e.g. Moore (1988, Part I).

(7) It may be useful to emphasize the points where the discretionary convertibility regime differs from both the extremes of pure quantity control and pure convertibility. On the one hand, the quantity of currency chosen by the bank has to flow into the economy through a market transaction with firms; as a major consequence there may be discount rates at which not all that quantity is demanded, or at which more than that quantity may be obtained on the asset market. On the other hand, Kaldor's analysis shows that the actual degree of quantity control depends on the degree of control on the credit policy of private banks; the former is zero when the latter is zero too, and hence money creation is "fully endogenous" within the private sector. Since we do not consider the relationship between the issuing bank and private banks, or equivalently we assume that the degree of control on the credit policy is complete, we need not go as far as Kaldor.

(8) This was Wicksell's conclusion in his famous article of 1898. It should be noted that the assumption of one centralized bank only simplifies the model; the result stays the same after private banks are added.

With the help of a standard inter-bank model (e.g. Turnovsky (1981, pp.18-19)) one immediately verifies that, since the equilibrium stock of transaction balances is zero (the currency/deposit ratio is zero), ($B1_0 = B2_1$) always obtains, for whatever reserve/deposit ratio of private banks. Of course one should be careful not to fall into the "macroeconomic illusion" that all individual private banks are therefore in stock equilibrium too; the individual bank does have the problem of matching loans with deposits, its own deposit multiplier being smaller the smaller its market share of deposits, but quite obviously a lack of deposits cannot occur for all banks simultaneously. Hence those banks which find themselves with unbalanced loan/deposit ratios can always resort to the inter-bank market (see also Moore (1988, Part I)).

(9) It was, however, pointed out in ch.I (sec.2.1), that there does not exist such a thing as Wicksell's "natural interest rate" to take as the benchmark of the bank rate. Contrary to the neoclassical world of perfect information and perfect foresight, in the present characterization of the financial economy it is the bank rate that acts as the anchor of the whole array of rates, and not the other way round. Indeed, in the financial economy money is an artificial instrument vouched for by the central bank; it is not a "natural" market commodity.

(10) Figure 1 is the typical portrayal of the money supply in the endogenous-money approach, where the supply schedule is horizontal (Kaldor (1982, p.24), Moore (1988, ch.V)); the orthodox approach would draw it vertical. As we shall see later on, the most appropriate supply schedule in a discretionary convertibility regime is upward sloping.

(11) Interestingly, the argument can also run the other way round: in a discretionary convertibility regime households' portfolio policy loses the full and direct impact on the rate of investment it has been given in the **General Theory** and in Keynesian monetary theory generally. When investors' debentures are convertible by the (or, actually, a) bank "Liquidity Preference turns out to have been a bit of a red herring -not the 'crucial factor' which, in the view of the great economists of Keynes's generation, such as Dennis Robertson or Jacob Viner, and, of a later generation, Harry Johnson and James Tobin, alone enabled Keynes to argue that an economy can be in equilibrium at less than full employment. It has nothing to do with that at all" (Kaldor (1982, p.26)). However, it should be clear from the above that the textbook story, that the "supply of money" is the instrument by means of which the central bank meets changes in households' "demand for money", is a complete misconception.

(12) The above does not mean that the rate of saving is irrelevant all the way. It is certainly important in the short run because it is a variable of flow equilibrium, and in the long run as it determines the evolution of the stock of wealth through time. In neither case, however, can it be considered the in-period supply of investment funds.

(13) This is true for the domestic saving generated in a closed economy as well as for the domestic plus foreign saving available to an open economy (see below, sec.2.3).

(14) It seems important to specify that the above two effects, and in particular bank intervention, do not occur because asset holders are at their lowest bound of the safest monetary reserve (A2min in fig.3, or more traditionally, the "liquidity trap"). We need not go that far -and, after all, "the liquidity trap was **not** in the **General Theory**" (Leijonhufvud (1969, p.21, point 6)). The bank is forced to "monetize" some national deficit spending, in order to preserve flow equilibrium, because total and marginal monetary reserves of households do not fall to zero along the **whole** schedule of desired reserves. Yet this may also be deliberate, if the bank realizes that asset suppliers are not prepared to finance their activities at whatever price.

(15) Since the expected return rate of the Trust is ($i7/p7 = \Sigma_a \alpha_a r_a$, $a \neq 2$) the terms at which the Trust is held vis à vis the monetary reserve are transmitted to the single non-monetary assets.

(16) See the solution for (a7min). Since [$V_p = \alpha' V \alpha$] (where α is the vector of protfolio shares and V is the variance-covariance matrix), shifts from one asset to a more variable one will increase (V_p). Therefore, in our present case,

$A5: dr5/dr3 = - A'5(r3)/A'5(r5) > 0$
$A3: dr5/dr3 = - A'3(r3)/A'3(r5) > 0$

Supposing a relatively high price variability of A5 as compared with A3 implies a lower demand elasticity and a lower degree of substitution,

$A'5(r5) < | A'5(r3) |$
$| A'3(r5) | A'3(r3)$
$A'5(r5) < A'3(r3)$

The above relations yield the following slopes (A5 > 1, A3 > 1, A5 < A3). For these relationships of asset substitution see Tobin (1969).

(17) The relevant literature is boundless. See the seminal works by Branson (1975, 1977).The most representative open macroeconomic models in this vein are those by de Macedo-Tobin (1980), and Tobin (1982). Useful surveys of this stock of models have been provided by Frankel (1983) and Krueger (1983, ch.4.3). I have also analyzed them in Tamborini (1987, 1988).

(18) See the general treatment by Branson-Henderson (1985, sec.3).

(19) More on direct currency substitution can be found in Krueger (1983, ch.4.3.3).

(20) If we abstract from international-specific transaction costs or information gaps, we have to invoke other non-economic criteria of distinction between the home and the foreign "habitat", such as social customs and political factors, in explaining the ranking of foreign assets. See Tobin's interesting discussion of the "home preference hypothesis" (1981).

(21) It seems quite clear that the assumptions identifying a "small country" have nothing to do with the international weight of the country, however measured, or any other empirical observation. Rather, these are assumptions on the asset market structure, whose most appealing "motivation is to simplify the accounting" (Frankel (1983, p.98)). However, the most innovative aspect of today's financial integration is not that London, New York and Tokio work like a single market, but that those market trade actively debt claims issued in Chile or the Philippines.

(22) As is often the case, the economics behind this formal solution is not so easy to swallow. There are two possible justifications, which I leave to the reader to assess: (i) the foreign asset under consideration is actually the foreign currency (say deposits abroad at fixed interest rate ($r6 = i6$, $p6 = 1$), (ii) the foreign asset is a price-variable asset, but exchange-rate variability is separated from price variability on the assumption that $[p61 = E(p6) = p6_0]$. The correct operation to do would seem to leave p6 in its place and to add the missing equation, the foreign-exchange market equation; but, strangely enough, this is not to be found in the standard specification of asset-market models of the exchange rate. This correction will be made in applications of chs.VI-VII.

(23) The formulation of the consumption-saving pattern in the precautionary approach is patently in line with modern consumption theories based on some long-run standard of living. There are, however, important differences due to the informational hypotheses. Essentially, standard theories posit that the consumer enjoys perfect forsight and faces no obstacle to keep consumption optimal throughout his life, whereas consumption is here viewed as a programme affected by uncertainty. For instance, unwillingness to borrow to smooth down the consumption path, as traditional life-cycle models would instead suggest, is a well-known corollary of risky capital markets in which households' borrowing rates are higher than lending rates and/or the future ability to meet the real debt burden is uncertain. See Okun (1981, ch.V).

(24) The role of the wealth-income norm in the expenditure function is strongly emphasized in the so-called "New Cambridge" view (see e.g. Cripps-Godley (1983), Vines (1976)). A controversial point of their analyses is that they assume realized wealth-income norms (so that the average propensity to save tends to zero); it seems more interesting to consider the case in which at least a part of the population has

not yet reached the golden age in which it is no longer necessary to save.

(25) This programme will have an average time horizon [$T = 1/(\sigma - \gamma) > 1$]. As already remarked, the time horizon can be shortened, or the period rate of saving reduced, within a more realistic programme where compound interests are reckoned. Note, then, that higher interest rates may enhance consumption over time, rather than exert the traditional negative effect.

(26) In fact, (γ) will also be lowered as much as necessary to keep (S^*_t/E_c) unchanged. For completeness, note that in the face of a random shock to income, the model leaves no ambiguity; since, at constant prices ($S^*_t/P_{ct}E_y = 1 - \gamma/\sigma$) is clearly the expected value of [$S_t = (1 - \gamma/\sigma)Yt$], the marginal propensities should coincide with the average ones.

(27) On this result see also Okun (1981, pp.215-217). The fact that households regard the current price level as the permanent one implies that they also regard the inflation rate in each future period as a random process with zero drift. If they believed in an extrapolative process, the adjustment in current consumption and saving would be far more ambiguous; the real wealth effect could be reverted into a speculative enlargement of current consumption (Grandmont has shown this possibility even in the traditional case of intertemporal utility maximization (1983, ch.I)). In the present case of static expectations, the real wealth effect could be counteracted by a real interest effect. Expliciting the return rate to the asset portfolio (r), the asset holder wishes

$$A_t(1 + r_t)/P_c(1 + \delta P_{ct}) = A^*(1 + r)$$

A complete "Fisher effect" [$(1 + r_t) = (1 + r)(1 + \delta P_{ct})$] would leave the current nominal wealth at its desired level. However, in the context of precautionary asset-holding and liquidity preference, the real interest effect is far from being obvious and neutral. In fact, to increase the portfolio return rate, asset holders would have to move towards riskier assets; the hedge they seek against inflation would be weakened by increased riskiness. See again Okun (1981, pp.208-212) and the literature on the failure of the Fisher Theorem quoted therein.

(28) More precisely, a growing public debt (and interests payments) may have the by-now conventional positive wealth effect on private consumption if (i) consumers lower the target of wealth, that is, perceive less variability of future income-expenditure prospects; or (ii) return rates on bonds grow exceedingly high with respect to portfolios' liquidity risk. In both cases, however, the wealth effect would manifest itself in a higher marginal propensity to consume, rather than in the form of a direct jump in expenditure. What about "Ricardian equivalence" of bonds today with tax tomorrow? A wide range of counter-arguments have been opposed to Barro's provocative dynastic tale (see Tobin (1980, ch.III)). One especially suited to the present context is that "Barro's Ricardian theorem presupposes intertemporal general equilibrium", whereas the absence of it underlies the qualifying economic behaviours in the financial economy (Leijonhufvud (1983)). One element which makes for the uncertainty of households' future budget constraints is the profile of taxation itself, which must be known with certainty for Ricardian equivalence to hold. In a growing economy, or in an open economy, it is not even certain that the government debt will ever disappear over time. The phenomenon closest to the Ricardian effect that the precautionary model seems to suggest is that a chance of heavier taxation in the future may increase the variability of expected outlets, and hence may lead households to a tighter accumulation programme and to a reduction in the average propensity to consume.

(29) There is a quite simple rule which is practically used by stock-dealers and which embodies the general principles expounded above: buy shares below the "normal" price/earnings ratio. The P/E ratio is an index published daily by financial newspapers which, in our terms, reads (EPVp5/i5). The "normal" P/E ratio is computed by using the risk-free bank rate (say our i2) to obtain ($EPV = i5/i2$, $p5_0 = 1$, $P/E = 1/i2$). Evidently, the rule amounts to buying at ($p5 < 1$). In a liquidity-preference context it is natural to think that the discount should pay for the liquidity risk premium.

(30) We have by now a wealth of theoretical and empirical investigation into the phenomenon of "equity constrained investment" and, more generally, into failures of the Modigliani-Miller theorem due to

imperfect information: from early works by Minsky (e.g. 1972) to more recent analyses and formalizations of the problem prompted by Stiglitz and others (see e.g. the synthetic treatment by Stiglitz-Greenwald (1988, pp.251-ff.) and the survey of theory and evidence contributed by Gertler-Hubbard (1988)).

(31) I shall neglect a third important component of investment finance: firms' internal funds.

(32) In this respect, it is important to notice that the equity constraint becomes more binding the closer the firm to the condition of marginal efficiency (i.e. EPV -> P_k). One would expect small competitive firms, even though publicly quoted, to conform to the investment pattern assumed in the text. Indeed, the evidence largely supports this theoretical prediction, even for not-so-small firms, throughout industrialized countries (see e.g. Gertler-Hubbard (1988)).

(33) Someone might like to deal with the real interest rate; if the real interest rate is expressed, as it should be, as the difference between i4 and the expected rate of inflation, then the latter also applies to (R'_{kt}, E_k) thus leaving expression 12 unaffected.

(34) See Greenwald-Stiglitz (1988, pp.251-ff.), Gertler-Hubbard (1988) and the literature quoted therein.

(35) Of course, when the equity market is bearish "there is no sense in building up a new enterprise at a cost greater than that at which a similar existing enterprise can be purchased", while in a bullish market "there is an inducement to spend on a new project what may seem an extravagant sum" (Keynes (1936, p.151)). However, as was already said, there is little evidence of systematic recourse to the equity market.

(36) Main reference will be made to the results discussed by Rotschild (1973) and to the contributions by Okun (1981) and Chick (1983, ch.V). It should also be noted that, as is well known, the various traditional forms of imperfect competition are all compatible with the principle of the profit-maximizing firm as price taker; further, the largest part of the literature concerned with uncertainty focuses on price parametric uncertainty, so that "the basic assumption that the firm is a price taker is retained -in a probabilistic sense" (Sandmo (1971, p.65)).

(37) On the related methodological aspects see again ch.I, sec.2, and especially Frydman-Phelps (1983) and Pesaran (1987, ch.IV).

(38) For the definition and methodological implications of strategic uncertainty, as opposed to parametric uncertainty, see again Pesaran (1987, chs.I and IV).

(39) Recall that

$$EMR \equiv d(p_{j0}q_{j0})/dq_{j0}$$
$$p_{j0} = [a - q_{j0} - E_j(Q_j)]b^{-1}$$
$$EMR = [a - 2q_{j0} - E_j(Q_j) - q_{j0}\partial E_j(Q_j)/\partial q_{j0}]b^{-1}$$

(40) It can be shown that in fact $E_j(\sigma_j)$ is the consistent expected value for whatever value of σ_{j0}, provided that all firms make the same conjecture σ_{j0} and use it to set the price. The result is intuitive, since the EMR is derived from the estimated market-clearing equation 15.

(41) Notice that σ_{j0} does not measure the **unintended** overall correlation among firm's output decisions, but the **intended** cross-sectional correlation among those decisions. In other words, j is not assuming that non-j are not expanding as it expands, but that non-j expansion is not caused by its own expansion.

(42) Recent models of imperfect competition (see e.g. Hart, 1982) generally lay stress on the extension of

the market (the number of firms J) in the determination of the mark-up m above the perfect case ($m = 1$, $EMR = p_{j0}$). The argument raised by Arrow and taken up here is independent of that parameter. Formally, as ($J \to \infty$, $EMR \to p_{j0}$) regardless of σ_{j0}. However, the economic meaning of this result is not that a larger number of firms reduces the elasticity of demand -which is given and invariant to scale- but that it swallows the individual market shares. It is sufficient to consider the existence of sizeable fixed costs to prevent operational market shares from falling to infinitely small. On the other hand, if one assumes marginal and scale decreasing returns, competition is socially preferable in this model only because it generates small-scale production units.

(43) It is well known that Keynes posited that firms' short-run (i.e. current demand) expectations may be considered fulfilled because they have learnt the market demand by trials and errors; he did not notice that such a process may not be compatible with perfect competition (see again Chick, 1983, ch.V). It is also useful to stress that the errors in question are not those assumed by Lucas's business-cycle theory. To put the difference very simply, Lucasian firms operate on Walrasian (price-takers) markets, but "mispercept" general-price for relative-price shocks; here firms operate on non-Walrasian (pricemakers) markets under incomplete information about their own competitors, but may well distinguish aggregate-demand from industry- demand shock (a distinction which is not however so crucial). On this point see the important remarks by Okun (1981, ch.IV) and Pesaran (1987, ch.IV.2).

(44) One of the most interesting results is so-called "customer markets", where "most products are sold with price tags set by the seller and through a process of shopping by the buyer", where "customers are valuable to sellers because of their potential of repeat business" and where "demand- insensitive prices stem from the recognition by sellers that they can influence the shopping behaviour of customers by pledging continuity of an offer" (Okun, 1981, pp.138149)). For extensive treatment see Okun (1981, ch.IV). There are, also, illustrious predecessors who are often forgotten: see for instance Kahn's Dissertation (1929) and the masterly piece by Joan Robinson (1953).

(45) On this point see especially Kaldor (1939) and Hicks (1965, ch.VII).

(46) More in this vein can be found in the rich contribution by Okun (1981, pp.154-ff.).

(47) Since shortly after the publication of the **General Theory** empirical investigation has cast doubts on the implications of the neoclassical production function (or labour demand), namely the anticyclical pattern of productivity and real labour cost. The monitoring of industrial economies in the last forty years suggests that average productivity grows in expansions and falls in depressions while the real labour cost is stable (Okun (1981, ch.I), Greenwald-Stiglitz (1988)). Short-run swings in productivity are not in contrast with the use of a long-run "norm" of average productivity if the the technology does not in fact require increasing marginal inputs in the long run. Since the real labour cost turns out to be stable over the cycle it seems that entrepreneurs can afford that practice (Okun (1981, pp.155-169). In fact, let ($w_0 = w_0$) be the nominal wage rate, λ the average labour productivity, and ($n'_{j0} = 1/\lambda$) the marginal labour input; hence the real labour cost is ($w_0/p_{j1} = \lambda/\mu$), since ($p_{j1} = w_0\mu/\lambda$), while ($\lambda - \lambda/\mu$) is the real capital-income share). Now, if λ' are procyclical short-run deviations of average productivity from the norm, and if wages and prices are not sensitive to them, the only effect is that the real capital-income share becomes procyclical ($\lambda' - \lambda/\mu$ increases when $\lambda' > \lambda$), as in fact it turns out to be.

(48) See, in general, Weintraub (1979), Chick (1983, ch.VII). Another important point clarified by the sequential approach is that labour suppliers are unable to bargain for real incomes (see also above, ch.I, sec.3.2). For each period the labour market establishes nominal wages, though the supply function may well contain a real-income norm. On the other hand, since firms are price makers on the goods markets, and there are no obstacles to transfer generalized cost variations onto prices, firms are always on the labour product schedule if they sell on the marginal cost schedule.

(49) For obvious reasons I shall explicitate functions of the home economy only. Those of the foreign one are analogous.

PART TWO

THE ADJUSTMENT OF TRADE FLOWS TO FINANCIAL FLOWS

CHAPTER FOUR

THE OPEN FINANCIAL ECONOMY AND THE WORLD TRANSFER PROBLEM

Introdcution

The first part of this work was largely concerned to provide a consistent characterization of a financial economy. We saw that such a characterization requires us to bring time and uncertainty into the the picture as essential features (see esp. ch.I). Monetary and non-monetary financial instruments -like those currently in use- are in fact viable means to carry wealth across markets and through time when information on all possible markets and states is lacking, when there is no auction market for all the necessary information. Accordingly, among the variety of motives for using money, "precaution" has been singled out as the "fundamental" one. Precaution means minimizing the probability of failure; as a consequence, financial positions do matter for economic activity in the "real" sphere because they determine the extent to which agents can afford fallible decisions.

The most widely debated issues in what goes under the heading of "international monetary economics" stem from the interaction between private market decisions and a balance-of-payments constraint. However, rational motives for using money scarcely account for the existence of "national economies", or perhaps more technically, for the existence of different monetary conventions delimited by authority. As I have said, we should regard this as a matter of fact. Currency sovereigns, given the exchange rate regime they establish, are the only agents in the world economy who perceive the balance of payments as a direct constraint and who have the power to make it effective at the level of market decisions. International monetary economics, and in particular balance-of-payments theory, deal with essentially macroeconomic phenomena -in the sense of "systemic coordination" as explained in the previous part (ch.II, ch.III). From this viewpoint, we have, on the one hand, firms, investors and households who manage their real and financial resources on integrated world markets, and on the other, that institutional balance-sheet which tells us whether home payments are exceeding foreign ones or not. The transfer-theory idea revived in this work -that financial capital movements are the driving force of goods movements, the balance of payments being the result of the two effects- thus naturally appears as the "open-macro" companion to the "closed-micro" relationships between financial and real decisions analyzed previously.

The world overflow of financial means towards the United States and the brisk pace of economic activity in the latter over the last decade, and parallely, the severe slump which debtor economies have incurred in order to pay for their debt in real terms are only the most striking examples of the working -and of the importance as well- of the world transfer process . In this opening chapter of Part II I shall first introduce the basic accounting relationships between the open financial economy and the rest of the world, and a taxonomy of international transfers and of patterns of world transfers. This preliminary task is made necessary by the well-known fact that the tangle of world payments can only be "read" according to specific criteria, which in the case of the transfer approach are those of the availability and circulation of real in relation to financial resources. Attention will be paid, on a purely static-comparative basis, to the properties of various world "scenarios", under conditions of stationarity, which entail the absence of financial transfers, as well as under conditions of non-stationarity due to the presence of financial transfers. I wish to stress that the non-stationary scenarios that follow should not be taken to involve any "value judgement" (such as greater or lesser desirability, longer or shorter durability, etc.), nor do they claim any closer resemblance to the real world with respect to the stationary state. A few considerations on the issue of sustainability will however be made. The reader will finally find a more vivid rendition of the whole matter in the historical outline that closes the chapter. I also wish to premise that since this work is not empirical in aim, this chapter will remain at a basic level of refinement both statistically and historically.

1. The open financial economy in the world economy

1.1. The balance of international transfers. A Taxonomy.

Let me start by reproducing for reference the stock-flow matrix introuced in ch.II, which gives us a systemic representation of the interrelations among decision-units' balance sheets.

Tab.1. Stock-flow matrix

	Flows		Stocks					
			1.	2.	3.	4.	5.	6.
Firms	O-Y'-I	=		*			*	*
Households	Y-T-C	=		*	*	*	*	*
Government	T-G	=			*			
Bank	0	=	*	*	*	*		*
Foreign sec.	M-X	=		*	*	*	*	*
	0	=	0	0	0	0	0	0

Flows: O = sales revenue, Y' = factor cost, Y = personal incomes, I = investment, C = consumption, T = tax revenue, G = public expenditure, M = imports, X = exports.
Stocks: 1 = monetary capital, 2 = currency and reserve, 3 = Public debt, 4 = Private debt, 5 = Equities, 6 = Foreign assets. (* = -) = increase in liabilities, (* = +) = increase in assets.
Memo: Y'= wage bill (W) + gross profits (R'); Y = wage bill (W) + net profits (R); O = GDP = domestic sales (I + C + G - M) + exports (X).

Drawing up a balance sheet of international payments is notoriously problematic. Items may be organized in a variety of combinations according to the information which has to be extracted. The key point in the transfer- theory approach is the correlation between trade payments and financial payments; accordingly, the outstanding modification that must be introduced in the standard balance of payments is the isolation of **trade payments** from all **autonomous finance-related payments**[1].

The balance sheet of the foreign sector previously given in ch.II can be reproduced as follows

The Foreign Sector

Receipts	Disbursements
Net Real Transfer	
Exports of goods & serv.	Imports of goods & serv.
Net Financial Transfer	
Incomes	Incomes
For. Gov. transfers	Gov. transfers
Sales of domestic securities	Purchases of foreign securities
Official Transfer (compensatory settlements of the central bank)	

Assets	Liabilities
Foreign securitie	Bonds
Official reserve	Debenture
	Equities

In symbols we may write:

(4a) $Z_t + F_t \equiv 0$

(b) $F'_t \equiv F_t - B_t$

(c) $F_t \equiv YF_t + GF_t + K_t$

(d) $K_t \equiv \Delta AF_t - \Delta A6_t$

(d) $B_t \equiv \Delta B6_t$

Z = Net Real Transfer, F = Net Financial Transfer, B = Official Transfer, YF = Net Foreign Incomes, GF = Net Government Transfers, K = Capital Transfers.
Memo: $\Delta A6$ = change in domestic holdings of foreign assets; ΔAF = change in foreign holdings of domestic assets; $\Delta B6$ = change in official reserve. Note that ($\Delta A6 > \Delta AF$) is an increase in private "Net Foreign Assets" or a capital outflow $K < 0$).

We thus have the skeleton of the **Balance of International Transfers** (BIT). The use of the term "transfers" is obviously borrowed from the tradition of the transfer theory; but, it also indicates that the stress is so much on receipts and disbursements as on the amount of resources, real and financial, made available to, or raised from, the rest of the world. A few comments on the items of the BIT are now in order.

The Net Real Transfer (NRT). The NRT, being the difference between exports and imports of goods and services, is clearly equivalent to the usual trade balance. To repeat, one only has to notice that when ($Z_t > 0$) the economy is collecting foreign currency but it is also transferring home real resources abroad. As a consequence, transfer theorists have also attached great importance to possible divergences between the nominal trade balance and the NRT; in fact -as will be seen in detail in due time- falling prices of exports relative to imports will impose a larger NRT on the economy in order to obtain the same nominal trade balance.

The Net Financial Transfer (NFT). For analytical purposes we shall consider the following components of the NFT:

Incomes: income payments to and from foreigners on the existing stock of capital assets.

Government transfers: home and foreign governments unilateral transfers due to international commitments.

Capital transfers: purchases from, and sales to, foreigners of capital assets distinguished between:

(i) direct investment, purchases and sales of physical capital;

(ii) portfolio investment, purchases and sales of financial securities.

The NFT thus encompasses a number of items that are generally kept distinct in the standard balance of payments. This is the case of Net Foreign Incomes and Government Transfers, on the one hand, and Capital Transfers on the other[2]. The first common characteristic which allows us to pool these items together is their being monetary payments which are not in direct exchange for real resources[3]. The second is more functional in kind; from the viewpoint of the individual units in the economy, financial transfers all represent an addition (subtraction) of means of payment in their budget constraint, whether this is due to capital transfers (e.g. borrowing or lending) or to incomes of existing physical, human and financial assets (liabilities) or to government transfers tied to international commitments; an addition (subtraction) which should have some effect on the amount and uses of real resources, as we saw in Part I.

This second characteristic has enabled transfer theorists to handle NFT as "exogenous shocks" to a given state of the economy. In most treatments NFT are simply reduced to government transfers (such as war payments, or commitments towards developing countries). This is a useful device for most analytical purposes, yet the scope of the theory can be extended well beyond it. Capital transfers and incomes cannot be considered "exogenous" like government transfers, and nonetheless they are still in the nature of transfers of means of payment from units in one economy to units in another. As a matter of fact, capital transfers, and their intertemporal effect on capital incomes, account for the largest share in most countries' NFT and represent enormous shifts of financial means across the world economy (see below, sec.3)[4]. In any case, it is important to fix the idea that **all** forms of financial transfers contribute, in principle, to the determination of real resources in the world economy even though the contribution by each form of financial transfer differs in degree and in kind, and even though -as will be seen later- the characteristics of the adjustment process will differ according to which form prevails. At the same time, this should warn us right from the outset against pursuing a one-sided "general theory"; on the contrary, we should direct our efforts to singling out the properties and consequences of the different ways in which financial means are transferred across the world economy.

1.2. The balance of international transfers. Basic relationships.

For our purposes the key relationships in the stock-flow matrix underlying the BIT are simply two:

(5) $$Z_t + F_t \equiv B_t$$

(6) $$(S_t + T_t) - (I_t + G_t) \equiv X_t - M_t$$

The first is the BIT identity (see above 4a-b). The basic proposition in the transfer approach is that, in general,

$$dZ/dF < 0$$

Some useful definitions can be introduced here.

The nominal transfer burden and the transfer effect. Let us assume an initial situation such that $(Z_0 = F_0 = 0)$. An autonomous NFT arising in period t can be expressed as $(F_t = F_0 + dF = dF \neq 0)$. Taking it for granted that dF is precisely measurable **ex ante**, the ratio of the NFT to initial exports is usually defined as **the nominal transfer burden**[5]

$$f = dF/X_0$$

This terminology elicits the idea that the economy with negative NFT $(dF < 0)$ has to develop a positive NRT $(dZ > 0)$, while at the same time the economy with positive NFT has to accommodate a negative NRT.

Quite obviously, an important aspect of the transfer problem is the extent to which the NFT affects the NRT; three cases are usually found in the literature:

(i) $dZ/dF > -1$ $(Z_t > F_t)$: the transfer is **overeffected**;

(ii) $dZ/dF = -1$ $(Z_t = F_t)$: the transfer is **completely effected**;

(iii) $dZ/dF < -1$ $(Z_t < F_t)$: the transfer is **undereffected**.

The straightforward implications are that in case (i) the BIT remains positive (net increase in official reserves), in case (ii) the BIT is kept in balance, in case (iii) the BIT turns into negative (net decrease of official reserves).

The above three cases are first of all relevant in terms of international payments and their effects on stocks of international money held by central banks. However -as I have already observed- the transfer approach also has a deeper focus on the correlation between transfers of financial resources and transfers of real resources. In this perspective, changes in NRT may yield a misleading measure when prices of international trade are variable.

The real transfer burden and the real exchange rate. As is well-known, the overall change in Z_t can always be decomposed into the change in quantities and the change in prices[6]; assuming initial balance $(X_0 = M_0)$ one obtains

$$Z_0 = Q_0P_{x0} - Q_{m0}P_{m0}$$
$$dZ = X_0(\delta Q_x - \delta Q_m) - X_0(\delta P_m - \delta P_x)$$

where (x, m) indicate exports and imports. Strictly speaking, the transfer effect on goods movements is thus equal to $[X_0(\delta Q_x - \delta Q_m)]$, while the nominal NRT also contains the price effect $[X_0(\delta P_m - \delta P_x)]$. The former effect is usually defined as the **real transfer burden**[7] or

$$z = \delta Q_x - \delta Q_m$$

The latter effect can be shown to correspond to an important variable in the open economy. If we define the **real exchange rate** as the ratio of import prices to export prices we see that

$$r = P_m/P_x$$

$$wr = \delta P_m - \delta P_x$$

$$dZ = X_0 z - X_0 \delta r$$

Hence, the nominal NRT always consists of the algebraic sum of the real transfer burden and the rate of real appreciation ($\delta r < 0$) or depreciation ($\delta r > 0$); and the two magnitudes are inversely proportional. An important relationship exists between the real transfer burden, the rate of real depreciation and the nominal transfer burden. Such a relationship has been widely used in the literature as an **ex ante** indicator of the transfer problem. Let us consider the condition under which the transfer is completely effected in goods; by making use of the above definitions and relations it is easily seen that

$$dZ = -dF$$

$$z = -f + \delta r$$

That is to say, in order to leave the BIT unaffected by an autonomous NFT the real transfer burden of the paying country must be at least equal to the nominal transfer burden, or else it must be greater (lesser) by the rate of real depreciation (appreciation).

Implicit transfers. To complete this part, the above relationship also helps to notice some neglected aspects of such important phenomena in the open economy as exogenous changes in the real exchange rate. These may occur owing to exogenous movements of the nominal exchange rate, or of foreign relative to domestic prices. An oil price increase with fixed exchange rate is paradigmatic[8].

Let us first consider the price effect. The conventional view is that the oil importer incurs a trade deficit due to the greater value of imports. Alternatively, we may say that the oil importer faces a real depreciation which measures the additional volume of goods that is necessary to export in order to obtain an unchanged volume of imports. Hence, we can conveniently use the relationship between nominal NRT and real transfer burden introduced above. As long as ($\delta Q_x = \delta Q_m = 0$), it follows that ($dZ/X = -\delta r$); consequently, the impact effect of real depreciation is a net increase in monetary disbursements abroad that can be expressed as a so-called **implicit transfer** of nominal burden ($f = dZ/X$). The oil importer is thus in the position of the T-economy, whereas the oil exporter acts as the R-economy. The analysis of an exogenous shock to the real exchange rate as a transfer problem clarifies (or confirms) that a monetary transfer is involved in the adjustment. Then the extent of trade adjustement and of its real costs are closely dependent on the model specification of the transfer problem.

1.3. The balance of international transfers. Transfer-economies and recipient-economies.

The second basic relationship we are interested in (see 6 above) links national saving and national deficit spending with external goods movements (see ch.III, sec.3). From 5 and 6 we also obtain

(7a) $$S'_t - D'_t \equiv Z_t$$

(b) $$S'_t - D'_t \equiv -F_t + B_t \equiv \Delta AF_t - \Delta A6_t + \Delta B6_t \qquad (YF_t, GF_t) \equiv 0$$

On the left-hand side of both identities we still have the excess of national saving over deficit spending, whereas the right-hand side makes the difference. 7a may be read as the foreign component of the change in **real wealth** associated with domestic private and public decisions of spending and saving. 7b may instead be interpreted as the financial counterpart of 7a, that is, the foreign component of the change in **financial wealth** due to that same pattern of saving and spending. Since 7a and 7b are both dependent on 6, they jointly define **the function of the open economy in the world economy.** We shall define:

(i) ($S'_t > D'_t$; $Z_t > 0$; $-F_t + B_t > 0$) a **transfer-economy** (T);

(ii) ($S'_t < D'_t$; $Z_t < 0$; $-F_t + B_t < 0$) a **recipient-economy** (R).

The position of T- or R-economy is known without ambiguity as soon as one of the three underlying relations is known. It should be noted that the position is defined in terms of observable flows. The T-economy has excess national saving and transfers real and financial resources abroad; it displays a NRT surplus, a NFT deficit and an increase in "net foreign assets" (reduction in foreign liabilities) held by private units and/or by the central bank. The R-economy has excess expenditure and receives real and financial resources from abroad; it displays a NRT deficit, a NFT surplus and a reduction in "net foreign assets" (increase in foreign liabilities). If we look at the world economy as a whole, it is easy to see that R-economies perform the same function as net spending units, whereas T-economies perform that of net saving units, in a closed economy. This is more than a mere coincidence; indeed, the R or T function of the economy as a whole derives from the underlying relationship between net-spending and net-saving domestic units[9].

2. The world transfer problem: alternative scenarios.

2.1. Patterns of world transfers.

Having set out the basic relationships between domestic units, the BIT and the world function of the open economy, let us now move to examining the network of transfers that links each economy with all the others. To this effect, and for further uses, one may usefully represent the world economy in matrix form[10].

Given N national units in the world economy, the country-by-country trade network (Z_{ij}; i, j = 1...N) yields the trade square matrix **Z** such that (**u** being the unity column vector) [**z** = **Zu**] is the vector of each country's NRT (Z_i). Note that it is also [**z** = **x** - **m**], where **x** and **m** are the vectors of each country's overall exports (X_i) and imports (M_i), respectively.

The country-by-country financial network (F_{ij}) yields the financial square matrix **F** ($F_{ij} = -F_{ji}$; $F_{ii} = 0$), such that [**f** = **Fu**] is the vector of each country's NFT (F_i). It follows that

(8a) $\mathbf{z} + \mathbf{f} \equiv \mathbf{b}$

(b) $\mathbf{u'z} = \mathbf{u'f} = \mathbf{u'b} = 0$

8a displays the individual BIT in the world economy, and **b** is the vector of each authority's change in official reserves in the given period (B_i). 8b expresses the system constraint that, by construction, the overall sums of Z, F and B all amount to nil.

It is interesting to note that the world network can be rearranged formally so that the function of each economy (or group of economies) discussed above is singled out. In general, any pair of vectors **z** and **f** will contain some non-zero elements (Z_i, $F_i \neq 0$); by means of elementary transformations[11] it is possible to obtain the hemisymmetric matrices **Z** and **F** where ($Z_{ij} \geq 0$, $F_{ij} \leq 0$; $j > i$, 0 elsewhere); that is to say, where each element (a group of countries, in fact) is a R-economy from all the preceding ones and a T-economy to all the following ones (Hilgerdt (1943)). It is intuitive that such matrices can be either of order 2 (whenever Z_i, $F_i \neq 0$ for all i) or 3 (whenever Z_i, $F_i = 0$ for some i). The former case shows a **bilateral pattern** of world transfers, where we see a T-economy ($Z_T > 0$, $F_T < 0$) face to face with a R-economy ($Z_R = -Z_T < 0$, $F_R = -F_T > 0$). The latter case represents a **trilateral pattern** of world transfers, since in addition to R and T there will be a balanced economy such that ($Z = F = 0$). To fix ideas the two cases are reproduced in Tab.1[12].

Tab.1. The bilateral and trilateral pattern of world transfers

$$\mathbf{Z}_2 = \begin{array}{c} T \\ \\ R \end{array} \begin{bmatrix} 0 & Z_{TR}>0 \\ & \\ -Z_{TR} & \end{bmatrix} \quad \mathbf{z}_2 = \begin{bmatrix} Z_T \\ \\ -Z_T \end{bmatrix} \quad \mathbf{F}_2 = \begin{bmatrix} 0 & F_{TR}<0 \\ & \\ -F_{TR} & 0 \end{bmatrix} \quad \mathbf{f}_2 = \begin{bmatrix} F_T \\ \\ -FT \end{bmatrix}$$

$$\mathbf{Z}_3 = \begin{array}{c} T \\ \\ R \end{array} \begin{bmatrix} 0 & * & Z_{TR}>0 \\ * & 0 & * \\ -Z_{TR} & * & 0 \end{bmatrix} \quad \mathbf{z}_3 = \begin{bmatrix} Z_T \\ 0 \\ -ZT \end{bmatrix}; \quad \mathbf{F}_3 = \begin{bmatrix} 0 & * & F_{TR}<0 \\ * & 0 & * \\ -F_{TR} & * & 0 \end{bmatrix} \quad \mathbf{f}_3 = \begin{bmatrix} F_T \\ 0 \\ -FT \end{bmatrix}$$

In the development of this work the above two patterns of world transfers will be taken as the analytical benchmark. In a broad sense, **the world transfer problem** can be defined as the problem of reducing a tangle of NxN individual relationships to one of the two ordered scenarios under a given vector of constraints (e.g. $\mathbf{b} = \mathbf{0}$). Indeed, what does matter for each individual authority is overall, and not bilateral, Z and F; at the same time, each individual Z and F must find a place in the world network consistent with the system constraints 8a and 8b, and hence with either $\mathbf{Z}_2$ or $\mathbf{Z}_3$. Rigorously, the transfer problem of no economy could be taken in isolation, however "small" we assume such an economy to be. A multilateral system typically involves some degree of intermediation, that is, bilateral deficits may be offset through surpluses with third countries. This is why a trilateral pattern emerges and is significant (when, of course, * are non-zero): because it makes explicit and simple what is implicit and complex in the full-blown network.

From the standpoint of the world transfer problem we also see that the conventional treatment of capital movements in open macroeconomics is not entirely suitable for study of the adjustment of international payments in the system as a whole or even in the individual economy. The first and most apparent reason is that only few kinds of capital transfers are considered; substantial shifts of financial means remain unmodelled[13]. The second and more subtle reason is that on analytical grounds the point of the priority of financial means over production and trade is completely lost. Even in a Mundellian world, capital movements cannot be an endogenous variable in all countries simultaneously. Since there are N countries but only N-1 independent balances, in at least one country the capital account cannot be determined endegonously so as to finance the trade balance. Rather, the opposite is true: the N-th country's capital account is exogenously given by the finance requirement of the rest of the world, and its own trade balance must be adjusted accordingly. Suppose the rest of world wishes to be the R-economy, i.e. to run a trade deficit; then the N-th country must become the T-economy: it must provide an equivalent NFT deficit and NRT surplus in the same time unit. The general implication of this view is that the economic performance of each individual country (and eventually of the system as a whole) is not fully self-determined domestically, but it depends on the economy's function in the world network of transfers, and on changes in it.

2.2. The world economy in stationary state.

Following the methodology introduced in Part I (ch.II and ch.III), our first step will be to analyze the conditions of stationary state at the world level and to point out their implications at the individual economy level. To do this we only need two sets of equations, one showing the vector of GDP's, the other showing the vecor of BIT's. The world economy is in stationary state in so far as each individual economy is in stationary state; from the latter conditions, which we already know (see ch.II, sec.2), we obtain by extension:

(9a) $\mathbf{o} - \mathbf{c} - \mathbf{g} - \mathbf{x} = \mathbf{0}$

(b) $\mathbf{z} = \mathbf{f} = \mathbf{0}$ $\qquad F_{ij} = 0$

The first set of equations states that GDP is wholly absorbed by private consumption, public consumption and exports for all economies; by implication, there is neither net saving nor net investment. Moreover, asset stock stationarity requires both the government budget and the NRT to be balanced; the NFT **and** all bilateral financial transfers must also be nil. We already know that under those conditions the domestic money stock is also stationary and sufficient to reproduce the economy through time; the same applies to the stock of international money for each economy and the world economy as a whole. Implicit in the above formulation is that all prices and exchange rates do not change over time (nominal and real magnitudes coincide), and that actual magnitudes that appear in the equations also coincide with expected ones.

As was already remarked in Part I, one of the key phenomena in the international economy -financial flows- cannot be ascribed to a stationary world; they involve, to a greater or lesser degree, adjustments somewhere in the system. This is an important achievement of stock analysis, one which has corrected previous conclusions drawn from flow analysis (the typical reference being Mundellian internal-external equilibria). The non-existence of financial transfers bears consequences upon internal-external equilibria in individual economies which are worth discussing.

On first inspection of the stock-flow matrix one realizes that, at the stationary level of prices (wages, interest rates, and exchange rates), the sole exogenous sources of output for the individual economy are public expenditure and exports[14]. However, their stationary level must be such that ($G_i = T_i$, $X_i = M_i$). Since the tax revenue (T_i) and the level of imports (M_i) are both a share of factor incomes (say t_i, m_i, respectively), it follows that

(10) $$G_i/t_i = X_i/m_i$$

In other words, the exogenous sources of output (and factor incomes) must be exactly offset by endogenous leakages from it[15]. In each economy, in the time unit, the foreign trade performance (X_i/m_i) is to be taken as given exogenously. Therefore, the stationary fiscal stance (G_i/t_i) must be constrained to be equal to the trade performance, after either G_i or x_i have been fixed. But taxation is an indirect argument of the private consumption function, and should therefore be regarded as implicitly fixed in the current level of consumption. In conclusion, if G_i is determined independently of ($X_i t_i/m_i$), say in order to optimize output, then the economy is bound to incur a trade deficit (if $G_i > X_i t_i/m_i$) or a trade surplus (if $G_i < X_i t_i/m_i$). We may say that in stationary state the fiscal stance bears the external constraint, and therefore output and income also turn out to be trade-balance constrained. The consequences at the world level are noteworthy.

Domestic and world output. Each economy's foreign trade performance can be reduced to two structural parameters: the share of world trade (e_i), and the share of imports out of income (m_i). Accordingly, the suitable expression for world trade is given by the amount of world imports $\mathbf{u'm}$. Each economy contributes to world trade by m_i and claims on it by e_i. Hence the public expenditure constraint for each government is

(11) $$G_i = \mathbf{u'm}\varepsilon_i t_i/m_i$$

while GDP and world output will be (given that $\mathbf{u'm} = \mathbf{u'x}$)

(12) $$O_i = \mathbf{u'm}\varepsilon_i(1 + t_i/m_i)(t_i + m_i)^{-1} = \mathbf{u'm}\varepsilon_i/m_i$$

(13) $\mathbf{u'o} = \mathbf{u'm}\Sigma_i \varepsilon_i / m_i$

Given the structural parameters (ε_i, t_i, m_i), GDP will depend on the level of world trade **u'm**. **Ceteris paribus**, an exogenous expansion in **u'm** allows for a proportional stationary expansion in G_i, O_i and **u'o**. By contrast, modifications of (ε_i, m_i) will feed back onto **u'm** and therefore will activate a non-stationary adjustment that will have to be examined under specific circumstances. Each economy's requirement of goods and services from other economies appears to be a key factor of world output. However, to the extent that the actual level of imports in turn depends on the level of output, a two-way relationship is established, which is the delicate mechanism underlying contractions and expansions in world economic activity[16].

The dominant country. A second important point is that condition 11 also embodies trade balance. As is well known, in the world system only n-1 external constraints are to be fulfilled, and hence only $(n-1)G_i$ are constrained. In one country, often called **the dominant country**, the government is free to fix expenditure independently[17]. Analytically, G_n can be considered the exogenous variable which activates the whole system of output determination. It is easy to show that GDP in n will depend on G_n, whereas in all other countries it depends on E_i. Moreover, to the extent that n contributes to world trade, world output will also be proportional to G_n. Let k_n be the contribution of G_n to world trade ($\mathbf{u'm} = G_n k_n$); as a result[18]

(14) $\mathbf{u'o} = G_n k_n (\Sigma_i \varepsilon_i / m_i)$ $\qquad i = 1...n$

Clearly, the stationarity conditions imposed so far have no direct relation to the **desired** level and distribution of output by the residents of each country. The traditional presumption is that stationarity conditions imply subjective satisfaction. Today's general attitude among policy makers and advisors is that "full equilibrium" is "good" in itself. Were the world economy a collection of perfect markets, one could make appeal to the Two Fundamental Theorems of Welfare Economics. However, as was already noted in connection with the perfection failures examined in ch.I, the international economy is not a mere collection of national markets, no matter how markets are integrated. Political sovereigns, and usually currency sovereigns, are still there; it is their duty to impose the "foreign constraint" on home economic activity. My aim here is not to discuss conditions of international general equilibrium; yet it is worth concluding this section by pointing out a peculiar consequence of "foreign constraints" in the stationary case.

It has been observed (Kindleberger (1981)) that in a world economy subdivided into political units, the dominant one should provide public goods. Some of these may be like national public goods (the military defence of the whole system is typical), others are essentially international in nature. As the above formulation shows, the level of world trade, or world output, is one of the latter. Since the provision of national-like public goods turns into a greater G_n, the two kinds of public goods generally go hand in hand. However, unlike a national sovereign, the dominant country has little, if any, power to levy taxation on beneficiaries; as far as the direct cost of public goods is concerned, all other countries are free riders by constitution. Thus the stationary world economy rests on a fiscal agreement which is not mediated by taxation, but through redistribution of policy instruments: the dominant government has full control over its own fiscal stance (and hence world output), other governments have none.

Kindleberger concluded that international public goods are likely to be underproduced. His conclusion seems to follow from our analysis too. If G_n includes the provision of international public goods, it should exceed the level necessary to satisfy n's own demand for public goods. The first obstacle may be raised from n's taxpayers, who may perceive exploitation on the part of foreign beneficiaries[19]. A second obstacle may come from resource supply in n; there is no mechanism underlying equations 12-14 by virtue of which the optimization of resource utilization in n is necessarily consistent with the same objective in all other countries. One reason is clear from equation 11; given G_n, G_i cannot be assigned to optimizing domestic output[20].

2.3. International transfers: the world economy in expansion.

As we already know, international transfers reveal that idle resources in one economy seek profitable employment elsewhere, possibly in economies which want resources[21]. As we know, the existence of international flows entails ongoing stock adjustments in at least two economies. Strictly speaking, we should say that the violation of one or more flow-stock conditions is implied. As usual, disequilibrium situations are more interesting, but also more puzzling. Following an established tradition in the discipline, I shall adopt the class of **non-stationary flow equilibria** as reference point. Their fundamental characteristics are

(i) firms' planned and realized output coincide,

(ii) total financial wealth is constant in each economy.

The outstanding difference with respect to full equilibrium is clearly due to point (ii), since it now allows for compensatory changes among specific asset stocks. For the time being, I shall not be concerned with adjustment processes, but I shall examine the properties of important patterns of payments with financial circulation.

Balanced Net Financial Transfers. The case of compatibility. Let us think of a world economy where in a given time period there emerge conditions for redistributing resources among individual economies, and let us consider that this process takes place -as it should- through financial means. As already shown, there will be a group of T-economies with an excess of resources ($S'_T - D'_T = Z_T > 0$; $F_T < 0$) and a group of R-economies with a lack of resources ($S'_R - D'_R = Z_R < 0$; $F_R > 0$) (and possibly a group of "intermediate" economies, $F = Z = 0$). R demand for, and T supply of, resources is **compatible** when:

(15a) $\quad Z_i + F_i = 0 \qquad\qquad i = R, T$

(b) $\quad \mathbf{z + f = 0}$

which in fact implies ($S_T - D'_T = D'_R - S_R$).

Provided that T export excess and R import excess are correctly anticipated in the planned output, a non-stationary flow equilibrium occurs if financial wealth is constant in all economies ($\Delta A_i = 0$). In the first place, firms' flow equilibrium ensures that ($S_i = I_i$) or that inside private wealth is constant. Then official reserves do not change ($B_i = 0$) as required by 15 if ($D_i + Z_i = 0$, $D_i = -Z_i = F_i \neq 0$). That is to say, the T government should be running a surplus equal to the trade surplus, while the R government should be matching this with a deficit parallel to the trade deficit. Finally there should be offsetting changes in outside wealth in both economies; namely, the T private sector should be releasing domestic bonds at the same rate at which it embarks foreign assets, with the R private sector performing just the opposite substitution (so long as they are not involved in financial flows, intermediate economies are in full stationary state). To sum up, income-expenditure flows are those desired by private units and governments, overall stocks of assets and official reserves are kept constant, all operations on asset markets are consistent. The degree of unsteadiness depends on the stock of government liabilities or the willingness to accumulate foreign assets in T, on the stock of foreign assets or the willingness to accumulate government debt in R[22].

Such a pattern of world transfers has long been the core of international economics and pursued as "the equilibrium position" of the system, though it cannot claimed to be such if "equilibrium" means stationarity. On the other hand, contrary to what the modern stock approach suggests, one's interest in that scenario is not misplaced, or better, it is not misplaced if one has a theory of non-neutrality of money and finance. Were money neutral, the case of world stationarity would be the only relevant one (while international economics would make little sense as a special discipline). At most, one could dwell on demonstrating that money, if it exists, is "internationally" distributed according to the requirements of the "natural" distribution of trades -a task accomplished by Ricardo a long time ago (1809)[23] (see also above, ch.I, sec.4).

The question of compatibility between real and financial transfers is, quite the contrary, of prime importance if money is non-neutral. In the international perspective, the issue of non-neutrality was raised by Frish in two well-known articles as early as 1934 and 1947. It also appeared in Keynes's **General Theory** in the largely unread chapter XXIII and was brought into full light in his Bretton Woods writings (1943-45) and in the related literature[24]. Let me follow Frish's argument, which is so admirably akin to modern restatements of money non-neutrality as those followed in this work.

Frish concentrates on an economy of production and trade which uses money and in which the monetary authority has full responsibility over international money. In a monetary economy, agents' uncertainty over sales on forward markets, or over the means of settlement of commitments, may jeopardize their willingness to buy or to commit themeselves to production for forward delivery (1947, p.538). In an open economy, production plans of the economy as a whole in the time unit give rise to an import flow of goods and services (including the provision of consumption goods for workers); this is analogous to a beginning-of-period borrowing denominated in foreign currency. Therefore, for the economy as a whole -that is, from the standpoint of the monetary authority- it is the current flow of exports that has to pay for the initial borrowing made through imports (both being denominated in foreign currency). Of course, in our terminology production plans at the going prices are feasible only if demand for, and supply of, production inputs across economies are compatible.

At the level of both the national and the international system, the necessity of the equivalence between current proceeds and beginning-of- period borrowing is made effective by the banking system backed by the monetary authority[25]. It seems quite natural to recall here the principles of precautionary behaviour set out in ch.I. Minimizing the probability of country default will call for a reserve accumulation programme commensurate with the variability of exports and with the import content of output. In the face of uncertainty over the level of current exports, or if current exports are actually falling, the period availability of international money fixes the maximum level of imports that the central bank can choose to allow the economy. Imports will have to be kept below expected exports in the course of the accumulation programme and in line with them thereafter. Frish (1934, pp.275-277; 1947, par.V) argued that an endogenous solution to the problem of cutting individual excess imports under the constraint [$z = 0$] may not emerge[26]. Not only are deficit countries compelled to reduce their utilization of world production inputs, but their efforts, if implemented independently, will not converge to any stable solution (1947, pp.542 ff.).

This conclusion is one of lucid pessimism as to the possibility that n independent currency sovereigns are able to achieve a scenario of compatible utilization of real resources. Note also the complementarity with the stationary case of par.2, where stationarity allowed for only one independent fiscal authority. As is now well understood, this kind of pessimism of Frish and the other economists mentioned above was partly exacerbated by their neglect of financial flows. We have seen above that the demand for NRT of some economies has a counterpart in the supply of NFT from some others. When the two meet, R economies' constraints on import expenditure and government expenditure are shifted upwards. Moreover, one should be stressed, in this case the role of dominant country disappears; overall payments being kept in balance by NFT, the n G_i's must fulfill the n $(D_i + Z_i = 0)$. The level of world output is that allowed for by domestic expenditures in all countries together given the amount of NFT from T to R.

In this perspective, Mundellian open macroeconomics was a U-turn towards optimism as it showed the possibility for any economy to finance the desired external deficit by means of appropriate assignment of policy instruments. The approach espoused by this work rather points to the fact that the utilization and circulation of real resources cannot take place independently of financial means and that this fact should be interpreted and modelled within a different framework of stock-flow interaction. Nonetheless, the case of compatible world transfers should still be regarded as a crucial one, both on positive and normative grounds. Little room is instead left for modern stationarity optimism.

Unbalanced Net Financial Transfers. The case of the dominant currency. Suppose now that in the relevant period the NRT and NFT of some economies happen to be unbalanced, i.e.

(16a) $Z_i + F_i = B_i \neq 0$

(b) $\mathbf{z} + \mathbf{f} = \mathbf{b} \neq \mathbf{0}$

As long as $(D_i + Z_i = 0$, so that $\Delta A_i = 0)$ private sectors are essentially in the same position as before: at the desired levels of income-expenditure flows they should perform offsetting substitutions in the stocks of government liabilities and foreign assets. The crucial point is that one further stock is changing: the stock of official reserves in R vis à vis T economies (say $B_R > 0$, $B_T < 0$).

In principle, all that can be said is that the present case is a "weaker" non-stationary state than the previous one. The general presumption is also that the reaction of monetary authorities (especially in reserve- losing economies) is likely to be quick; but of course there are no a priori arguments which ensure that the reaction of R central bank to the overflow of T currency should be faster than the reaction of T asset holders to the overflow of R liabilities in the previous case. History suggests that the opposite may be true. The case is worthy of consideration because it stresses the role played by institutional factors, such as the function of currencies in the international system.

The willingness of R central bank to accept T currency is clearly a matter of portfolio choice. As we know from ch.I, the portfolio role of currency is closely related to the nature of general means of payment. By extension, a national currency can be accepted in foreign official portfolios to the extent that it is acceptable as international means of payment. However, unlike national currencies, international currencies cannot achieve the status of perfectly liquid assets; threats may come from exchange-rate variability and legal restrictions to convertibility. The matter is not only one of economic calculus; as the establishment of a unique national currency involves an institutional element (see above ch.I, sec.4), so does the establishment of an international currency (Hamada (1977)). As usual, I shall not analyze this particular aspect, but I shall concentrate on the characteristics of such a scenario.

In one respect the issuer of the international currency gains the power of any currency sovereign, namely "seignorage". However, some aspects are specific to the international context[27]. The most apparent of these is that the international issuer faces no BIT constraints: not because of Walras Law, but thanks to seignorage. This fact brings us back to the the same institutional framework as that of the dominant country. In fact it is a commonplace that the consequence of seignorage is unconstrained government expenditure; this fits into our framework since it may be that, given ($F_T < 0$), T obtains ($B_T < 0$) because D_T is too small a surplus (and hence Z_T is too small a surplus too). However the other possibility should not be overlooked -i.e. that the private F_T is too large in relation to the given D_T (Z_T). Both public and private transfers may take advantage from seignorage. Moreover, there are advantages for third parties too. To the extent that the dominant country exploits seignorage to enlarge government expenditure, all participants in the system may gain for the reasons already shown in the stationary case; they also gain -for the reasons shown in the balanced-transfers case- if seignorage leads to larger private transfers from the dominant country; finally, the overflow of T currency, to the extent that it is acceptable, meets R central banks' precautionary demand for liquid assets. Thus the resulting scenario lends itself to a two-fold interpretation: either ($B_T < 0$) is due to spendthriftness of the sovereign or it is due to parsimony (or free riding) of subjects[28].

2.4. A note on sustainability.

The analysis of patterns of world transfers in this section has been mainly taxonomical and static-comparative. The institutional dimension of world scenarios, which is usually neglected, has also been emphasized. One important issue has been that financial flows violate stationarity conditions, and yet may be associated with greater international benefits with respect to a stationary world economy. On the other hand, it is certainly true that the so-called problem of **sustainability** moves to the front of the theoretical stage. Since this study concerns the correlation between capital and goods movements, in a sense it concentrates on how world scenarios are born -and whether transfers are balanced or not- rather than on how long they will survive. Indeed, though the two issues do relate one to the other, the latter involves extended analysis of long-run factors and is now developing into a special branch. In this paragraph I only wish to make some observations from the transfer-problem standpoint.

On the premise that, for a given world pattern, flows of resources match the levels desired by all public and private agents, the degree of sustainability will depend on the limits on compensatory substitutions among stocks that have been identified above.

This is a simple and general principle. However, it is of prime importance in so far as it tells us **what** we should look at in each scenario relative to a **specific theory**[29].

In his above-mentioned work Frish viewed the world transfer problem as one of incompatibility among country preferences over real resources utilization. It was in the Ricardian spirit of that age to regard modifications in such preferences as hardly feasible, or scarcely desirable anyhow (see also Keynes (1919, 1929)). Moreover, Frish warned that an endogenous solution of the problem may not exist. He thus proposed an interesting measure of the degree of incompatibility in a given pattern of NRT -that he called "absolute skewness" (1947, p.542)- given by the total amount of negative elements (deficits) in vector **z**. By extension, also interesting is the measure of "relative skewness" (δ) as the ratio of absolute skewness to world trade, i.e.

$$s = \mathbf{u}'\mathbf{z}^{-}/\mathbf{u}'\mathbf{m} \qquad\qquad \mathbf{z}^{-} = [z_i < 0]$$

The higher the relative skewness in the international economy, the heavier the weight of adjustment **in real terms**. On Frish's premise that an international lending plan cannot exert corrections on skewness, s may also express a measure of the unsustainability of a given pattern of NRT (1947, p.543).

It has already been observed that the idea according to which the real requirement of R-type economies could not, at least temporarily, be sustained by financial means flowing from T-type economies was based on an artificial separation between real and financial activity. Moreover, the alleged inability of financial transfers to modify the utilization of real resources has to be investigated, and has in fact become the leading theme of transfer theory. We have seen that when NRT and NFT do make up a network of compatible world transfers, T must absorb, wholly or in part, R issue of debt per unit of time. In a portfolio view (see above, ch.III, sec.3), the limit to sustainability arises from the return rate to R debt in relation to its stock in foreign portfolios. Since the return rate must discount the future price, i.e. the debtor's ability to service the debt, the fundamental factor is therefore the expected debt-service[30]. We also know that in order to maintain compatibility conditions among transfers, in the absence of further borrowing the future debt service must be piad out of a trade surplus (that is, the R and T positions should be switched in the long run). Therefore, a pattern of compatibile transfers is sustainable as long as the rate at which T lends to R, and the return rate to R debt, compensate for T asset-holders' probability of default, i.e. R probability of not being able to generate a future trade suplus commensurate with the future capital income transfer. Once again, the latter circumstance amounts to a typical transfer problem that, we shall see, has various possible solutions involving various possibile adjustment variables. As a consequence, it cannot be taken for granted that there should be only one rational time path of T lending and of the adjustment variable(s) involved in the future R transfer problem.

An important instance of non-stationarity has been seen in the case of unbalanced transfers under a dominant currency. The peculiarity of this form of non-stationarity with respect to balanced transfers lies in that part of overall financial transfers from T to R consisting of international currency or official assets accruing to the coffers of R central banks. Apparently, not only is the scenario unsteady in the future, but it should even be unsustainable in the present. The arguments in the paragraph on the dominant currency suggest that sustainability cannot be analyzed successfully as if all the parties involved were like the impersonal and atomistic agents of pure theory. Overflows of the dominant currency are acceptable by R central bank at the rate compatible with the likelihood that, and in so far as, that currency performs the function of international means of payment. In a given time period, the critical variables for R are therefore two[31]:

$$\Sigma^t B_{Tt}/B6_R$$
$$\Sigma^t B_{Tt}/B6_T$$

that is, the cumulated flows of T currency in relation to the existing stock of assets held by R central bank, and in relation to the existing stock of assets held by T central bank. The former is a standard portfolio share; the latter is a usual indicator of solvency. A classical measure for $B6_T$ is provided by gold (Triffin (1960))[32]. As Triffin's early two ratios: in fact, the international stock of T currency should not fall short of R precautionary demand nor should it grow higher than the convertibility ratio. In a forward-looking attitude, however, the assessment of $B6_T$ should also discount the future current-account position of T (Minsky (1979)). To the extent that T displays a positive NRT now, $B6_T$ may be expected to grow steadily with $\Sigma^t B_{Tt}$. Since it is obvious that the evolution of the convertibility ratio can be re-expressed as

$$\Sigma^{t'}(Z_{Tt'} + F_{Tt'})/\Sigma^{t'}Z_{Tt'} \qquad\qquad t' > t$$

the expectation of a worsening in T transfer performance brings about a fall in T solvency and in the actual sustainability of the system, whereas the opposite expectation (or even the expectation of unchanging transfer performance) sustains both T solvency and the existing transfers pattern.

With due care we may extract from the foregoing considerations the general principle that the sustainability of today's world transfers pattern depends on the forecast of tomorrow's world transfer problem. It goes without saying that the latter problem is closely related to the former; even if one thinks of financial transfers as water flowing on stones, one should admit that in the long run water does reshape stones. We have seen that in the paradigmatic case, a T (lending) economy and a R (borrowing) economy should in the long run take each other's place; as is well known, and as the transfer theory helps to show, that should happen if R makes (or T supervises) the correct use of borrowed capitals. For this aspect the transfer approach is akin to the so-called "balance-of-payments stages hypothesis". A continually sustainable international system is one in which R and T BIT cycles are perfectly synchronized. As is intuitive and will be seen from some historical examples below, turning points are critical. If it is rational that a NFT should flow only into economies which are expected to have a positive NRT, the most critical point is the one where the T-economy is entering the R-economy stage[33]. As is exemplified by the dominant currency problem just discussed, a successfull transfer from T to R may progressively erode T solvency thus making its position unsustainable at the turning point and creating a discontinuity in the cycle.

3. World transfer problems: Lessons from history.

3.1. Transferring purchasing power. The birth of modern finance and trade

"Never has there been international trade without movements of capital". This statement by John Williams in 1929, one which marked a fruitful period of theoretical and historical reappraisal in international economics, draws our attention to the fact that the evolution of the modern economy (by which I mean over the last six centuries) has been characterized by the joint development of financial and commercial circulation.

During the dynamic phase of the commercial revolution towards the end of the 13th century, which paralleled the resurgence of monetary economies, princes, merchants and manufacturers came up against a formidable obstacle: the shortage of metallic currencies. The statesmen of those days (the economist had not yet been born) realized something that would become taboo (much more in theory than in practice) to their liberist successors: the availability of precious metals could increase less rapidly than trade and industry would require, principally because the latter would call for large- scale **advances**. Scant trust was placed in the self-regulatory mechanism of metal prices. Instead, sophisticated techniques were devised for the management of what is today called the monetary base: firstly by taking care of a positive balance of payments, then by manipulating the coinage, and finally by economizing metal currency with the help of substitutes.

The joint operations by merchants, bankers and money-changers in order to facilitate credit payments lead one to think that the linkage among credit, increase in purchasing power and sales of goods must had been understood quite clearly: "In the commercial world credit reigned supreme" (P.Jones)[34]. According to Cipolla's acute interpretation (1982, pp.14-15), at the outset of the 14th century Florence represented a dominant and developed economy standing between the kingdoms of North and South Europe, such as Britain and Naples ("two definitely underdeveloped countries"), which prompted exports of manufactured goods by means of commercial credit while it financed imports of raw materials thanks to the "offshore" deposit service offered by Florentine banks. Quite interestingly, the sand in the wheels was thrown from the financial side; in particular, chains of bankruptcies among Northern indebted sovereigns (who had dissipated credits in unproductive uses, especially wars) dried up the fuel of Florentine export industry and, at the one and the same time, undermined the solvency of its banks and their ability to attract foreign capitals (Cipolla (1982, pp.13 ff.)).

Although a modern economist might define the first two centuries of the Merchant Age (the 13th and the 14th) as ones of "high capital mobility", the subsequent period from the 15th to the 18th century saw a determined effort towards nationalization of finance: not in the modern sense of direct management by the state, but consequent on the concept of "national interest", in the name of which merchant-financiers -often descendants of Adam Smith's "citizens of no country"- were called upon to offer their services to newborn nation-states. If the practice of private outbound lending declined, this was because the capitals required for trade expansion rode on the ships of the great Companies -the financial innovation of that age. These capital movements would be recorded in modern accounting as "government transfers" (military or otherwise) and "direct investments".

3.2. The sterling system and the gold standard

The structure of world trade and finance inherited from the Imperial Age affected the European industrial revolution to a considerable extent[35]. If one fails to bear this legacy in mind, one finds it difficult to account for the singular fact that the "the workshop of the world", Great Britain, during most of the 19th century never regained a surplus in merchandise trades; but neither did it incur a deficit in the overall balance (see below, App.A.1, tab.1)). During the first half of the century a number of unorthodox economists advanced the hypothesis that investments and loans made by the mother country were insufficient to encourage imports from colonies (see Hobsbawm (1968, ch.VII)); during the second half of the century that hypothesis was no longer tenable. The **fundamental** role played by financial (non-gold) flows, especially to and from London, in the development and stabilization of the gold standard has progressively emerged from a number of studies in the last decades; these all agree that the gold-standard should be redefined as a **sterling system**[36].

From 1870 to 1889 Great Britain invested some 1.3 billions pounds abroad, at a pace of 65 million a year -a sum which were almost worth 23% of commodity exports; between 1890 and 1914 foreign investment surged to 2.7 billions pounds, averaging 108 millions each year and 26% of commodity exports (De Cecco (1975) and below, App.A.1, tab.1). Recipient countries were no longer only Britain's colonies, but also countries in North America, South America and Europe. Over the whole period, however, interests and dividends (an annual average of 100 million pounds) were **by themselves** more than enough to compensate for the deficit in goods and services (an average of -19.6 million pounds per year); on the other hand, residual excess supply of pounds from foreigners was almost negligible as foreigners largely re-deposited their balances in London. As a result, the British BIT was always kept positive or broke even.

If we refer back to the patterns of world transfers described earlier, the gold standard can be seen as a **trilateral system of balanced transfers** (see in particular Hilgerdt (1943) and below, App.A.1, tab.2). Great Britain was the R country in the system; it absorbed net real and financial resources from the rest of the world and was thus able to neglect its "fundamental disequilibrium". Great Britain's debtor countries -the T countries in the system, mainly located in the Southern hemisphere- were able to service their debts thanks to their sales of primary goods.chiefly in the newly industrializing areas of Europe and North America, which compensated for them by their surpluses of manufactured goods towards Great Britain[37].

It is remarkable that such a pattern reached its greatest degree of stability when the pivot R country became a chronic dependent country as to real resources; its absorption being adjusted to the yearly world rent, Great Britain acted as the determinant of the world trade level. At the same time, the sterling pound had **de facto** the status of international money, and as a "bank", Great Britain offered absolute safety to those who came "even from the Moon" to deposit to London. Yet such a situation sharply contrasts with those general principles of sustainability according to which the currency issuer -or the "world bank"- has to perform a trade surplus, or that R countries should be expected to become T countries in the long run. This seems to confirm that the scope for absolute principles in this matter is very limited. One reason for the British peculiarity may be that, as the world currency sovereign, it did not exploit seignorage on a large scale and the world was not flooded with British paper (e.g. McKinnon (1988))[38]. However, further explanations should be sought for worldwide neglect of Britain's inability to turn itself into a T economy. An explanation may be found in the composition of Britain's NFT: it consisted largely of income transfers and short-term capital transfers from the rest of the world. The former component -which was the trailer of the latter- indicated that the dominant country was not living beyond its own means as a foolish debtor: it was living like an affluent rentier. There was no British transfer problem in the reasonable future.

3.3. The inter-war reshuffle.

After the First World War the structure of Britain's foreign payments did not change substantially at least until the end of the 1920s. However, this was not the case of the conditions for financial sustainability. From the world transfer problem viewpoint of the collapse of the gold-standard and the inter-war international crisis, the well-known issue of competitive deflation and beggar-my-neighbour policies should not be kept separate from the issue of the reshuffling of world financial transfers. I shall only emphasize two outstanding events in this respect.

First came the German transfer problem of war reparations. From 1919 to 1924 German war payments were primarily effected in kind (provisions of finished goods and raw materials), while financial installments became prominent between 1924 (Daws Plan, revised in 1929 by Young) and 1932 (year of the official cessation of payments instead of the established 1988). Between 1924 and 1932 Germany paid slightly more than 11 billion marks in various forms, about 1.4 billion a year, estimated to be close to 2.5% of national income and 6.5% of foreign trade. In 1924-28 the annual average NRT was negative (-1.4 billion marks) vis à vis reparation payments by 1.2 billion marks. In 1929-32 the NRT turned into positive by practically the same amount as reparation payments (about 1.4 billion marks per year)[39].

than a decade; it also became a paradigmatic exercise in the transfer theory[40]. Although it did not grow to a dramatic quantitative dimension, the German problem represented an important qualitative turning point in the European economy -one of which few became aware at the time (Keynes (1919, 1929)). In the sterling system described above, Germany was one of the economies that provided intermediation for the transfer problem between Southern primary economies and the final consumer mother country. Under the pressure of export-oriented transfer policy, and as a result of a longer trend in industrialization, Germany turned out to be an aggressive exporting economy. Moreover -as Ohlin pointed out (1929)- Germany never displayed such a huge negative NFT as was expected; large capital inflows from North- Eastern Europe, as well as from Great Britain and the United States, witnessed that a new European pole had been born, both in the allocation of financial resources and in the production of real ones. The brilliant transfer performance of Germany after 1929, which some saw as proof of the "malleability" of transfer problems (Machlup (1963)), was in fact obtained at the cost of giving up foreign capitals and of severe domestic slump (Webb (1988)). Both measures interfered heavily with the emerging pattern of trades and exacerbated Europe's destabilization, thus partly vindicating Keynes's disapproval of the Peace Treaty.

A second, even more revolutionary modification took place in the group of intermediaries. The United States turned into a typical T economy, a net exporter of goods and capitals with cumulation of large quantities of gold. More importantly, in the expansionary cycle 1922-29 the outlets of US goods and capitals conflicted with those of Great Britain and eventually displaced them. A large R-area had to be created anew, while both newly industrializing European economies and Southern primary economies were pursuing positive NRT. Since Kindleberger (1937, and 1984, ch.XV)), Brown (1940) and Nurkse (1944), the "financial" interpretation of the inter-war crisis has related it to the struggle for currency dominance; a struggle fought more on the field of "hot money" than on the field of long term capital transfers[41]. Great Britain was herself a major importer from the United States. The dollar began to compete with the pound as the invoicing and numeraire currency of international payments. While the progressive depletion of Britain's comfortable capital rent unvealed the weakness of its foreign trade, hot money ceased to behave as the willing hand-maiden to London's discount rate and entered the world scene as an independent force in the stabilization of the balance of payments.

There is, however, something more to be told about the long-run evolution of sustainability of the sterling system -something which is relevant to the issue of sustainability in general. Newly-industrialized exporters in Europe and America had largely benefited from British direct investments; hence -as Feis noted (1930)- that part of the world transfer problem had been successfully accomplished. Yet at the cyclical turning point when Great Britain moved into the stage of world importer, international financial funds broke the cyclical path on the expectation of British trade deficits. Here we have an example of the kind of difficulties envisaged above (sec.2.4) that may disrupt smooth BIT cycles. It was at this juncture that the lack of an orderly distribution of financial resources, and of a dominant currency, was most acutely felt in the international economy; national selfish interest did not find harmonization, as was explained by Frish's analysis of unsustainable requirements of real resources.

3.4. The dollar system under fixed exchange rates.

The dominant country that presided over the reconstruction of a sustainable world scenario after World War II was the United States. As in post-Napoleonic Britain, this reconstruction came about on the basis of the the long-term financial structure that had been established during the preceding period. However, unlike the Britain of the sterling system, the United States of the dollar system was still the world T-economy[42]; the corresponding R-economy had been created by the war in Europe and the break-up of empires in the South. A second difference lay in the fact that the circuit of transfers had changed from being trilateral to bilateral. All the parties concerned (principally, the United States, Europe and the then-developing countries) showed both NRT and NFT imbalances. The third and most important difference was that the United States, which transferred capitals (primarily government and military transfers, and direct investments) and goods to Europe and the developing countries, very soon had a NRT that lagged behind the NFT. The US "transfer gap" -as it was aptly named by Machlup (1969)- was half a billion dollar a year between 1951 and 1957, it grew threefold to 1.6 billions yearly in 1958-69, and in 1971, when the dollar inconvertibility and the end of Bretton Woods Agreements were declared, the gap amounted to 30.5 billion dollars.

The dollar system clearly belongs to the class of bilateral unbalanced transfers described in sec.2.3. That system held for more than twenty years thanks to the US dollar status as reserve -or as we named it, dominant- currency (indeed, most theorizing on transfer patterns and sustainability is tailored on the dollar system). By virtue of the adoption of a paper reserve currency virtually free of a gold base, the world transfer system ushered in a new order in the pattern of financial transfers, thus freeing the productive energies that had been bound by the convulsions of the previous system[43]. However the qualitative and quantitative differences mentioned above emerged once again in the form of a collapse in the conditions of financial sustainability. According to Triffin's analysis recalled in sec.2.6, the mass of short-term US liabilities (hot money once again) had exceeded its critical ratio with the gold reserves which should formally have provided an anchor for it. As others have added, a correct forward-looking attitude towards the US transfer problem should see the erosion of the US NRT as the critical factor (e.g. Minsky (1979)). In any case, traditional wisdom would say that whereas international lenders in the sterling system had sanctioned the rentier position of the R country, in the dollar standard they sanctioned the unproductive excess of seignorage of the T country (the waste of money during the Vietnam War is paradigmatic).

It should be added that, as in the case of the sterling system, the crisis in the dollar system broke out at the cyclical turning point of the dominant country's BIT. Similarly to what happened to Great Britain, the United States had a substantial share of its export capacity eroded by its own direct investments in former R-economies (Machlup (1969) gives an excellent account of this process). One may note that US financial transfers had been unable to open an adequate R-area of developing countries (Biasco (1984)), but it seems clear that the US-Europe transfer had been successful (perhaps too successful); nevertheless conditions of supply of financial means did not allow for a smooth switchover between United States and Europe.

3.5. The world transfer problem under flexible exchange rates.

The 1973 declaration of fluctuation of the dollar marked the beginning of the present-day scenario. The choice in favour of fluctuation was tantamount to admitting that the **ex-ante** international pattern of real resources and of financial ones were not compatible with the given terms of trade. Policy-makers in industrial countries believed that floating exchange rates, by linking trade imbalances to financial flows, and by correcting trade imbalances in the long run, would have taken care of the problem of the financial requirements and of the financial sustainability of the system. The message of adherents to the new stock approach was, in this respect, full of promise (Kenen (1985, sec.4)). At the same time, producers of raw materials, led by the OPEC cartel, went to the heart of the same problem by changing the terms of trade in their favour in order to obtain the monetary means they lacked; they got what they wanted, albeit through the world intermediation of the US banking system.

As I have said in the previous paragraph, such dramatic changes at the institutional level took place at the turning point of the pattern of world transfers: midway through the 1970s (not the 1980s) the United States had become the R-economy of the system and had come to assume structural features similar to those of Great Britain a century earlier. By 1976-77 the long-term NFT had turned to positive (i.e. an inflow) by more than 4 billion dollars per year; in 1978 the overall NFT (inclusive of short-term capital movements) also became positive by 2.1 billion dollars. Since then the US absorption of world financial resources has increased constantly, reaching 111 billion in 1986. The main items and sources of the NFT towards the United States have been capital income from developing countries (up to 1983), direct and portfolio investments, and short-term capitals from Europe and Japan (since 1981). Hence, whereas Great Britain was a rentier, the United States has become a pure debtor. The absorption of real resources has progressed at a similar pace: the first US NRT deficit, the first in a series that lasted without interruption to the present day, fell in 1976 when it scored 9.5 billion dollars; it reached 144 billion in 1986.

The free fluctuation of the key currencies has, almost by definition, eliminated transfer gap problems thus re-establishing the R-economy role in the system -the famous "locomotive". On the other hand, anyone sees that the change of exchange-rate regime has hardly solved the "skewness" in real resources requirements inherited from the previous phase; rather, the new regime has complied with it. The lesson to be learnt from the 1980s, one that still needs studying in depth, is that exchange rates have been rendered endogenous in the process of world transfer of resources (Dornbusch (1987)). Moreover, an important part of the story lies in the vicious (virtuous?) circle of NFT-revaluation-NRT that has pivoted on the dollar, with sizeable effects on both financial and real transfers towards the United States (Biasco (1987), Tamborini (1987)). Hopefully, the next three chapter of this work may contribute to our understanding of the issue.

A second important aspect is that, until a stationary state is reached, the flexible rates regime can modify (possibly ease) the transfer problem, but cannot eliminate the underlying question of sustainability; and the critical point is still the asset-liability structure of the R-economy. In 1973 the dollar system collapsed since no one was able to sustain the transition of the United States to being the R-economy. As the dollar was peaking in mid-1985, some analysts warned that the ongoing pattern of world transfers in favour of the United States was still unsustainable (Frankel (1985), Krugman (1985)); the dollar was running inconsistently with the trend necessary to generate a NRT surplus to pay for the US external debt. Furthermore, on the eve of the international financial crisis of October 1987, the United States as the "world bank" was virtually illiquid -just as it was fifteen years ago when the dollar was declared inconvertible (Triffin (1987))[44]. There are signs that the crisis of 1987 was not an isolated accident, but, more than a cyclical downturn within a stable scenario of international economic functions and institutions, the beginning of a **change of scenario**, the features of which are still largely hidden from view. One of the pieces of the puzzle will be the United States' ability to pay for external debt, or even further, its ability to give up the role of world R-economy in favour of East-European and Southern economies. The interested reader may look at the analytic contribution of the following chapters in this perspective.

Appendix

A.1. Data appendix.

b. 1 Britain's Net Real Transfer vis-à-vis Net Capital Incomes, 1871-1915 (Millions of Pounds)

	1871-75	1876-80	1881-85	1886-90	1891-95	1896-900	1901-905	1906-910	1911-915
T REAL TRANSFER	25.6	-32.6	-8.3	1.2	-38.5	-71.6	-71.8	-3.9	23.8
Merchandise, net	-19.3	-78.9	-56.4	-44.3	-84.4	-118.4	-115.0	-79.1	-61.3
Services, net	44.9	46.3	48.1	45.5	45.9	46.8	43.2	75.2	85.1
T CAPITAL INCOMES	50.0	56.3	64.8	84.2	94.0	100.2	113.0	151.4	188.0
TAL (CURRENT ACCOUNT)	75.6	23.7	56.5	85.4	55.5	28.6	41.2	147.5	211.8

urce: Elaborations on De Cecco (1975)

Tab.2 The world transfer network in the 1920s (Millions of US dollars, f.o.b., 1928)

A. The triangular trade matrix (Net Balances)

	1. PRIMARY ECONOMIES	2. U.S.A.	3. INTERMEDIATE ECONOMIES	4. CONT. EUROPE	5. U.K.	TOTAL EXPOR
1. PRIMARY ECONOMIES	-	640	30	370	-	[illegible]
2. U.S.A.	-	-	600	620	610	[illegible]
3. INTERMEDIATE ECONOMIES	-	-	-	710	80	[illegible]
4. CONT. EUROPE	-	-	-	-	560	
5. U.K.	210	-	-	-	-	
TOTAL IMPORTS	210	640	630	1700	1250	[illegible]

B. The trilateral transfer pattern

		T-ECONOMIES	ON BALANCE	R-ECONOMIES	NET REAL TRANSFER
T-ECONOMIES	1+	-	30	160	190
	2	-	600	1230	1830
		-	-----	-----	-----
			630	1390	2020
ON BALLANCE	3	-630	-	790	160
R-ECONOMIES	4+5	-1390	-790	-	-2180
					0

Source: Elaborations on Hilgerdt (1943)

Tab. 6 General price indexes of major industrial countries, 1953-1984 (1953=100)

	United States	Japan	France	Germany	Italy	Great Britain
1953	100	100	100	100	100	100
1954	101	105	101	100	103	101
1955	103	106	102	101	106	104
1956	106	112	109	105	111	111
1957	110	119	111	108	113	114
1958	112	117	106	112	116	120
1959	115	120	92	114	116	122
1960	117	127	95	116	118	124
1961	118	137	99	126	121	128
1962	120	142	103	132	128	133
1963	122	148	110	136	139	136
1964	124	155	114	141	148	139
1965	125	158	115	145	154	146
1966	130	164	121	151	159	153
1967	134	174	125	152	164	155
1968	140	183	130	155	166	139
1969	147	194	131	163	173	147
1970	155	208	130	191	184	158
1971	163	225	138	215	201	178
1972	170	272	159	246	226	196
1973	179	339	196	316	252	206
1974	194	381	202	347	268	226
1975	213	404	254	386	314	272
1976	224	429	250	390	290	253
1977	237	501	266	439	326	280
1978	255	672	320	528	386	341
1979	276	659	371	602	457	434
1980	303	656	421	635	537	567
1981	331	690	362	531	479	554
1982	351	625	339	518	470	513
1983	364	376	320	508	483	468
1984	377	663	298	464	462	428

Source: Aquino (1986, tab. 14)

Tab. 5 Wholesale national price indexes of major northern trading parterns, 1814-1913, selected years (1913=100)

	United States	Great Britain	Germany	France	Italy
1814	178	178	129	132 a	
1849	80	90	71	96	
1872	133	125	111	124	
1896	67	76	71	71	74
1913	100	100	100	100	100

a = 1820

Source: Triftin (1969),

Tab. 7 The general price level and the real exchange rate of the United States relative to major trading partners, 1953-1984 (1953=100)

	RGPL	RER
1953	100	100
1954	101	98
1955	101	96
1956	105	94
1957	104	92
1958	102	90
1959	97	85
1960	100	85
1961	105	85
1962	107	85
1963	111	86
1964	113	87
1965	115	85
1966	115	84
1967	114	82
1968	111	81
1969	111	79
1970	113	80
1971	116	82
1972	128	87
1973	145	94
1974	149	93
1975	153	89
1976	151	84
1977	157	86
1978	171	93
1979	174	90
1980	174	92
1981	155	77
1982	143	70
1983	138	67
1984	128	63

Source: Elaborations on Aquino (1986, tab. 12)

Tab. 8 The general price level and the real exchange rate of Italy relative to major trading partners, 1953-1984 (1953=100)

	RGPL	RER
1953	100	100
1954	99	101
1955	98	108
1956	98	119
1957	100	118
1958	98	122
1959	98	131
1960	100	128
1961	101	136
1962	100	139
1963	96	131
1964	93	130
1965	91	136
1966	92	139
1967	93	140
1968	91	139
1969	92	139
1970	93	140
1971	93	139
1972	93	140
1973	98	151
1974	102	149
1975	100	144
1976	109	156
1977	108	149
1978	108	157
1979	102	154
1980	96	144
1981	101	149
1982	100	152
1983	96	154
1984	98	157

Source: Elaborations on Aquino (1986, tab. 12)

Tab. 9 The nominal and real exchange rate of the United States 1975-7988 (1980 = 100)

	Nominal	Real
1975	93,7	90,6
1976	89,1	87,4
1977	89,5	89,9
1978	97,9	99,9
1979	100,1	101,2
1980	100,0	100,0
1981	88,7	89,8
1982	79,4	79,7
1983	75,1	77,2
1984	70,7	71,6
1985	68,4	68,8
1986	85,3	85,6
1987	97,4	98,1
1988	103,8	103,6

Source: IMF, International Financial Statistics Yearbook, Washington, 1989

Tab. 3 The Balance of International Transfer of the United States, 1950-1988 (Billions of US dollars)

	1950-59 (a)	1960-69 (a)	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
NET REAL TRANSFER	3.6	3.8	2.6	-2.3	-6.4	0.9	-5.5	8.9	-9.5	-31.1	-34,0	-27.6	-25.5	-28.0	-36.5	-61,1	-112,5	-122,1	-144.5	-160.3	-126.3
NET FINANCIAL TRANSFER	-4.1	-5.4	-13.3	-28.2	-4.7	-6.1	-3.3	-13.5	-1.0	-3.9	2,1	41.2	17,6	26,6	38,5	57,2	113,2	127.9	110.7	103,4	90,1
Incomes	1.4	1,7	3.2	4,7	4,7	10.3	14.9	14.1	18.9	21,6	24.0	32.7	34.9	41.3	36.7	30.3	17.4	22.0	21.0	21.2	5.2
Unilateral Transfers	-5.0	-3.0	-3.4	-3.8	-4.0	-4.0	-7.4	-4.9	-5.3	-5.0	-5.6	-6.1	-7,5	-7.5	-8.9	-9.5	-12.1	-15.0	-15,3	-13.4	-13.6
Priv. Capital Transfers	-0.5	-4.1	-13.1	-29.1	-5.4	-12.4	-10.8	-22.7	-14.6	-20.5	-16.3	14,6	-9.8	-8,2	10,7	36,4	107,9	120.9	105.0	95.6	98.5
OFFICIAL TRANSFER (Transfer GAP)	-0,5	-1,6	-10,7	-30,5	-11,1	-5,2	-8,8	-4,6	-10,5	-35,0	-31.9	3,6	-7.9	-1.4	2.0	-3,9	0,7	5.8	-33.8	-56,9	-36,2

(a) year average

Source: Machlup (1969); IMF, "International Financial Statistics Yearbook", Washington, 1989

Tab. 4 The Balance of International Transfer of Italy, 1950-1988 (Billions of US dollars)

	1950-59 (a)	1960-69 (a)	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
NET REAL TRANSFER	-0,3	-0.2	-0.4	0.2	0.0	-3.9	-8.5	-1,1	-4.2	-0.1	2.9	1.0	-16,9	-12,1	-8,9	-2,5	-5,8	-6,1	4,5	-0,1	-0,8
NET FINANCIAL TRANSFER	0.4	0,5	0.8	1.2	-2,5	-2,1	5.2	-2.4	5.7	5.3	0.0	-1.0	17.4	11.0	4.0	8.0	8,2	-1.6	-2.9	5,5	8,2
Incomes	...	1,1	1	1.3	1,5	1.3	0.5	0.3	1.1	2.4	3.7	6,0	5.5	1,5	1.4	2.4	1.7	1.5	0,2	-0.5	-3.4
Unilateral Transfers	...	0,4	0.2	0.3	0,4	0,2	0.0	0.3	0,3	0,2	-1.4	0,4	1,2	0,9	0,9	1,3	1,3	1.0	-1.6	-0.9	-0.4
Priv. Capital Transfers	...	-1,0	-0,4	-0.4	-4.4	-3,6	4.7	-4.0	4.3	2.7	-2.3	-7.4	10.7	8.6	1,7	4,3	5,3	-4,1	-1,5	6,9	12,0
OFFICIAL TRANSFER (Transfer GAP)	0.1	0,3	0.4	1.4	-2.5	-6.0	-3.3	-4.5	1,5	5.2	2.9	0.0	0.5	-1.1	-4.9	5.5	2.4	-7,7	1,6	5,4	7,4

(a) year average

Source: IMF, "International Financial Statistics Yearbook", Washington, 1989

Notes

(1) Machlup (1943, 1969) develops all the statistical and technical details that I have kept here at a simplified level.

(2) As is well known, the former enter the current account in addition to the trade balance, whereas the latter form the capital account.

(3) We are therefore excluding government transfers in kind from analysis.

(4) It should be stressed again that the organization of NFT in this work is for the purpose of theoretical analysis, and as such it is far from being exhaustive on statistical and empirical grounds. The reader is referred to Machlup (1943) for a thorough treatment. In particular, Machlup points out where the transformation of the standard balance of payments into the BIT may be misleading. He argues quite correctly that not all figures in "Non Official Capital Movements" qualify as "Net Financial Transfers"; some of these (like inter-bank swaps and all forms of lagged payments) do not involve an effective monetary payment; others (like commercial credits) are actually "induced" by trade transactions. One may observe that even these items still exert an autonomous financial effect on budget constraints, in spite of the absence of effective shipments of means of payments. For instance, if an importer lags his payment abroad, his own (or his bank's) corresponding debt position amounts to shifting his ability to spend (or his bank's ability to lend) upwards. Be that as it may, we shall not consider these particular aspects explicitly.

(5) This measure is widely employed in the literature on the transfer of international debts; see e.g. Webb (1988).

(6) For the time being the change in quantities and the change in prices are taken to be two independent measures. Recall that (δ) is the rate of change of a variable x defined as $[dx/x_0]$.

(7) The real transfer burden was first defined by Mill (1844) and Taussig (1920) who drew attention to the aspect of redirection of real resources entailed by international financial transfers.

(8) Important insights into changes in import prices as a transfer problem can be found in some works on the oil shock (esp. Balogh (1978), Balogh- Graham (1979)). Devaluation was explicitly examined as a transfer problem by Johnson (1956).

(9) Note that in order to identify a network of payments the definition of "receiver" and "transfer-economy" adopted here is more general than the usual one of "creditor" and "debtor" or, what amounts to the same thing, of "lending" and "borrowing" economy. In fact, the former are based on the current sign of the economy's Z and F (flows), whereas the latter are based on its cumulated net financial position (stock) or on the "motivation" of capital flows. Thus a creditor economy may be a T-economy, when lending abroad, as well as a R-economy, when enjoying earnings from previous lending, and vice versa a debtor economy. On the other hand, neither T's must all be lenders, nor R's must all be borrowers; some T may also be debt payers, whereas some R may be rentiers.

(10) The methodological reference is to Hilgerdt (1942, 1943), Frish (1947), Tinbergen (1964), Metzler (1966), Goodwin (1980).

(11) For instance by adding up rows thus obtaining "regions" instead of individual countries: $\Sigma_i Z_i$ for all $Z_i > 0$, $\Sigma_j Z_j$ for all $Z_j < 0$, etc..

(12) For some historical examples see sec.3 below.

(13) Capital movements in conventional open macroeconomics are essentially the portfolio component of Capital Transfers in the BIT, with the inclusion in a few, more sophisticated models of the direct-

investment component (compare e.g. Dornbusch (1980, chs.X-XI) with De Macedo-Tobin (1980)). Further important observations on this point have been made by Machlup (1964, Part V; 1972).

(14) In fact, in equilibrium, GDP is wholly exhausted by factor incomes, and after-tax factor incomes are wholly spent in domestic consumption and imports. The former is therefore equivalent to (Y' - T - M). For simplicity's sake, we are now taking public consumption to be equal to public expenditure, that is to say we are assuming zero interest payments. On this point see above, ch.III, sec.4.1.

(15) For detailed treatment of this point see Godley-Cripps (1983, pp.296-ff).

(16) See e.g. Cripps (1978) and below sec.2.3.

(17) "One country, firm or person dominates another when the other has to take account of what the first entity does, but the first can ignore the second" (Kindleberger (1981, p.185)). Kindleberger attributes the concept of dominance to Professor Francois Perroux, of the Collége de France. Balogh's pioneering contributions in the field should also be mentioned (see e.g. 1963)).

(18) If G_n is set independently n will have $[O_n = (u'm\varepsilon_n + G_n)(t_n + m_n)^{-1}]$. If $(u'm = G_n k_n)$, then $[O_n = G_n(1 + k_n e_n)(t_n + m_n)^{-1}]$. The fact that $(O_n m_n = G_n k_n \varepsilon_n)$ for whatever G_n, implies $(k_n = m_n/\varepsilon_n t_n)$ and $(O_n t_n = G_n)$ at the same time, for whatever positive t_n. This fact also entails that $(O_n = G_n k_n \varepsilon_n/m_n)$; suppose initially that 13 expresses total output of the first n-1 countries, then by adding O_n to 13 one obtains 14.

(19) As a response, a cut in x_n would rise k_n, but would also reduce the share of domestic public goods in the given G_n. A more acceptable solution will be a cut in the share of international public goods. For instance, President Reagan's idea of simultaneously cutting taxation and expanding the supply of world military defence has driven the US budget into a huge deficit. The Bush Administration has promised to reverse the course of action.

(20) The literature on instability and breakdowns of dominance is now expanding. See again Kindleberger (1981) and Padoan (1986, chs.II-III).

(21) If one is prepared to accept as a possible conclusion of the previous paragraph that a world stationary economy may involve maldistribution of resources (if not global underutilization), one may regard international transfers as a way to escape from that state (a way quite similar to lump sum transfers in welfare theory or, on the private side, similar to shifts of resources from savers to investors).

(22) Turnovsky (1981, ch.XI.4) and others regard the above situation as one of full stationarity allowed for by "perfect" capital mobility, provided that the government budget is financed by means of bonds only, thus leaving the money stock unchanged. As a matter of fact, T private sector is called upon to accommodate R public bonds by the whole amount. Moreover, whereas standard open macroeconomics focuses on outside money, we have seen in ch.III that inside money will vary to the extent that savers choose to allocate some marginal wealth to the money stock at the expense of equities; parallely, investors should get more indebted with the bank. On the whole inside and outside wealth are both constant, but, as already remarked, the fact should not be overlooked that changes in specific asset stocks are involved that cannot be expected to last forever.

(23) For modern monetarist arguments see Frenkel-Johnson (1976, p.25 ff.).

(24) From Kalecki-Schumaker (1943), Kalecki (1946) and Nurkse (1945, 1946) up to Polak-Rhomberg (1962).

(25) Generally speaking, the main consequences a firm incurs whenever its current proceeds fall short of

outstanding debt are current losses (sales of real or financial assets to settle the initial debt) or bankruptcy (liquidation of the whole productive unit). Given that a country cannot be liquidated, the international banking system traditionally adopts a number of discriminating measures against reserve-losing countries very similar to those adopted by any domestic commercial bank (see e.g.the literature on country risk in Padoan (1986, ch.IX)).

(26) Frish's problem is to find a column vector α (nx1) such that

$$z = (X - X^{d})\alpha^{*} = 0$$

where X is the world matrix of exports and X^{d} is the diagonal matrix of each country's total imports computed as the n sums of the columns of X $[X^{d} = \mathrm{diag}(u'x_1, ..., u'x_n)]$. Since by construction E diagonal has null elements, E^{d} diagonal is also $(X - X^{d})$ diagonal. Vector a^{*} should yield for each deficit country the cut in imports (no matter how obtained) and the cut in exports due to other deficit countries' cuts in imports. In general $[\mathrm{rank}(X - X^{d}) = n - 1]$ and hence the above equation has ∞^{1} non trivial solutions; consequently, it is necessary to fix one element of α^{*} exogenously. It should be noted that Frish does not consider indirect repercussions of income effects due to initial import cuts (for a model extendend to these effects see Tamborini (1986)).

(27) For the relevant literature see Padoan (1986, ch.II).

(28) The classical argument runs from seignorage to spendthriftness and hence the necessity of a constitutional constraint upon the currency sovereign. Yet the developments in international political economy have pointed out that international currency and government transfers are both in the nature of public goods; in this view, parsimony (or more crude "neomercantilism") may emerge as a form of free riding. For the literature in this field see again Padoan (1986, ch.III).

(29) I would stress again that no-one can claim to possess an absolutely objective criterion of stationarity, because there can never be any theory able to encompass all the factors and variables impinging on individual choices and the accomplishment of them. On the basis of the arguments already set forth, the approach followed in this work, like that of most open macroeconomic theories, gives priority to factors of financial nature. This does not exclude that real factors and variables, once endogenously expressed (e.g. the exhaustion of non-reproducible resources, etc.) may, or should, play an equally important role in the issue of sustainability.

(30) See e.g. Branson (1977, Part III; 1985), Krugman (1985), Masera (1986), Dornbusch (1987a).

(31) See basic contributions by Triffin (1960), Kenen (1960), Officer-Willet (1969).

(32) There is no difficulty in extending $B6_T$ to include R-denominated assets or assets readily convertible in R-denominated assets.

(33) For a discussion of the balance-of-payments stages hypothesis and a simple model of unstable export-led borrowing see Padoan (1986, chs.II, VII, and Appendix).

(34) See Ardant (1976) and the masterly treatments by Carlo M. Cipolla (e.g. 1982). After Keynes's reappraisal of certain aspects of Mercantilism, followed by the important works by Dobb and Schumpeter, few scholars are today willing to endorse the old condemnation of economic foolishness and pure imperial greed.

(35) This argument, especially as it concerns finance, has often been pushed into the background in historical-economic studies. In addition to the already cited Williams (1929) see also Hobsbawm (1968, ch.VII), and Lewis (1978)

(36) Suffice it to cite here the most representative works by Brown (1940), Bloomfield (1959), Triffin (1969), De Cecco (1975). The recent reappraisal by McKinnon (1988) is also worth mentioning.

(37) The contribution of intermediary countries was a decisive factor in enabling interest payers to solve the transfer problem. In fact, as stressed by De Cecco (1975), Great Britain reacted to declining exports by forcing them into her colonies. In the period under consideration, the bilateral NRT towards the mother country remained slightly negative, and at those terms, interest payments would never have been served.

(38) This amounts to saying that the ratio of paper pounds to the asset stock of foreign banks and to the gold stock of the Bank of England remained within the boundaries defined in sec.2.4.

(39) For the complete historical and statistical account see Machlup (1963), Webb (1988).

(40) An exhaustive overview of the various positions ca be found in Iversen (1935), and Machlup (1964, Part V). See also Tamborini (1985).

(41) See also Clarke (1967), Eichengreen (1985), De Cecco (1985), Eichengreen-Portes (1987). As the last two contributions stress there was a connection between war debts and the ability of the United States to emerge as world lender.

(42) I am making reference to the interpretations of Lamfalussy (1962), Triffin (1969), Machlup (1969), De Cecco (1979), Biasco (1984).

(43) This happened with complete success in the United States and Western Europe; less so in many former colonies or economies producing industrial raw materials and foodstuffs in the Southern belt, which lost their advantageous position they had occupied before the war (I am thinking here of Latin America) or were unable to "take off" (the case of many African countries). On this point see Lewis (1978).

(44) In June 1987 US call debts to foreigners amounted to 748 billion dollars equal to 55% of the total external debt. Such debts were only by 29% with central banks and governments, almost 68% was in private hands and they burdened on commercial banks by more than 62% . In the books the United States claimed short-term credits by about 479 billion dollars: the liquidity balance was then **negative** by 279 billions. Further, 93% of credits were written in banks' balance-sheets and were largely inexigible.

CHAPTER FIVE

THE TRANSFER PROBLEM AS A CURRENCY PROBLEM. THE REAL EXCHANGE RATE

Introduction

In the non-stationary world economy a transfer of capitals (NFT) and goods (NRT) from T-type economies to R-type economies is constantly in progress. As Ohlin saw it,

> in principle the chief difference between domestic and international capital movements is that the monetary mechanism is somewhat different. Purchasing power and credit cannot be transferred without being, so to speak, transformed from one monetary system to another; this gives rise to certain complications. But it cannot be said too often that the chief difficulty in the way of interlocal [real] capital movements, whether they pass across a national frontier or not, arises because capital moves only in the form of goods or services, and neither of them is freely mobile geographically;hence a cumbersome readjustment of production becomes necessary (1933, p.406).

Now the problem we are interested in is, at the single economy level, the process whereby transfers of financial means from T are capable of generating those transfers of real means which are demanded in R, and, at the world level, the possibility of flow equilibria. By flow equilibria I mean the case of "balanced net financial transfers", the scenario examined in ch.IV, sec.2.4.

Transfer theories have accompanied the development of international payments theory since the early days. It seems to me a richness of such a body of theories that they reflect a variety of institutional and historical situations, albeit often hidden in the background, thus bringing into light different aspects of such a complex phenomenon as international transfers. The chapters that follow are organized around the two key approaches to the transfer problem: the **currency problem** and the **financing-utilization problem**. The former approach views the transfer problem as a problem of excess demand for foreign currency; the latter focuses on why and how the financial transfer is raised in T and used in R. The two approaches lead to two different "transfer mechanisms": the one based on **the real exchange rate**, and the other based on **real**

expenditure and income. It goes without saying that in a sufficiently complicated representation we should expect both mechanisms to be at work; however, it is of greater theoretical interest and analytical clarity, at least as a preliminary step, to take the two separately and to see under what conditions the one dominates, if not excludes, the other. In this respect, the predominance of one aspect over the other is also highly sensitive to **the general theoretical framework** (perfect competition with full employment vs. imperfect competition with employable resources). Hence not all the different viewpoints are compatible one with the other, nor can they simply be lumped together in a general eclectic theory; an effort will be made to bring the specificity of each model, and the limits of its applicability, to the forefront. The comparison between the two approaches is also of interest since recent analyses on major world transfer problems are mostly based on the currency problem view.

Hence the present chapter focuses on the currency problem involved in NFT. It shows how the transfer process necessarily operates through the real exchange rate when the transfer is identified with a shift of currency, say "gold", from T to R under a gold-standard-type monetary regime, and when conditions of general competitive equilibrium with money neutrality are assumed to hold. These are the building blocks of the classical transfer theory, which is analyzed in sec.1 in the price-specie-flow version. Sec.2 deals with some major difficulties, both empirical and theoretical, of the classical transfer theory and illustrates a number of important modifications on the monetary as well as the real side of the model.

1. Transfers of currency and the real exchange rate

1.1. The transfer problem as a currency problem.

The identification of the transfer problem with the currency problem is well-suited to the theoretical framework of the classical gold-standard regime[1]. Any international transfer requires an amount of currency of T to be moved into R; the currrency problem is basically one of draining "gold" from the domestic stock and of shipping it abroad, and this is all that is necessary to put the adjustment in motion. In theory, and to some extent in practice, the major concern of the monetary authority of the small open economy idealized by the classics is the stability of the gold reserve, in a regime where exchange rates are constrained within the so-called "gold points" and where international settlements have to be effected by means of actual gold shipments. Shifts of gold endowments which are not dictated by changes in pure trade or in the world production of the precious metal are highly undesirable; international payments independent of commodity trade are then seen as a typical monetary disturbance and a threat to gold reserves. The aim is to show that under an "orthodox" monetary regime such disturbances are able to exert transitory effects on goods movements, but have no permanent effect on the "natural" distribution of gold endowments and real resources. With the exception of Keynes, scholars in this vein have generally been highly confident that monetary self-regulation and neutrality are in fact operational. The neglect of **motives** of capital transfers as a permanent and fundamental element in the transfer process has primarily been due to doctrinal bias, which has become inexcusable since the second half of the past century[2].

As was pointed out by Viner (1937, ch.V), the above represents an extreme approach to the problem, which is useful but unnecessary in obtaining the distinctive results of the theory: changes in real exchange rates. In the first place, the classical price-specie-flow mechanism gives rise to a number of problems concerning the links between international shifts of currency and international trade via relative prices that are examined in sec.2. Moreover, in a developed monetary system, the "material support" of the monetary transfer might well be obtained by offsetting existing credit or by means of international assets other than gold; indeed, from Mill to Keynes the monetary side of the theory replaced the price- specie-flow mechanism with the interest-rate mechanism. Thus what stands out as the crucial point in the currency transfer problem is not actual movements of gold, but **the effects of the monetary transfer on T stock of international means of payments when these act as a constraint.** Accordingly, **the currency problem is a problem of the monetary authority.** However, this specification implies that the small-economy assumption is also a strategic one, where by "small economy" is meant a non-dominant country or one which does not enjoy seignorage. In fact, the right of seignorage would allow T to make the payment simply by printing money with no monetary impact, at least in the T country.

1.2. The classical transfer model.

The basic elements of the transfer theory under examination were put together and clarly set out by Mill:

Commerce being supposed to be in state of equilibrium when the obligatory remittances begin, the first remittance is necessarily made in money. This lowers prices in the remitting country, and raises them in the receiving.
The natural effect is that more commodities are exported than before, and fewer imported, and that, on the score of commerce alone, a balance of money will be constantly due from the receiving to the the paying country. When the debt thus annually due to the tributary country becomes equal to the annual tribute or other regular payment due from it, no further transmission of money takes place; the equilibrium of exports and imports will no longer exist, but that of payments will [...] (1848, ch.XXI, p.638).

Evidently, the core of Mill's model is the price-specie-flow mechanism, which is based on opposite movements in the general price levels in T and R in relation to the transfer of currency from T to R. We may simply call this **the classical transfer model**. An up-to-date formalization of such a model may be the following:

(1a) $Z_t = P_t Q_{xt}(P_t) - P_{mt} Q_{mt}(P_{mt})$ $\qquad Q'(P)<0,\ Q'_m(P_m)<0$

(b) $B_t = Z_t + F_t$

(c) $H_0 + (1 - \alpha)B_t = P_t H2_0(Y_0)$ $\qquad 0 \leq \alpha \leq 1,\ H2'(Y)>0$

(d) $H^*_0 - (1 - \alpha^*)B_t = P^*_t H2^*_0(Y^*_0)$ $\qquad 0 \leq \alpha^* \leq 1,\ H2'^*(Y^*)>0$

Home variables are referred to the T-country; (*) denotes the foreign R-country; (t) denotes the period in which endogenous variables are changing. $P_t Q_{xt}$ = value of exports, $P_{mt} Q_{mt}$ = value of imports, H_0 = nominal stock of money, $H2_0$ = desired stock of money by the public, α = degree of external sterilization.

(1a) is the NRT equation, (b) is the BIT identity, (c) is the equilibrium condition on the domestic money market and (d) is the same on the foreign money market. The model rests on the following assumptions as to the monetary economy it portrays:

(i) At the beginning of period (0), the economy is in stationary state.

(ii) Each economy is specialized in the production of one (composite) good which is exported and consumed domestically.

(iii) Given real output and factor incomes (Y_0), the stationary stock of money is also given by [$H2_0(Y_0)$]; the money in the economy is only outside fiat money and the sole source of supply is through BIT imbalances, net of the sterilization degree.

(iv) The monetary regime is of the "orthodox" gold-standard type, hence ($\alpha = \alpha^* = 0$), and the exchange rate (e) is fixed. Therefore the stationary state requires ($B_t = 0$, $Z_t = 0$, $F_t = 0$).

(v) All market disequilibria generate competitive price adjustments.

The monetary transfer can be represented as an exogenous shock to T monetary equilibrium ($dF < 0$). The sign of the change in general price levels is that given by the price-specie-flow theory ($dP/dF>0$, $dP^*/dF<0$ and hence $dP < 0$, $dP^* > 0$). Now, under monoproduct specialization and fixed exchange rate, T real exchange rate coincides with the general price levels ratio

$$r \equiv P_m/P \equiv eP^*/P$$

as a consequence, it must be that ($dr/dF > 0$). We shall say that the T- economy has a real depreciation (or worse terms of trade), and conversely, the R-economy has a real appreciation (or better terms of trade).

In the model under consideration the transfer problem hinges on variations of the real exchange rate as the decisive force able to activate an adequate goods movement from T to R. The change in the real exchange rate comes from a deflation component of export prices and an inflation component of import prices; given the nominal exchange rate, the former component coincides with general domestic deflation and the latter component coincides with general foreign inflation.

A great deal of work has concentrated on equations (1a-b) since Mill's formulation, and in this respect the transfer theory has overlapped with the elasticity approach to the trade balance. Bearing in mind that ($dF/X \equiv f$) is the nominal transfer burden upon T, taking the total change in BIT (and remembering that $Q_x \equiv X/P$, $Q_m \equiv M/eP^*$, $X_0 = M_0$), the world transfer takes place under flow equilibrium if:

(2) $(1 - \varepsilon_x)\delta P - (1 - \varepsilon_m)\delta P^* + f = 0$ $\delta P<0,\ \delta P^*>0$

ε_x = price point elasticity of R demand for T exports, ε_m = price point elasticity of T demand for R exports, $\delta P \equiv dP/P$ = T inflation rate $\delta P^* \equiv dP^*/P^*$ = R inflation rate

Since (dF < 0), the change in NRT must be positive; a necessary condition is

$|\varepsilon_x, \varepsilon_m| > 1$

As long as the focus is exclusively on the NRT equation the extent of real depreciation is determined on the market for international trade, and it seems obvious to solve for the equilibrium change (δP). From equation 2, T deflation will be greater the larger f is, and the smaller ε_x, ε_m, δP^* are. If T is so small that the inflationary effect of its currency transfer abroad is negligible ($\delta P^* = 0$), the burden of adjustment in terms of internal deflation will necessarily be larger[3].

However, equation 2 is the market equation of demand for, and supply of, foreign exchanges, and as such it does not contain any explanation of price changes -the market equations of home and foreign goods (prices) are missing. It was only in the great wave of exchange-rate studies of the 1930s that the price changes involved in international trade adjustments came under closer examination. The first well-known solution was brought by Joan Robinson (1937) and Machlup (1939-40), and consisted in adding the price elasticity of production of home and foreign goods. We shall not formalize this point here, but it is intuitive that wP will be smaller the higher home supply elasticity is, while wP* will be larger the lower foreign supply elasticity is. In sum, high home supply elasticity and low foreign supply elasticity should ease the transfer problem and shift part of the burden from home deflation to foreign inflation[4].

Notoriously, the "four elasticity" extension of the real-exchange-rate model raises a number of serious difficulties[5]. First comes a difficulty which is specific to the currency transfer problem. This problem is one of inducing enough T deflation (relative to R inflation) as to increase the export revenue (decrease the import disbursement) just to offset the currency outflow; therefore, the initial conditions of export supply are totally irrelevant, since what is required is a shift of the whole supply schedule (e.g. Keynes

(1929, pp.164-ff.)). Hence the necessary rate of T deflation still remains dependent on demand elasticities, and we still lack an explanation of its determinants. Secondly, if a positive NRT has to emerge after the currency transfer we should be able to analyze the substitution process whereby more goods are exported rather than absorbed in T, and vice versa in R (Keynes (1930, ch.XXI)) -or else, the process whereby excess output and excess absorption arise in T and R respectively.

The gold-standard regime which frames the currency problem provides a straightforward explanation of T deflation (excess output), and R inflation (excess absorption) according to equations 1c-d. These are the equations of the money market in T and R respectively. With no sterilization, the transfer of currency from T to R ($dB = dF < 0$) is equivalent to a contraction of money supply in T and an expansion in R; thus (δP, δP^*) are determined in the substitution between goods and money in order to keep the desired stock of money in equilibrium in both economies ($H2_0$, $H2^*_0$). The NRT emerges because of excess supply in T and excess demand in R, in accordance with stock-flow matrix constraints (see above, ch.IV)[6]. A crucial variable in this respect is **the monetary effect of the transfer in the two countries** as measured by

$$dF/H2 \equiv h, \ -dF/H2^* \equiv h^*$$

From equations 1c-d it is easy to see that ($\delta P = h<0$, $\delta P^* = h^*>0$). Moreover, the rate of real depreciation in T will also be determined [$\delta r = dr/r = h^* - h$)] as a weighted average of the nominal transfer. By substituing these results into the BIT equation we obtain

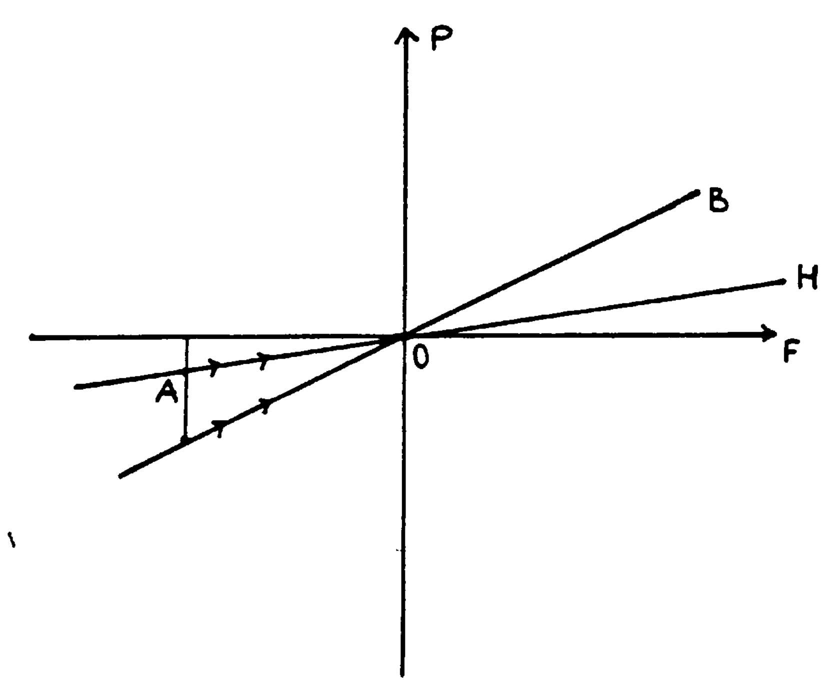
$$(3) \qquad dB/X = (1 - \varepsilon_x)h - (1 - \varepsilon_m)h^* + f$$

Therefore, the NRT from T to R will depend on the monetary effect in the two economies and on international demand elasticities. The monetary effect will in turn be maximal with no sterilization, that is, if both monetary authorities accept the necessary price adjustment. We have thus a mixed elasticity-monetary model of the BIT which is a useful intermediate step towards introducing further aspects of the problem.

Since equation 3 does not contain specific endogenous variables, it follows that in general T will obtain a positive NRT after a currency transfer, but there is no a priori presumption that the former will be equal to the latter. What if NRT in fact falls short of NFT ($dZ < -dF$)?

In order to answer, we have to introduce the distinction between stock and flow equilibrium, that was absent from the debates over the transfer-of- currency problem. Accordingly, equation 3 should be regarded as an impact effect of the currency transfer. For simplicity's sake, let us consider the case of a single installment transfer ($F_t = -dF$, $F_{t'} = 0$, $t' = t+1,...$). The problem is illustrated in fig.1, where T price level (P) is the dependent variable of the transfer (F), and where the schedule B is the locus of BIT equilibrium according to equation 2 and the schedule H is the locus of T money stock equilibrium according to equation 1c.

Fig.1. The currency transfer problem in the classical model



Initial stationary state exists at point O. In period, point A, the transfer turns out to be a redistribution of the world money stock, with a consequent finite change, in opposite directions, of the price levels in T and R [$P_t(F_t) < P_0$, $P_t^*(F_t) > P^*_0$]. Point A shows a situation in which T money stock is in equilibrium whereas BIT is not; in fact all points above schedule B are such that ($0 < dZ < -dF$; $F_{t'} = 0$, $Z_{t'}(P_{t'}, P^*_{t'}) = Z_t(P_t, P^*_t) > 0$)); hence (i) T monetary authority in period t has raised less "gold" than the initial transfer, and opens period t' with a "gold" reserve lower than the initial one; (ii) T money holders in periods (t, t',...) increase their nominal balances, with respect to the equilibrium level associated with (F_t, P_t, P^*_t), because of positive trade balances. Therefore, at point A, upward pressure on T prices will arise and will persist until Z_t (B_t) is driven to zero and full stock-flow equilibrium is reached again at point O.

The classic ideal of the "natural" endowment of currency is thus upheld, either because T deflation and real depreciation are just enough to effect the ongoing currency transfer in goods (schedules H and B coincide), or through cumulated trade surpluses accompanied by T reflation and real re- appreciation after the initial currency transfer has ceased. The latter case is only a matter of time profile, which is proportional to the gap between actual and necessary T deflation (the distance between schedules H and B at point A).

To conclude, the oustanding feature of the classical transfer theory is its prediction of swings in real exchange rates proportional to world NFT, then reversed in the transition towards the steady state. There is no presumption, however, that flow equilibrium should hold throughout the transfer process. Therefore, world NFT generate equilibrium real cycles of currencies and payments, such cycles being unsynchronized between T and R economies. The resulting picture contrasts sharply with the general view of the moderns who rather regard real exchange rate movements as disequilibrium phenomena, or at least as undue by-products of uncoordinated monetary policies.

1.3. The real transfer burden.

In the classical transfer model the T-economy suffers from no loss of currency, at least in the long run. The nominal transfer burden only gives rise to transitory effects on the real exchange rate. On the other hand, this only happens because the currency transfer has to force a goods transfer from T to R; such real effects were interestingly pointed out by Mill (1848) and later by Taussig (1920), and have been paid great attention in the debt literature (e.g. Webb (1988)). As the currency transfer is effected in goods, the cost of the transfer is not in terms of gold, but in terms of goods, formerly consumed domestically or imported. The fact that the real transfer is extracted through real depreciation entails that such real transfer burden ensues from the two compound effects of price and quantity adjustments. As was shown in ch.IV, sec.1.2, assuming initial equilibrium ($X = M$) and normalizing to X,

$$\begin{aligned} z &= \delta Q_x - \delta Q_m \\ &= -f + \delta r \end{aligned}$$

are two equivalent measures of the real transfer burden upon the T-economy. Clearly, if the transfer process has to involve prices, the real transfer burden must also exceed the nominal transfer burden ($f < 0$) by the amount due to price effects or to the rate of real depreciation ($\delta r > 0$). Even under the presumption that the switch of domestic production from domestic demand to exports leaves the employment of factors unaffected (on this point see below, sec.2.2) international transfers are not so neutral until they persist; the transfer process entails a displacement of real resources from T to R consumers in a way that no full-body classical economist would see favourably (see again Mill (1848, ch.XXI), Keynes (1919)).

In the classical view of the world economy, currency transfer problems may arise not only owing to exogenous monetary payments but also because of exogenous shocks to prices of international trade[7]. As was shown introductorily in ch.IV (sec.1.2), we can conveniently use the relationship between NRT and real transfer burden. The price effect of the oil price rise is that the oil importer faces an impact real depreciation. As we know, in so far as ($\delta Q_x = \delta Q_m = 0$), it follows that ($dZ/X = -\delta r$); the exogenous real depreciation is thus equivalent to an implicit currency transfer of nominal burden ($f = -\delta r$). The oil importer is thus in the position of the T-economy, whereas the oil exporter acts as the R-economy.

The conclusion to be drawn from the foregoing analysis of the transfer problem is that the study of partial equilibrium conditions on the markets for international goods is inadequate; the underlying monetary transfer implies adjustments on other markets as well. This conforms with the outstanding conclusion in the debate over the effects of devaluation[8]. A conclusion, note, that concerns the inadequacy of partial equilibrium analysis, not the irrelavance of elasticities (see also below, sec.2.1-2). An interesting analytical point clarified by the transfer approach is that the link between devaluation and domestic markets need not go through imported price-effects, but (also, perhaps mainly) through the direct transfer-effect of means of payment from the devaluing to the revaluing economy. Hence the extent of trade adjustment and of its real costs are closely dependent on the model specification of the transfer problem. The real burden on the depreciating economy is at least as high as the inital impact (dZ/X). Yet in the classical transfer model -as we have seen above- a new equilibrium of trade may call for further real depreciation (as a combination of T deflation and R inflation), and hence an additional displacement of real resources from the depreciating to the appreciating economy, unless the initial import price rise is immediately offset by a fall in import demand. If this is not the fortunate case, the implicit monetary transfer plays the fundamental role of inducing further price changes and goods movements, through money stocks adjustments, as described in sec.1.1.

2. The classical transfer model revised

2.1. Some facts about the role of relative prices in transfer episodes.

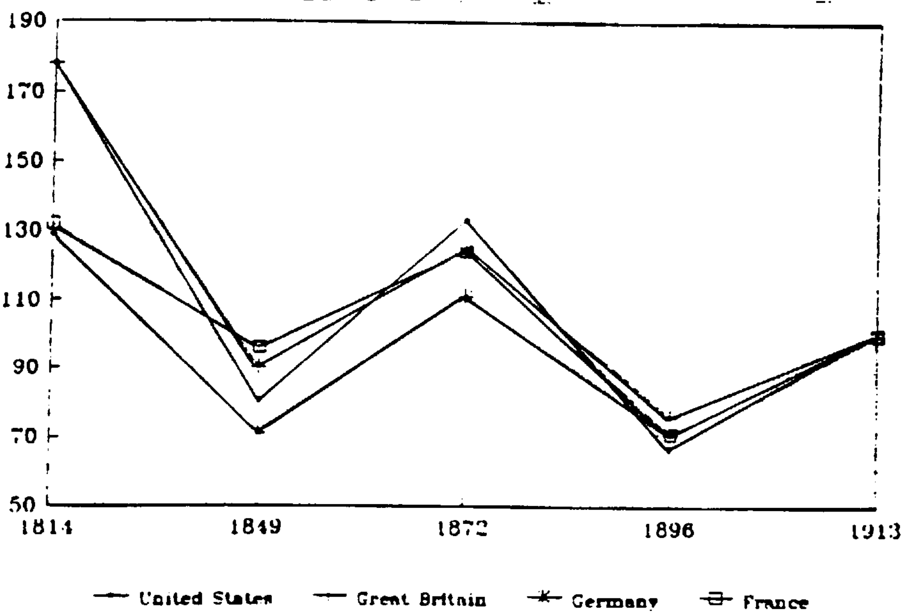
The classical transfer model rests on two pillars: the assumptions as to international trade determinants, and the assumptions as to national and international monetary organization. Both have turned out to be shaky, whether on the grounds of theory or of historical evidence.

It is perhaps interesting to begin with a brief account of the empirical shortcomings to the classical transfer model, or at least to its distinctive prediction that in a world economy with large and persistent NFT across economies we should observe proportionally pronounced and peristent real depreciation between T- and R-economies.

In the first place, assuming fixed exchange rates, we have seen that in the classical transfer model the real exchange rate (eP^*_x/P_x) coincides with the relative general price level (eP^*/P); real depreciation must spring from divergent movements in T general price level (deflation) vis à vis R general price level (inflation). The underlying assumption is one of national monoproduct specialization. Shortly after World War I a few empirical studies on the pre-war international economy already signalled scarce evidence in support of the classical explanation[9]. Two crucial departures from inherited tradition were found: (i) the surprisingly high precision and speed of adjustment of goods movements (i.e. NRT) to non-trade monetary movements (i.e. NFT); (ii) the surprisingly scant contribution of gold movements and relative price changes to those adjustments. These two points have since been revived and confirmed to become cornestones of non-classical interpretations of the gold-standard (see above, ch.IV, sec.3.2.). A well-established interpretation dating back to these studies is that substantial changes in relative prices were prevented by effective arbitrage on integrated world markets with fixed exhange rates (Frenkel-Johnson (1976), Zecker-McCloskey (1976), McKinnon (1988)).

Chart 1 reproduces cyclical movements of wholesale price indexes of major Northern trading partners in 1814-1913. While in the second half of the period Great Britain was becoming the R-economy, and was steadily enlarging its negative NRT, its general price index did not show any countercyclical tendency with respect to emerging T-economies (namely United States and Germany). It should be observed that the prominent role as T-economies in that period was not played by manufacturing Northern economies but by primary Southern economies (see above, ch.IV, sec.3.2); they had to furnish raw materials and food to the former group. On the other hand, the data do show that general price levels were not perfectly correlated and that changes in real exchange rates took place. It remains the case, however, that such changes were not always in the right direction or of the supposed magnitude and that they apparently were not originated by shifts of gold from T- to R-economies[10].

Chart 1. Wholesale national price indexes of major Northern trading partners, 1814-1913, selected years (1913 = 100)



The picture resulting from another world transfer episode -the US transfer with industrialized economies under the dollar standard (see above ch.IV, sec.3.4)- is more complex. By taking for reference the period 1952-1970 as the most representative of the emergence of the US transfer problem, the first observation is that general price levels of trading partners still showed a clear procyclical pattern (chart 2). The second observation is that despite procyclical general price movements, the relative general price level of the T-economy actually depreciated by 12 points (11.4 %) according to theory (chart 3). The third observation is that, contrary to theory, at the same time the US transfer gap widened dramatically, while the US real exchange rate (US imports/US exports price ratio) appreciated by some 25 points (20%). It is instructive to find a mirror pattern of relative prices in a supposedly "small economy" in the R area, such as Italy (chart 4). At this stage of analysis it seems that the widening US transfer gap may find some explanation in US partners' ability to depreciate their own export prices.

Chart 2. General price indexes of the United States and major trading partners. 1952–1984 (1952 = 100)

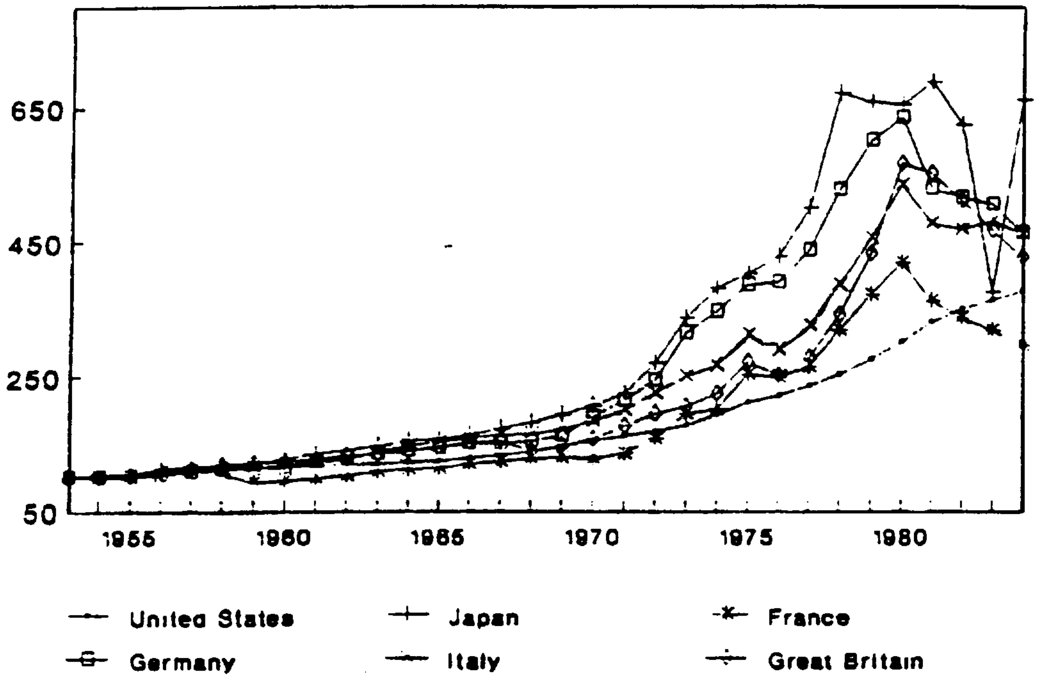


Chart 3. The general prive level and the real exchange rate and of the United States relative to major trading partners, 1952–1984 (1952 = 100)

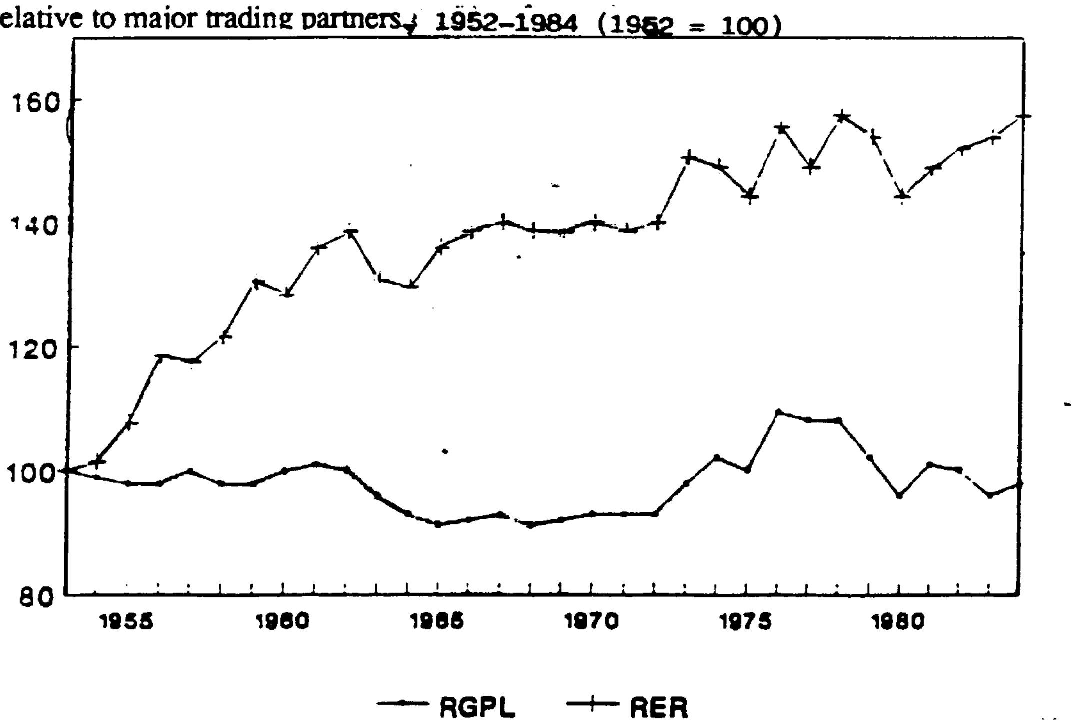
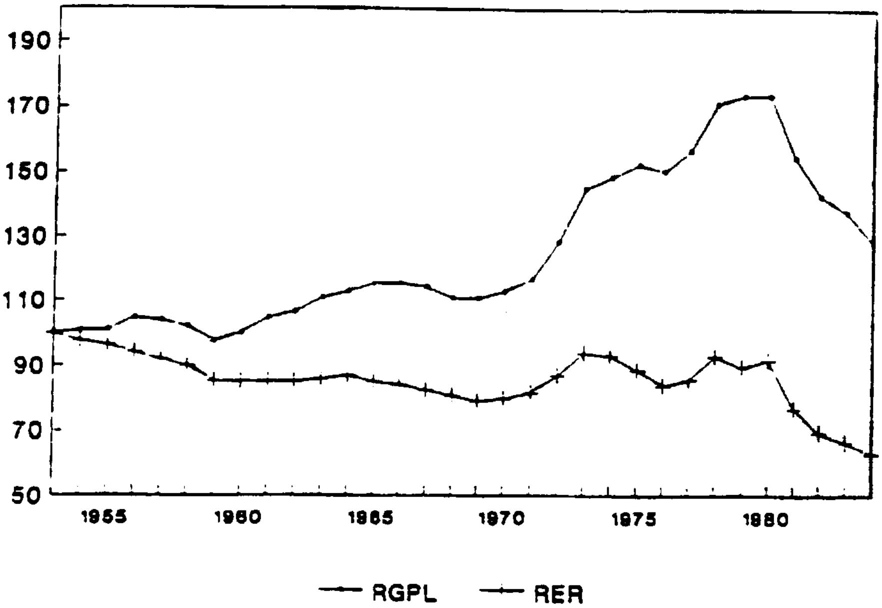


Chart 4. The general price level and the real exchange rate of Italy relative to major trading partners. 1952-1984 (1952 = 100)



2.2. An alternative monetary mechanism: the discount rate.

The emphasis on "gold movements" in the classical model, that has proved to be misplaced, is due to the difficulty to adapt the doctrinal requirements of money neutrality to a world of substitutes of metallic currencies and of quasi-monies. As we know from the history of the international monetary system, shifts of gold were largely replaced by monetary assets even in the heyday of the gold standard. Generally, monetary assets are convertible at a price -the discount rate- by the central bank (the basic operations of the discount window were examined in ch.III, sec.1). Hence, the rate at which T central bank has to convert a given NFT into gold is an inverse function of the discount rate.

Important extensions of the transfer theory were made in the wake of the then new theories of international payments (Hawtrey (1926, 1927), Keynes (1930, ch.XXI, XXVII, XXVIII), Kindleberger (1937), Viner (1937, ch.V)). In particular, Keynes envisaged a classical solution to the transfer problem (changes in relative prices) but with a mechanism based on discount rates in the place of gold movements. It is higher discount rate in T (possibly with lower discount rate in R) that should bring about excess supply of domestic output (namely investment) and deflation in T, coupled with excess domestic demand and inflation in R, necessary to obtain the NRT between the two. Keynes concluded that

for the most part, approximate equality between [NFT] and [NRT] is preserved, not by an increase in [NFT] directly stimulating and increase of [NRT], but because an excess of [NFT] over [NRT] brings about either the threat or the fact of a movement of gold,.which induces the banking authorities of the countries concerned so to alter their terms of lending as temporarily to reduce the net amount of [NFT] and ultimately to increase [NRT] [...] through the medium of a disturbance of the existing investment equilibrium in both countries leading to appropriate changes in relative prices at home and abroad (1930, p.296).

The outstanding feature of this monetary mechanism is that the condition of international flow equilibrium is endogenized through discount rates -or else, the discount rate is assigned to the external objective. The overall balance of payments being null, the money stock is also implicitly in equilibrium. Thus the problem arises of whether internal flow equilibrium still obtains. Evidently, Mundellian issues of thirty years later were not absolutely novel.[11]

In order to capture this point it is sufficient to specify the "compensatory effects" of discount rates on NFT and to substitute the money stock equations in system 1 with external-internal flow equilibrium equations, i.e.:

(1e) $B_t = Z_t(P_t, P^*_t) + F_t(i_t, i^*_t) = 0$ $F'(i)>0,\ F'(i^*)<0$

(f) $O_t(P_t, P^*_t, i_t) = O_0$ $O'(P)>0,\ O'(P^*)>0,\ O'(i)<0$

(g) $O^*_t(P_t, P^*_t, i^*_t) = O^*_0$

i, i^* = T and R discount rate, O, O^* = T and R total output.

The key issue in this model is immediately apparent: there are four endogenous variables for three equations. The trouble lies in the BIT equation; for only one independent endogenous variable (discount rate) is admissible. In other words the missing equation is the one showing the relationship between the two discount rates. According to modern analysis, either the two rates must be continuously equalized ("perfect capital mobility") or their differential reflects imperfections in capital mobility. Clearly, the former case is the most consonant with the classical framework and was in fact widely accepted. In this case, each single central bank cannot modify the "world rate" independently of the others, while it cannot differentiate its own rate individually. This means that we can hardly expect divergent movements in discount rates to take place as was sometimes envisaged by early analyses. Consequently, the opposite effect of NFT on demand in T and R is not fully explainable within the discount-rate model. This is an important analytical flaw, to which we shall have to go back later on (see ch.VI).

Nonetheless, it is still possible to study a situation in which T central bank must raise its own rate (plausibly because the world rate is rising) in an attempt to countervail an exogenous NFT (-dF). With a slight re-arrangement of system 1e-g, the solutions of the three endogenous variables (i2, P, P*) are given by the following Jacobian matrix (see App.A.1):

$$\begin{bmatrix} F'_i & -Q'_x & Q'_m \\ -O'_i & -Q'_x & Q'_m \\ 0 & Q'_x & O^{*\prime}_{p^*} \end{bmatrix} \begin{bmatrix} di \\ dP \\ dP^* \end{bmatrix} = \begin{bmatrix} dF \\ 0 \\ 0 \end{bmatrix}$$

We obtain:

$$di > 0,\ dP < 0,\ dP^* > 0$$

The rise in the discount rate is proportional to the insensitiveness of compensatory capitals and of domestic output $[1/(F'_i + O'_i)]$. Given the fall in domestic output ($-O'_i di$), and the switch from imports to domestic consumption if P* rises ($Q'_m dP^*$), T general price level has to fall to fill the output gap with exports ($-Q'_x dP$). Since lower P induces a switch in R from domestic consumption to imports ($Q'_x dP$), P* has to rise to generate additional domestic output ($O^{*\prime}_{p^*}$). The depth of T domestic deflation is exacerbated by rigidity of R demand for T goods, by low domestic inflation in R, by strong discount-rate effects on output. The first factor has already been considered in sec.1 (see also below, par.3-4, for further treatment). The latter two factors offer instead a novel insight which was especially emphasised by Keynes; indeed, if R demand for T goods is rigid and R inflation is low, there **must** be strong discount-rate effects on T output and prices[12].

The classical model-cum-discount rate highlights some important aspects of the transfer process; in particular it shows how flow equilibrium can be obtained immediately with no, or little, shift of gold. On the other hand, the model retains the principle that the only means of sending goods to R economies is through real depreciation in T economies, though it is faulty in its explanation of whether and how R-economies' monetary expansion is brought about. The strong implication seems that world transfers should be expected to raise T-economies' discount rates and real exchange rates substantially, the evidence for which was, at times of fixed exchange rates, scant. It is hard to believe that in the case of NFT spanning years or decades, the world transfer process should only hinge on steady increases of discount rates and decreases of prices in one part of the world.

2.3. Tradable and non-tradable goods.

The few figures on relative price changes in world transfer problems shown in par.1 point to various possible amendments to the international-trade side of the classical model. (i) Almost all countries, no matter how "large", involved in substantial and persistent world transfers have normally displayed **two** distinct patterns of relative prices: a pattern for relative general price levels (eP*/P), and a pattern for the real exchange rate (eP^*_x/P_x). (ii) Such changes in relative prices were, however, too small to sustain large and persistent goods movements. Not all the solutions so far proposed in the literature are consistent with both facts and theoretical arguments.

The first and most celebrated amendment is Cassel's (1922) principle according to which international trade across integrated markets deals with homogeneous goods no less than domestic trade; the assumption here is one of world monoproduct. The extreme implication is that the Law of One Price must hold on all markets (Frenkel-Johnson (1976)), or less strictly, that purchasing power parity should be established as a long-run norm (McKinnon (1979))[13]. The evidence in favour of international trade in homogenous goods, or of effective commodity arbitrage, or of purchasing power parity as a dynamic law of price changes has always been puzzling, whether under fixed or flexible exchange rates; lately, there seems to be widespread disbelief in any of these conditions (Kravis-Lipsey (1978), Dornbusch (1987b)). For instance, charts 3 and 4 (above) and chart 5 (below) do not bear evidence that exchange rates have worked to offset changes in relative prices over the first ten years of fluctuation (1973-1984). The usual lines of attack concentrate on the set of strong conditions that must hold if the world monoproduct assumption is to be linked with the law of one price. These conditions are essentially two: (i) perfect competition among producers, (ii) perfect arbitrage among consumers (see also above, ch.I, sec.2). The law of one price fails if either (i) or (ii) fail. A number of cases have been made in which imperfect competition (Dornbusch (1987b, sec.IIIA)) or imperfect information (Giovannetti (1987)) interfere with the law of one price even under the assumption of world product homogeneity. However, this assumption is questionable in itself.

It was shown in ch.I (sec.2) that the law of one price for homogeneous goods and purchasing power parity for different currency-commodities are trivial implications of Arrow-Debreu general competitive equilibrium. In fact, general competitive analysis is concerned with alternative allocations, and problems of alternative allocations arise either because (i) goods are not homogeneous, or because (ii) if they are homogenous, they are still produced in different "places". In case (ii) the price must be equalized net of transport costs, and, of course, there are no interlocal movements of such goods (there are neither "exports" nor "imports"). But why would it be worthwhile producing the same good in different places if, say, proximity to consumers did not yield producers any benefit? General competitive analysis indicates the place of a theory of localization; the pure theory of international trade is on the whole an attempt to take that place (though it brings nations and national interests into the analysis deceitfully). In this view, pure trade theory has tried quite correctly to explain product specialization, rather than homogeneity. According to Harrod's (1973, ch.IV) sensible systematization, and to the celebrated revision of trade theory by Helpman and Krugman (1985, Part II), we have both theoretical and empirical reasons for distinguishing between a class of **homogenous products** and a class of **specialized products**. The former typically includes primary commodities, for which organized markets and hence one world price exist. The latter instead includes manufactured goods, in the production of which localization is important because of comparative advantages in local knowledge and information on techniques and tastes. In the class of specialized products the law of one price cannot hold (Dornbusch (1987b, sec.IIIB)).

It is well-known that one need not invoke the law of one price to obtain positive correlation across goods prices -i.e. a weak form of purchasing power parity or of international market integration. If two goods are substitutes to consumers and to producers, though not perfect substitutes, the price dynamics of the one good will be transmitted to the other through substitution with a correlation degree closer to unity, the closer the two goods are substitutable. Yet what is implied in most modern versions of the purchasing power parity doctrine is not substitution across goods, but substitution between the consumption basket and money in different countries. In this case, in order to observe perfect correlation (albeit spurious correlation) between general price levels, one should impose two severe restrictions, namely that consumption baskets have the same composition, and that the dynamics of money supply relative to the money stock is equal, across countries. By contrast, classical transfer theorists would argue that world monetary stability obtains as the dynamics of money supplies is divergent and relative general price levels do change.

As a matter of fact, the items of evidence collected above do not support the idea of large and systematic divergent price cycles; yet the extent of actual changes in relative prices suggests that the classical transfer model assumes, not too much, but too little specialization. Taussig (1917, 1928), Viner (1924; 1937, ch.VI, sec.VI)) and Keynes (1929; 1930, ch.XXI) all brought modifications to the classical model by introducing an element that would become quite popular in later developments of trade balance models: a class of **non-tradable goods**[14]. Non-tradable goods belong to specialized products; they are in fact fully specialized products on a local basis, either because they have no other market than the local one or because they cannot be transported profitably. Home producers of non-tradables do not compete with foreign producers of the same non-tradable abroad. The first important consequence of the inclusion of non-tradables is that the NRT emerges as a genuine problem of substitution in each economy's output mix. The second is that the composition of the output mix becomes relevant to price dynamics; and in particular real exchange rates may diverge from relative general price levels. Finally, as a third consequence the model allows for explicit analysis of the condition that the level of output does not change in the course of adjustment (a condition which must hold if demand for real balances is to stay stationary).

Let the general price index in T and R simply be

$$P = \omega_d P_d + \omega_m P_m$$
$$P^* = \omega^*_d P^*_d + \omega^*_m P^*_m$$

where ($\omega_d + \omega_m = 1$) are the weights of non-tradables and importables (for simplicity, exportables are not consumed domestically). Changes in the general price index, which must be consistent with money stock equilibrium, result from compound changes in sectoral prices. Therefore two further endogenous variables are added to system 1 for each country: the price of non-tradables (P_d, P^*_d), and the price of importables (the price of other countries' exportables) ($P_m \equiv eP^*_x$, $P^*_m \equiv P_x/e$). In principle, sectoral prices should be determined by respective product market equations; however, since sectoral prices are linearly dependent through the price-index constraint, we only need one further equation for each country. The classical candidate is a constant output equation. We may thus rewrite system 1 as follows

(4a) $$Z_t = P_{xt}Q_{xt}(P_{xt}) - eP^*_{xt}Q^*_{xt}(P^*_{xt})$$

(b) $$B_t = Z_t + F_t$$

(c) $$H_0 + B_t = P_t H2_0(O_0) \qquad P_t = \omega_d P_{dt} + \omega_m eP^*_{xt}$$

(d) $$H^*_0 - B_t = P^*_t H2^*_0(O^*_0) \qquad P^*_t = \omega^*_d P^*_{dt} + \omega^*_m P_{xt}/e$$

(e) $$O_0 = O_{dt}(P_{dt}) + O_{xt}(P_{xt})$$

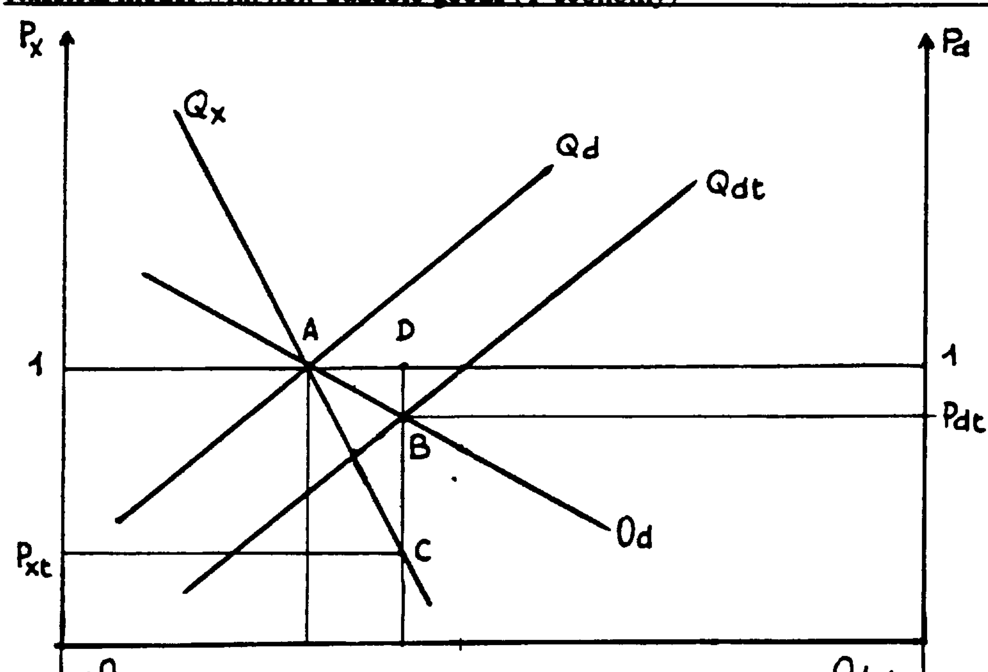
(f) $$O^*_0 = O^*_{dt}(P^*_{dt}) + O^*_{xt}(P^*_{xt})$$

Equations 4c-f are sufficient to determine the six endogenous variables consisting of sectoral and general prices in T and R, given an exogenous transfer (-dF). This porperty can be verified in the Jacobian matrix of sub-system 4c-f, expressed in rates of change, whose determinant is different from zero (see App.A.2):

$$\begin{bmatrix} \omega_d & 0 & 0 & \omega_m \\ 0 & \omega^*_d & \omega^*_m & 0 \\ \eta_d O_d & 0 & -\varepsilon_x Q_x & 0 \\ 0 & \eta^*_d O^*_d & 0 & -\varepsilon_m Q_m \end{bmatrix} \begin{bmatrix} \delta P_d \\ \delta P^*_d \\ \delta P_x \\ \delta P^*_x \end{bmatrix} = \begin{bmatrix} -h \\ h^* \\ 0 \\ 0 \end{bmatrix}$$

Since the full expressions for the endogenous variables are unwieldy and of little use, it is convenient to make the simplifying assumption that (ω_d, $\omega^*_d = 1$). This captures the classical idea that the core of the transfer mechanism lies in the sectoral adjustment between non-tradable and exportable goods. The sectoral adjustments of prices and output are drawn in fig.2.

Fig.2. The currency transfer problem and sectoral adjustments of prices and output in the classical model with non-tradable goods (T-economy)



The impact of the currency transfer on money stock equilibrium calls for general deflation in T and general inflation in R. This is obtained by cutting demand for non-tradables in T and expanding it in R until ($\delta P_d = h < 0$, $\delta P^*_d = h^* > 0$)). T domestic output will also be cut by ($\delta O_d = \eta_d \delta P_d < 0$, where $\eta_d > 0$ is supply elasticity, from point A to B in fig.2). The transfer problem is then one of substituting non-tradables with exportables; T price of exportables will have to fall so that abstracting from initial quantities ($\delta O_x = -\delta O_d = \delta Q_x = -\varepsilon_x \delta P_x$; from point A to point C in fig.2). The salient implication is that the BIT (equation 4b) is adjusted residually. In fact, by substituting the above results in equation 4b we obtain for the T economy:

(5) $$\begin{aligned} dB/X &= \delta Q_x + \delta P_x - \delta Q^*_x - \delta P^*_x - f \\ &= h[\eta_d(1 - 1/\varepsilon_x)] - h^*[\eta^*_d(1 - 1/\varepsilon_m)] - f \end{aligned}$$

where there are no specific endogenous variables. The adjustment of NRT will be of the correct sign ($dZ/X > 0$) if variables and parameters have the expected signs; however, there is no guarantee that the currency transfer is completely effected in goods ($dB/X = 0$), if the adjustment of non-tradable output and exportable output has to leave total output unchanged. Given the impact effect of NFT on BIT, it is not difficul to extend the transition towards the stationary state as shown in sec.1.1 to the present case.

In the course of adjustment, this model yields three important variations in T relative prices:

(i) in the relative general price levels: $\delta P^* - \delta P = h^* + h > 0$;

(ii) in the real exchange rate: $\delta P^*_x - \delta P_x = h^* \eta^*_d / e_m + h \eta_d / e_x > 0$

(iii) in the tradables/non-tradables relative price: $\delta P_x - \delta P_d = -h(\eta_d/\varepsilon_x - 1)$

The signs of the first two variations are unambiguous; T should have a depreciation both in the relative general price level and in the real exchange rate. The sign of the domestic adjustment of tradables/non- tradables relative price is instead dependent on the relative magnitude of elasticities. However, whereas the amplitude of (i) is given by the monetary impact of the transfer in the two economies, the amplitude of (ii) and (iii) will also depend on relative elasticities.

As we have seen above, theoretical arguments and empirical evidence are traditionally divided on these grounds. The body of literature centred on the idea of low (or nil) product specialization in international trade, or on the (small country's) inability to modify real exchange rates unilaterally, is here represented by setting large values of international demand elasticities. As (ε_x, ε_m -> ∞), we should observe negligible changes in the real exchange rate while real depreciation is shifted onto the non-tradables relative price (e.g. Dornbusch (1973b)). The sectoral adjustment implied is such that, whatever the amount (and composition) of T, excess supply is readily exportable at the going world price (Q_x is a horizontal line through points A and D in fig.2). We have seen previously a number of reasons why such a picture is not convincing. By contrast, the idea of effective product specialization, or that quantities are not readily modifiable on international markets, amounts to setting finite values of ε_x, ε_m. The typical presumption in this case is that in the sheltered sector of non-tradables the price is weakly responsive to demand, whereas in the open sector of exportables the quantity is weakly responsive to the price ($\eta_d/\varepsilon_x > 1$, $\eta^*_d/\varepsilon_m > 1$); as a consequence, we should observe amplified depreciation of the real exchange rate together with appreciation, instead of depreciation, of the non-tradables relative price (the case of fig.2) (e.g. Keynes (1930, ch.XXI))[15].

As already remarked with reference to charts 1 to 4, it seems that changes in relative prices did play a role in major transfer episodes, with clearly distinct patterns for tradables and non-tradables. Yet such patterns display slight variations of relative prices with large and continued goods movements in the same direction. One might conclude that this is an empirical matter of elasticities; alternatively, in the coming chapters, we shall see how different approaches to the transfer problem bring to light other, and stronger, forces underlying it.

2.4. Flexible exchange rates

My own view is that at a given time the economic structure of a country, in relation to the economic structures of its neighbours, permits of a certain "natural" level of exports, and that arbitrarily to effect a material alteration of this level by deliberate devices is extremely difficult. Historically, the volume of foreign investment has tendend, I think, to adjust itself -at least to a certain extent- to the balance of trade, rather than the other way round, the former being the sensitive and the latter the insensitive factor (Keynes (1929, p.167)).

The foregoing is Keynes's famous statement of classical pessimism as to the ability of integrated economies -and especially non-dominant economies- to cope with "sensitive" international financial transfers. The argument was restated with greater analytical accuracy in chapter XXI of the **Treatise**, whose key features of the real side can be seen in model 5 in the previous paragraph. As a matter of fact, if pessimism was not justified in the heyday of the gold standard, it was mounting up at the time Keynes was writing in the 1920s. Also, in the **Treatise** we find explicit mention of flexible nominal exchange rates as a remedy against external transfer shocks (especially in the case of exogenous increases of import prices); in much the same spirit, both Joan Robinson (1937) and Machlup (1939) analyzed the role of flexible exchange rates in the transfer problem. Here we shall modify the classical transfer model 5 by introducing a fully flexible exchange rate with no intervention by central banks. Since we retain the money stock equation, we shall obtain a variation in the monetary approach to the exchange rate[16].

The most important feature which makes the model more "classical" than "modern" is that product specialization is retained too; not only in terms of non-tradable, but also in terms of tradable goods. In fact, such a specification is necessary to give content to the choice of the flexible rates regime. As we have seen in the previous paragraph, were T exportable good a world commodity with infinitely elastic demand at the world price, T transfer problem would be immediately solved as soon as sufficient resources were switched from the non-tradable to the exportable industry; problems in switching production fall outside the classical theory. By contrast, the exchange rate may become a relevant variable when transfer difficulties arise from the demand side of T exports -e.g. for the reasons discussed in par.2-3. To analyze this point, we still need the classical trade-balance equation, instead of the modern law of one price, to determine the exchange rate. Note that T and R prices of exportables are neither fixed nor equalized through arbitrage; their changes are simply prevented by market-clearing changes of the exchange rate. The rest of the model works as it does in previous cases, i.e. through the transfer effect on the money stock and the demand for domestic goods. Hence, we have

(6a) $$Z_t = P_{x0}Q_{xt}(P_x/e) - eP^*_{x0}Q^*_{xt}(eP^*_x)$$

(b) $B_t = Z_t + F_t = 0$

(c) $H_0 + B_t = P_t H2_0(O_0)$ $\quad P_t = \omega_d P_{dt} + \omega_m e P^*_{x0}$

(d) $H^*_0 - B_t = P^*_t H2^*_0(O^*_0)$ $\quad P^*_t = \omega^*_d P^*_{dt} + \omega^*_m P_{x0}/e$

Setting (P_{x0}, $P^*_{x0} = 1$, dP_x, dP^*_x -> 0), model 6 has five endogenous variables (P_t, P_{dt}, P^*_t, P^*_{dt}, e_t) which reduce to three because of the linear constraint imposed by general price indexes. This is shown in the following Jacobian matrix of the system, for exogenous shocks (-f,-h, h*), whose determinant is non-zero if ($\beta \neq 0$) (see App.A.3):

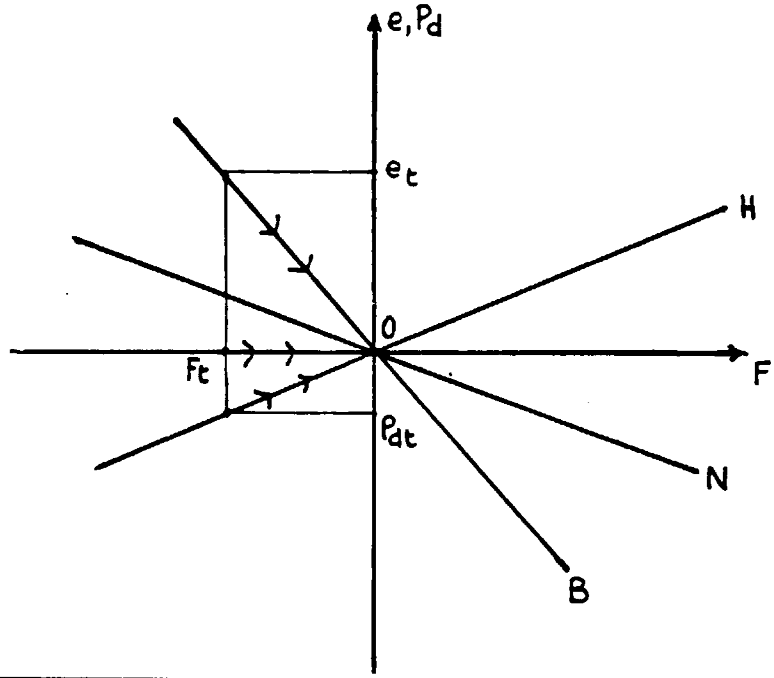
$$\begin{bmatrix} \beta & 0 & 0 \\ 1-\omega_d & \omega_d & 0 \\ -(1-\omega^*_d)/e & 0 & \omega^*_d \end{bmatrix} \begin{bmatrix} \delta e \\ \delta P_d \\ \delta P^*_d \end{bmatrix} = \begin{bmatrix} f \\ -h \\ h^* \end{bmatrix}$$

where ($\beta = \varepsilon_x + \varepsilon_m - 1$) is the Marshall-Lerner total elasticity of the trade balance with respect to the exchange rate. The expected sign is ($\beta > 0$). we measures the rate of change in the exchange rate, which, due to the assumptions on the prices of tradables, comes to coincide with the T rate of real depreciation necessary to keep overall payments in balance, i.e.

$$\delta e \equiv \delta r = f/\beta > 0$$

Obviously, depreciation is greater the heavier the nominal transfer burden, and the smaller the trade-balance elasticity. T excess output, and R excess expenditure, behind the positive NRT are obtained through the monetary impact of the transfer on the two economies. Interestingly, for reasons already explained, the model does not change qualitatively even without direct involvement of the exchange rate in the money stock adjustment. Setting also in this case (β_d, $\beta^*_d = 1$), T and R money stocks are isolated from exchange-rate effects; the solution for the non-tradable goods markets will be a fall in T price and output and a rise in R price and output up to ($\delta O_d = -\eta_d h$, $\delta O^*_d = \eta_d{}^* h^*$). Figure 3 shows the equilibrium schedules of the overall balance B and of the money stock H for T, and the solutions for (e, P_d).

Fig.3. The currency transfer problem in the classical model with non- tradable goods and flexible exchange rate (T-economy)



At this stage it should be clear that the first oustanding implication of the classical transfer model under flexible rates is that the condition of constant output seems to be underdetermined. Unless elasticites assume particular values, there is no guarantee that the expansion of exportable output ($f\varepsilon_x/\beta$) will exactly replace the contraction of non-tradable output in T ($-\eta_d h$), and vice versa in R. In general, the condition under consideration ($\varepsilon_x e = \eta_d h$) imposes a negative relationship between (e, F) (N in fig.3). Given $-F_t$, all e_t above N entail excess depreciation and excess demand for T total output, whereas all e_t below N yield insufficient depreciation and excess supply of T total output.

These cases may generate serious troubles, since the whole model is based on a stable demand for money. Consider first the case in which N is flatter than B (fig.3); for (F_t, e_t, P_{dt}) T winds up with ($Z_t = F_t > 0$) and excess demand for total output. In this case there exists a consistent path towards stationary state along the schedules B and H - that is, internal reflation and external reappreciation. On the contrary, if N is steeper than B, so that T obtains ($Z_t > 0$) with excess supply of total ouput, there is no way back to stationary state; either e_t has to depreciate further, while there is excess supply of foreign currency on the foreign exchange market, or P_{dt} has to fall further, while there is excess supply of money through the foreign channel.

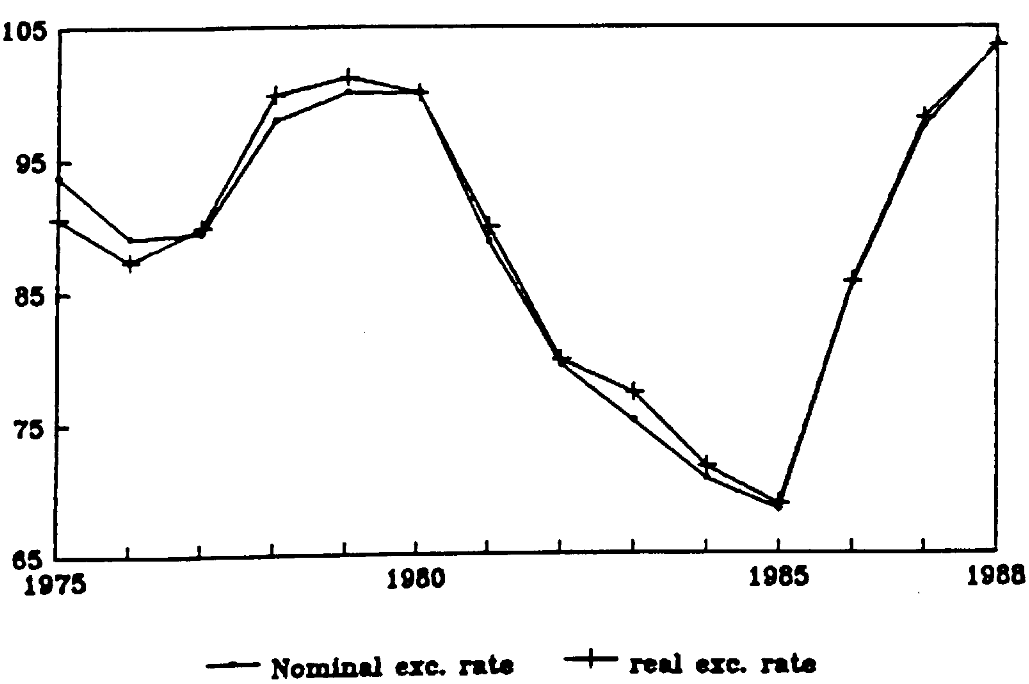
Flexible exchange rates are an effective instrument in the classical transfer problem to the extent that the trade-balance elasticty condition holds, and no excess supply in T (excess demand in R) is left after the adjustment of tradable output in the two economies. The distinctive prediction is that exchange rates and domestic prices should display countercyclical patterns, whereas the modern monetary model of the exchange rate predicts strongly procyclical patterns. The reason is that in the classical world exchange rates move as much as necessary to generate real depreciation of tradables, relative to both importables and domestic non-tradables, in T economies, instead of moving to prevent changes in relative prices of tradables. Such a difference, as already stressed, is not due to the general theoretical framework, but simply to different specifications of international trade.

The association of deflation with depreciation, and large swings in real exchange rates, may strain credibility. The favourite episodes of the monetarist school (the French franc devaluation 1919-25, German hyperinflation 1922-23, and the US dollar-D mark depreciation 1975-78), as well as various popular views of the trade balance, firmly underpin the idea that depreciation goes hand in hand with inflation. Those three episodes are of difficult interpretation in a transfer-problem view, mainly because they occured during the transition from one pattern of world transfers to another (see ch.IV, sec.3). In such circumstances, the trade balance, rather than the BIT, imposes itself as the effective external constraint; accordingly, monetary authorities and private agents tend to push exchange rates towards correcting relative price differentials. Most of the international activity in the 1920s, 1930s and late 1970s was directed to this end (Kindleberger (1984, Part IV), Argy (1981, Part I), Biasco (1987))[17].

In spite of the dramatic episodes of the early 1920s, the opposite classical view was the rule, more than the exception, during the floating experience of the 1930s -as we know from the fundamental work by Nurkse (1944). Almost all debtor countries in

Central Europe, Latin America and Oceania experienced domestic deflation -a slump indeed- and exchange-rate devaluation, nominal and real, after 1929 (Eichengreen-Portes (1987)). However, the most striking vindication of the classical presumption has come from the 1980-85 World-US transfer. As was noted soon after the inflation-**cum**-depreciation experience of the United States (e.g. Dornbusch (1980b)), the freely floating dollar had not shown any tendency to offset inflation differentials as was dictated by purchasing power parity. Moreover, the rate of growth of money excess supply (nominal money growth - income growth) had been higher in Germany than in the United States, in line with a widening trade surplus of the former and trade deficit of the latter. The picture was consistently one of transition in the world transfers pattern, rather than a story of "spendthriftness" (see also above, ch.IV secs.3.4-3.5). Since then, the United States has firmly taken the position of world R-economy **vis à vis** Europe, Japan and Latin America as world T-economies; since 1980 the nominal and the real paths of the dollar have been highly correlated, indeed, the latter is almost entirely explained by the former.

Chart 5. The US nominal and real exchange rate



In a classical perspective, the World-US transfer has been effected in goods through the nominal-real appreciation of the dollar, which has thus allowed for a massive process of substitution of imported and domestic goods for exportable goods on US markets, and of exportable goods for imported and domestic goods on foreign markets. The dollar nominal appreciation has almost entirely taken over relative changes in supply prices. There is evidence of initial relative general deflation in R-economies, and then imported deflation in the T-economy (see also Fitoussi-Phelps (1988, ch.II)). The comparative advantage of the classical interpretation, with respect to many modern monetarist versions, lies in its recognition of the transfer-problem nature of the present World-US interdependence, and in the role it assigns to goods substitutability within and across economies. However, the many shortcomings to the classical model itself can hardly be mended by manipulating elasticites; they rather call upon major modifications in the anaylsis of the world transfer problem.

Appendix

A.1. Solution of system 1e-g

System 1e-g joins the goods-markets equations of the classical model with a monetary mechanism based on the discount rate as the endogenous variable in the BIT equation. Hence we obtain:

(A1) $B_t = Z_t(P_t, P^*_t) + F_t(i_t, i^*_t) = 0$ $\qquad$ $F'(i)>0,\ F'(i^*)<0$

(A2) $O_t(P_t, P^*_t, i_t) = O_0$ $\qquad$ $O'(p)>0,\ O'(p^*)>0,\ O'(i)<0$

(A3) $O^*_t(P_t, P^*_t, i^*_t) = O^*_0$

i, i^* = T and R discount rate, O, O^* = T and R total output.
As such the world model displays four endogenous variables for three equations. The classical strategy is to assume perfect capital mobility and to impose

(A4) $i_t = i^*_t$

Now the model runs by assuming implicitly ($dF/di^* < 0$) -i.e. a rise in the world discount rate generates a negative NFT from T- and solving explicitly for the three endogenous variables [i, P, P*]. Eq.A2 of T output is specified so that the change in domestic output ($O'(i)di$) must be offset by change in foreign demand ($-Q'_x(P)dP$) and substitution in import consumption ($Q'_m(P^*)dP^*$). Eq.A3 of R output is so specified that the change in domestic output ($O^{*\prime}(P^*)dP^*$) must substitute for the change in import consumption (i.e. T exports, $Q_x(P)dP$). The Jacobian matrix of system A1-A3 results as follows:

(A4)
$$\begin{bmatrix} F'_i & -Q'_x & Q'_m \\ -O'_i & -Q'_x & Q'_m \\ 0 & Q'_x & O^{*\prime}_{p^*} \end{bmatrix} \begin{bmatrix} di \\ dP \\ dP^* \end{bmatrix} = \begin{bmatrix} dF \\ 0 \\ 0 \end{bmatrix}$$

The determinant of the system is:

$$\Delta = -Q'_x(O^{*\prime}_{p^*} + Q'_m)(O'_i + F'_i) < 0$$

The solution vector of the endogenous variables is:

$$di/dF = -Q'_x(O^{*\prime}_{p^*} + Q'_m)/\Delta = 1/(O'_i + F'_i) > 0$$
$$dP/dF = O'_i O^{*\prime}_{p^*}/\Delta < 0$$
$$dP^*/dF = -Q'_x O'_i/\Delta > 0$$

A2. Solution of system 4.

System 4 represents the classical transfer model with tradable and non-tradable goods as follows

(A1) $Z_t = Px_t Q_{xt}(Px_t) - eP^*_{xt} Q^*_{xt}(P^*_{xt})$

(A2) $B_t = Z_t + F_t$

(A3) $H_0 + B_t = P_t H2_0(O_0)$ $\quad P_t = \omega_d P_{dt} + \omega_m e P^*_{et}$

(A4) $H^*_0 - B_t = P^*_t H2^*_0(O^*_0)$ $\quad P^*_t = \omega^*_d P^*_{dt} + \omega^*_m P_{xt}/e$

(A5) $O_0 = O_{dt}(P_{dt}) + O_{xt}(P_{xt})$

(A6) $O^*_0 = O^*_{dt}(P^*_{dt}) + O^*_{xt}(P^*_{xt})$

There are four independent endogenous variables in the system (P_{dt}, P^*_{dt}, P_{xt}, P^*_{xt}) which yield in addition (P_t, P^*_t, Z_t). The four equation which solve the system are A3-A6. The Jacobian matrix of the equilibrium variations of endogenous variables is obtained under the following constraints: ($dH = 0$, $dB = dF$), ($dH^* = 0$), ($dO = 0$), ($dO^* = 0$). The latter two constraints imply that the change in domestic output must be compensated by an opposite change in export output; hence $O_{xt}(P_{xt})$ and $O^*_{xt}(P^*_{xt})$ should be equivalent to $Q_{xt}(Px_t)$ and $Q^*_{xt}(P^*_{xt})$ respectively. Therefore, setting ($dF < 0$, $h < 0$, $h^* > 0$),

(A7)
$$\begin{bmatrix} \omega_d & 0 & 0 & \omega_m e \\ 0 & \omega^*_d & \omega^*_m/e & 0 \\ O'_{dp} & 0 & -Q'_{xp} & 0 \\ 0 & O^{*\prime}_{dp} & 0 & Q'_{mp} \end{bmatrix} \begin{bmatrix} dP_d \\ dP^*_d \\ dP_x \\ dP^*_x \end{bmatrix} = \begin{bmatrix} -hP_0 \\ h^*P^*_0 \\ 0 \\ 0 \end{bmatrix}$$

Setting all time 0 nominal variables equal to 1 and arranging to obtain rates of change, the Jacobian can be rewritten as follows:

(A7b)
$$\begin{bmatrix} \omega_d & 0 & 0 & \omega_m \\ 0 & \omega^*_d & \omega^*_m & 0 \\ \eta_d O_d & 0 & \varepsilon_x Q_x & 0 \\ O\eta^*_d & O^*_d & 0 & -\varepsilon_m Q_m \end{bmatrix} \begin{bmatrix} \delta P_d \\ \delta P^*_d \\ \delta P_x \\ \delta P^*_x \end{bmatrix} = \begin{bmatrix} -h \\ h^* \\ 0 \\ 0 \end{bmatrix}$$

The determinant of the matrix is:

$$\Delta = \omega_d \omega^*_d \varepsilon_x Q_x \varepsilon_m Q_m - \omega_m \omega^*_m \eta_d O_d \eta^* = 0$$

The solutions of the four endogenous variables are (all time 0 nominal variables set equal to 1):

$$\delta P_d = (h\omega^*_d \varepsilon_m Q_m + h^* \omega_m \eta^*_d O^*_d) \varepsilon_x Q_x / \Delta$$

$$\delta P^*_d = (-h\omega^*_m \eta_d O_d - h^* \omega_d \varepsilon_x Q_x) \varepsilon_m Q_m / \Delta$$

$$\delta P_x = (\eta_d O_d/\varepsilon_x Q_x)\delta P_d$$
$$\delta P^*_x = (\eta^*_d O^*_d/\varepsilon_m Q_m)\delta P^*_d$$

The signs are consistent with the classical theory if ($\Delta > 0$), then:

$$\delta P_d < 0,\ \delta P^*_d > 0,\ \delta P_x < 0,\ \delta P^*_x > 0.$$

In order to obtain ($\Delta > 0$) it must be that

$$\frac{\omega_m \omega^*_m}{\omega_d \omega^*_d} < \frac{\varepsilon_x Q_x \varepsilon_m Q_m}{\eta_d O_d \eta^*_d O^*_d}$$

The economic meaning is that the weights in the money stock deflator must be such that imported inflation in T (imported deflation in R) does not overweighs domestic deflation (domestic inflation).

A.3. Solution of system 6.

System 6 reproduces the classical transfer model, with tradable and non-tradable goods, under a flexible exchange-rate regime:

(A8) $Z_t = P_{x0}Q_{xt}(P_x/e) - eP^*_{x0}Q^*_{xt}(eP^*_x)$

(A9) $B_t = Z_t + F_t = 0$

(A10) $H_0 + B_t = P_t H2_0(O_0)$ $\qquad P_t = \omega_d P_{dt} + \omega_m eP^*_{x0}$

(A11) $H^*_0 - B_t = P^*_t H2^*_0(O^*_0)$ $\qquad P^*_t = \omega^*_d P^*_{dt} + \omega^*_m P_{x0}/e$

Setting ($P_{x0}, P^*_{x0} = 1, dP_x, dP^*_x \dashrightarrow 0$), the model should yield five endogenous variables ($P_t, P_{dt}, P^*_t, P^*_{dt}, e_t$) which reduce to three because of the linear constraint imposed by general price indexes. The three solving equations are obtained by substituing A8 into A9 in addition to A10 and A11. The three equations operate under the following constraints ($dB = 0$), ($dH = dF$), ($dH^* = -dF$), with ($dF < 0$); hence the resulting Jacobian matrix, in rates of change, is:

(A12)
$$\begin{bmatrix} \beta & 0 & 0 \\ 1-\omega_d & \omega_d & 0 \\ -(1-\delta^*_d)/e & 0 & \$^*_d \end{bmatrix} \begin{bmatrix} \delta e \\ \delta P_d \\ \delta P^*_d \end{bmatrix} = \begin{bmatrix} f \\ -h \\ h^* \end{bmatrix}$$

where ($\beta = \varepsilon_x + \varepsilon_m - 1$) is the Marshall-Lerner total elasticity of the trade balance with respect to the exchange rate. The expected sign is ($\beta > 0$). The determinant of the matrix is:

$$\Delta = \beta\omega_d\omega^*_d > 0$$

The solution vector of the endogenous variables is:

$$\delta e = f/\beta > 0$$

$$\delta P_d = -h/\omega_d - (\omega_m/\omega_d)\delta e < 0$$

$$\delta P^*_d = h^*/\omega^*_d + (\omega^*_m/\omega^*_d)\delta e > 0$$

Notes

(1) This was in fact the view of early scholars in the 19th century (McCulloch (1804), Longfield (1840), and with particular analytical clarity, John Stuart Mill (1848, ch.XXI)), but it was also held by later writers such as Taussig (1917, 1928), Viner (1924), and Keynes (1929, 1930, ch.XXI). Early debates were occasioned by rent transfers from Ireland to England, and later by payments from and to colonies (Viner (1937, ch.IV, sec.3)). Taussig and Keynes took active part in the debate on Germany's ability to pay her war debts.

(2) For a more extended treatment in the history of thought see Tamborini (1985).

(3) This was one of Keynes's arguments in his pessimistic view of the German transfer problem (1929, p.162), although this was **not** his major one (see below sec.2.2).

(4) That is to say, the same conditions that support the "orthodox presumption" of the effectiveness of nominal depreciation on the trade balance (Robinson (1937)) also support the presumption of the effectiveness of real depreciation on the transfer problem.

(5) See e.g. Krueger (1983, ch.III), Kenen (1985).

(6) On the introduction of the money equation as the missing equation in trade balance models see again Krueger (1983, ch.III), and in particular Frenkel-Johnson (1976). The model in use here bears similarities with Dornbusch's (1973a, 1973b); it adopts a major simplification in equations 1c-d: the money stock deflator is equal to the price level of the national good in each country and does not contain the price level of the imported good. For the time being, however, such a simplification does not modify results qualitatively and helps to keep the treatment manageable (see below, sec.2.2).

(7) This point was made clearly in the early 19th century in the context of a debate on negative corn harvests in Great Britain (see Viner (1937, ch.IV, sec.3)); the same point was magnified by oil price shocks in the 1970s (Balogh (1978), Balogh-Graham (1979)). Johnson (1956) and Dornbusch (1973a) analyzed the relationship between exchange-rate devaluation and the transfer problem.

(8) See e.g. Kenen (1985).

(9) Viner (1924), Angell (1926), Taussig (1928), Bresciani Turroni (1932), Kindleberger (1937) are among the most representative. These studies were also supplemented with accurate surveys and discussions by Iversen (1935) and Viner (1937).

(10) For instance, from 1872 to 1913 Britain's general price level relative to the United States initially appreciated by losing 18 points (1896) but then regained 12 points, while the same magnitude in relation to Germany even depreciated steadily by gaining 11 points (see the same source as chart 1). As for world prices of primary commodities relative to prices of manufactured goods, various sources indicate a depreciation between the 1870s and the 1910s ranging from 19 points (16%) to 3 points (2.5%) (see Aquino (1986, ch.II) for accurate statistics).

(11) For transfer models in a Mundellian framework see Tamborini (1984).

(12) Keynes's monetary view paved the way for an interesting literature on asymmetries in the burden of adjustment -or the "violations of the rules of the game". Asymmetries may be due to relative size, namely the case in which NFT is large for T central bank but is small relative to R money stock, or to different responsiveness of compensatory capitals, or to uncoordinated reaction functions, in which case R

monetary authority is not prepared to accept monetary inflation. Directly referring to this issue and to the negative historical record of the 1920s and 1930s, Eichengreen (1985) has shown in a policy-coordination model that a gold-standard regime may in fact fail to enforce enough coordination of inflation rates.

(13) On this distinction and related theoretical issues see Bruce-Purvis (1975, sec.4).

(14) For non-tradables in trade balance models see in general Harrod (1973, ch.IV), Kenen (1985), Bruce-Purvis (1985).

(15) For the sake of precision, Keynes put forward a more complex argument which is worth considering in detail. Keynes is usually considered to be the champion of elasticity pessimism in the transfer literature; however, his reasoning is not so much concerned with low demand elasticities as with efficient product specialization. As he wrote in the **Treatise**, "the amount of the alteration in the terms of trade [...] depends on non-monetary factors -on physical facts and capacities, and on the elasticities of demand in each of the two countries for goods which the other can produce with physical efficiency"(1930, p.301). Keynes had a sort of Ricardian model of export expansion. In a specialized world, T must produce and transfer goods that (i) were not previously produced in R since they were already exported by T, or that (ii) were previously produced in R and have now to be imported from T. Rigorously, the ratio η_d/ε_x may be unfavourable to T, not because ε_x is low absolutely (i.e. with reference to case (i)), but because T may have a less efficient output mix (case ii), and "it is unlikely that [R] would have previously [produced] the goods in question or refrained from importing them unless there was some gain in doing so" (p.300). Since the marginal efficiency of exportable output is negative, the latter cannot be produced efficiently at the going price of exportables relative to foreign exportables as well as domestic non-tradables. "I conclude that, if the payment of reparations involves a substantial change in the terms of trade, then it will probably be necessary to force down the rate of money earnings in Germany by means of a painful (and perhaps impracticable) process of deflation" (p.307).

(16) See general treatments by Krueger (1983, ch.IV) and Frenkel-Mussa (1985).

(17) However, the classical transfer model does have a channel through which domestic prices and exchange rates may become positively correlated: imported inflation. The simplest way to activate such a channel is by allowing (ω_m, $\omega^*_m = 0$) in the money stock deflator. Clearly, if the weighted increase of the exchange rate overtakes the weighted decrease of the price of non-tradables, the T-economy would have external depreciation, domestic slump and general inflation at the same time, the more so the more general inflation exerts a negative real-balance effect on the demand for non-tradables. A whole body of literature interprets German hyperinflation as the joint result of reparation payments and imported inflation (Kindleberger (1984, ch.XVII)). The inflationary experience of industrial economies in the 1970s has also been widely analyzed with the help of models of imported inflation -though largely non-classical models (Argy (1981, Part III), Biasco (1979)). In this connection, one can find an impulse in oil price shocks, which gave rise to a massive currency transfer from oil- importers to oil-exporters (for the analytics of this point see above, sec.1.2). Then higher oil prices and competitive devaluations made for a typical transfer problem with imported inflation.

CHAPTER SIX

THE TRANSFER PROBLEM AS A FINANCING-UTILIZATION PROBLEM. REAL EXPENDITURE AND INCOME

Introduction

The identification of the transfer problem with the central bank's (especially T central bank's) currency problem captures only a part of the whole transfer process. This limitation may become serious as soon as one considers a monetary organization different from the idealized gold-standard of the classics. For instance, the monetary organization that was introduced in ch.III makes use of paper currency issued by the central bank - largely **inside money**- and trades **monetary and non-monetary assets** internationally. In the previous chapter on the classical transfer theory it was stressed that, under such a different organization, shifts of "gold" alone may leave the world transfer mechanism with too weak a driving force -and even under the official gold standard actual gold movements did not take place on the scale implied by movements of real resources. Moreover it is not difficult to realize that the currency-problem approach totally ignores **why** a financial transfer is undertaken.

In order to overcome the limitations of the classical transfer theory, we should move towards a theory including such features as (i) some form of international paper standard, (ii) world financial transfers as results of autonomous private trade in assets. It also follows that the transfer process can no longer be derived exclusively from central bank reaction functions; for (ii) implies that a financial transfer from T to R is a **direct counterpart of autonomous demand for and supply of capitals**. From this standpoint, the focus of the transfer problem shifts to sources of capital supply in T and to the employments of capital demand in R, or in Johnson's (1956) terminology, it becomes a **financing-utilization problem**. This approach to the problem leads to a variety of specifications, each of which highlights crucial analytical aspects and observable phenomena that find no room in the classical theory. As will be seen in sections 1 and 2 under different exchange rate regimes, the new pivot of the transfer process is its effects on **real expenditure and income**.

1. The financing-utilization problem under fixed exchange rates

1.1. The general framework for analysis.

The classical theory disregards a fundamental aspect of the world transfer problem: any NFT from T to R economies has a counterpart in excess supply of capitals in the former and excess demand for capitals in the latter. Or better, the classical theory runs as if this could only obtain **ex post** and in real terms, while the fact that it holds ex **ante** and in financial terms is the key characteristic of a non-stationary world as defined hitherto. Put differently, the causal relation does not go from the currency market inwards, but the other way round. Ohlin (1933, ch.XXI) greatly contributed to understand this point, and his name is usually tied with the revival of a minoritarian tradition dating back to Ricardo (1809)[1], according to which any NFT is a "transfer of purchasing power" connected with a shift of demand from T to R independently of changes in the real exchange rate. NFT correspond to situations in which

> the buying power in [R] has been increased, while that in [T] has been reduced [...] **There is thus a market in [R] for more of [T's] goods than formerly**. On the other hand, the market in [T] for [R's] goods is not as big as it was before. The local **distribution** of the total demand has changed. [R] has become a better and [T] a worse market for goods of all kinds (1933, p.406-407).

Johnson (1956) also made an important contribution in this respect, one which is easily translatable into our stock-flow matrix. T excess demand for foreign currency should correspond to the excess supply of domestic funds; the latter may come from two sources: (i) the displacement of current expenditure (or components of expenditure), or (ii) the mobilization of existing wealth (or components of wealth). This is T **financing problem**. Conversely, R excess supply of foreign currency should have its counterpart in the excess demand for funds; these may find two outlets: (i) the enlargement of current expenditure (or components of expenditure), or (ii) the accumulation of wealth (or components of wealth). This is R **utilization problem**.

Combinations of these four possibilities yield a virtually complete range of types of capital transfers and appropriate transfer theories, each including the currency problem as an intermediate step. The most interesting cases will be examined in this chapter.

Underlying excess demand for and supply of financial means there should be complementary shifts of demand on goods markets in each economy -or **expenditure effects**- either **directly** (through channels (i) above) or **indirectly** (through channels (ii) above), or a mixture of the two. The existence of expenditure effects immediately suggests that changes in the real exchange rate can no longer be the sole transfer mechanism. More precisely, relative prices (may) change because of changes in demand due to expenditure effects, and not the other way round.

The specification of various transfer mechanisms in this framework is a matter of chosing from the following building blocks:

(i) the financing-utilization pattern

(ii) international asset-markets relationships

(iii) internal asset-market-goods-market relationships

(iv) domestic and international goods markets.

Obviously, points (ii) to (iv) characterize the general theoretical outlook of the analysis. We have seen in the previous chapter that the currency- problem approach and the chief role of the real exchange rate follow quite naturally from the classical adherence to general competitive equilibrium and money neutrality. The different view of money, asset and goods market interrelations taken here will require us to give a distinctive role to uncertainty, imperfect competition and financial non-neutrality. This will be accomplished in accordance with Part I.

International asset-market relationships. In order to model international asset-market relationships I shall use the tools of asset-market analysis introduced in ch.III, sec.3. The general theoretical framework is one of uncertainty and liquidity preference. Each agent holds a fully diversified portfolio of domestic and foreign assets with a non-zero share of monetary reserve to minimize the probability of default of the market value of the portfolio. The general specification of asset stock equilibrium was shown to be the following:

(1a) $A_t\alpha_{at}(\mathbf{r_a}, V_{pa}) = A_{at}$, $A'_a(r_a)>0$, $A'_a(r_{\hat{a}})<0$, $A'(V_{pa})<0$

(b) $\Sigma_a A_{at}/P_t = A_t$

a = 1,..., indicates assets ($\hat{a} \neq a$), aa_t = portfolio share ($\Sigma_a\alpha_{at} = 1$), A_{at} = nominal value of the stock, A_t = desired value of total wealth, P_t = goods price index, $\mathbf{r_a}$ = vector of rates of return, V_{pa} = price variance of the stock.

It will be recalled that for each asset, r_{at} is known when the nominal interest rate i_{at}, the market price p_{at}, and the expected market price are known. Unless otherwise stated I shall assume static expectations as already explained in ch.III, sec.3; consequently ($r_{at} = i_{at}/p_{at}$). For any given level of wealth (A_t), and constant asset price variances (V_{pa}), the endogenous variables of system 8 are the elements of the vector [$\mathbf{r_a}$] or, given [$\mathbf{i_a}$], the asset price vector [$\mathbf{p_a}$]. The wealth constraint 1b introduces one degree of freedom in the system; I shall attribute it to the asset price of money which is fixed to 1 by definition. Therefore system 1 determines the price vector of non-monetary assets and the quantity of monetary reserve in the portfolio.

As usual in portfolio analysis, we have to adopt a specification strategy to make the model manageable. The key issue here is the substitution between domestic and foreign assets. It is therefore convenient to consider three assets (index numbers refer to the menu of ch.III): a domestic asset (A7), a foreign asset (A6) and money (A2). A7 and A6 may usefully be regarded as optimally diversified Investment Funds offered to savers, each containing private and public securities issued at home and abroad respectively. In the absence of barriers to capital mobility, each asset supplier in each country faces worldwide demand; hence we can specify system 1 as follows (the home country is T, the foreign country * is R):

(2a) $A_t\alpha6_t(\mathbf{r_a})/e + A^*_t\alpha6^*_t(\mathbf{r_a}) = A6_t$

(b) $A_t\alpha7_t(\mathbf{r_a}) + eA^*_t\alpha7^*_t(\mathbf{r_a}) = A7_t$

(c) $\Sigma_a A_{at}/P = A_t$

(d) $\Sigma_a A^*_{at}/P^* = A^*_t$

Note that e is the nominal exchange rate, which is assumed to be fixed; hence 2a expresses the world stock of A6 in foreign currency; 2b expresses the world stock of A7 in home currency; 2c and 2d are expressed in respective currencies.

Asset-market-goods-market relationships. The connection between the asset market and the goods market is an extremely important part of the problem we are dealing with. In the classical model this connection was established by the assumption of direct susbstitution between money and goods and money neutrality. In the present framework of many assets and liquidity preference the "transmission mechanism" must operate through asset prices. Macromodels usually obtain this by means of an "interest-elastic" component of aggregate demand; further, they may introduce "wealth effects" on aggregate demand. Elaborations on components of aggregate demand made in ch.III allow us to be more precise -or at least they force us to make explicit and well-controlled assumptions.

The basic components of aggregate demand are consumption and investment. I rewrite here for convenience the two respective functions, where r7 is used as the investment discount factor[2]:

(3) $C_t = P_{ct}Q_{ct}(P_c, Y, A)$ $\qquad Q'_c(P_c)<0,\ 0<Q'_c(Y)<1,\ Q'_c(A)>0$

(4) $I_t = P_{kt}Q_{kt}(P_k, r7, A)$ $\qquad Q'_k(P_k)<0,\ Q'_k(r7)<0,\ Q'_k(A)>0$

The balance of payments is obtained by simply recording those of the above transactions which concern foreign units, that is to say:

(5)
$$B_t \equiv Z_t + F_t$$
$$Z_t = X_t(P_x, Y^*, A^*) - M_t(P^*_x, Y, A)$$
$$F_t = YF + GF + \Delta AF(r_a) - \Delta A6(r_a)$$

where Z = NRT, F = NFT, YF = Net Foreign Incomes, GF = Net Government Transfers, ΔAF = purchases of the domestic asset by foreigners (capital inflows), ΔA6 = purchases of the foreign asset by residents (capital outflows).

Under the above qualifications we may also write the usual aggregate function of

GDP, which in flow equilibrium must equal factor incomes:

(6a) $$Y_t = P_{ct}Q_{ct} + P_{kt}Q_{kt} + P_{xt}Q_{xt}$$

(b) $$Y_t = P_{dt}O_{dt}(Y, r7, A) + P_{xt}Q_{xt}(P_x, Y^*, A^*)$$

$0<O'_d(Y)<1,\ O'_d(r7)<0,\ O'_d(A)>0$

So far we have established the chain of relationships linking the asset market (and stock equilibrium conditions) with the goods market (and flow equilibrium conditions). As we know from Part I, we should also take account of the links from flows to stocks. By recalling the stock-flow matrix, the following relationship must hold:

(7) $$S_t \equiv I_t + D_t + Z_t$$
$$\Delta A_t \equiv D'_t + F_t - B_t$$

where D = government deficit, D' = national deficit spending.

Relation 7 states that flow equilibrium impinges on the stock of wealth through non-zero period saving. Indirectly, wealth as well as specific asset stocks should grow with real income. The period change in wealth amounts to national deficit spending, to the net financial transfer with foreigners, and to the official transfer resulting from the balance of payments. Note that the allocations of such aggregate flows of wealth cannot be deduced consistenty from relation 7. D'_t corresponds to $\Delta A7_t$ (i.e. the change in the domestic asset stock), a share of which may be allocated to foreigners thus entering F_t. Correspondingly, only the remaining part of F_t accounts for $\Delta A6_t$ (i.e. the change in the stock of the foreign asset). Only the non-sterlized official transfer accrues to $\Delta A2_t$ (i.e. a change in the money stock); with full sterilization, resident units are led to offset $\Delta A2_t$ with $\Delta A6_t$[3]. Such a variety of possibilities is by no means irrelevant to a correct understanding of so-called "wealth effects"; these are not easily deduced from aggregate accounts and may vary greatly under different circumstances, as we shall see later (below, ch.VII, sec.1).

Domestic and international goods markets. We now turn to the real side of the two economies. Price-quantity relationships in the classical model are based on the assumption of perfect competition and of market-clearing instantaneous price adjustments. Product specialization only implies that each country's export industry faces a downward-sloping demand function, while individual firms within the industry are price-takers which can sell all the efficiency quantity they produce. We saw in ch.III that by introducing time, uncertainty and sequential decision-making, the picture of a competitive industry changes substantially. (i) In a sequential setting, each competitive firm must be price-maker. (ii) At the time of planning production, each firm is uncertain about the correct price-quantity pair. (iii) Each fallible firm in a competitive market of fallible firms enjoys some market power corresponding to the elasticity of market demand at the point of quantity supplied ("polypoly"), which, for the i-th firm, yields the traditional imperfect-competition pricing rule:

$$p_{i0} = \mathbf{w}_0 \mathbf{n}'_{i0} \mu_i \qquad\qquad \mu_i = \varepsilon_i/(\varepsilon_i - 1)$$

where $\mathbf{w}_0$ is the vector of factor costs known at time 0, $\mathbf{n}'_{i0}$ is the vector of marginal inputs associated to the plan q_{i0}, ε_i is the market demand elasticity at the point of quantity supplied (where the individual supply is inversely proportional to the number of firms) under the expectation that

$$q_{i0} = E_i(q_i) = E_i[Q(p_{i0})] - E_i(Q_j)$$

where j denotes all non-i firms, Q is market demand and Q_j is non-i aggregate supply. Such a production plan is consistent if the market demand function $[Q_t(P_t)]$ is common knowledge and each firm ignores the production plans of all the others. Plans consistency implies that $[P_t = E(p_{i0})]$ will be the market price. The analytics can be simplified by the assumption of CES market demand $(\mu_i = \mu_j = \mu)$, so that the supply price can vary (across firms and for the industry as a whole) only if different planned quantities entail different marginal costs. Since at each production round $\mathbf{w}_0$ is known and given for all, variations in marginal costs can only be due to increasing or decreasing elements in $\mathbf{n}'_{i0}$. I instead propounded the hypothesis of constant marginal inputs, which relates changes in supply prices to changes in factor costs from one period to another.

Under price-makers competition thus defined, goods and labour prices turn out to be invariant with respect to demand shocks unless (i) average productivity, (ii) industry demand structure, or (iii) other non-labour costs change concomitantly. With the important exception of the exchange- rate regime, there is no reason to believe that these elements have a direct connection with the transfer process[4]. Thus we shall concentrate on an adjustment process where prices are not changed. Consequently, all nominal magnitudes coincide with real ones; price and exchange-rate indexes will be set equal to 1.

An "empirical" issue arises in the field of product specialization. There is little to add to what was said in ch.V, sec.2; we shall retain the assumption of national product specialization with the further distinction between tradable and non-tradable goods. After determining the conditions under which prices are not changed, it will be convenient to identify non-tradables with goods (or a composite good) either consumed or invested, and let consumption consist of domestic as well as imported goods, whereas tradables are only exported. Therefore, we need to know the weights of domestic and imported consumption

$$C_t = C_{dt} + M_t = \omega_d C_t + \omega_m C_t.$$

These weights should also enter the general price index

$$P_t = \omega_d P_{dt} + \omega_m eP^*_{xt} \equiv 1.$$

Knowing the consumption/income ratio, it is easy to obtain the import/income ratio:

$$m = M_t/Y_t = \omega_m c$$

1.2. International portfolio equilibrium, real interest rates and real income.

The above formalization is general enough to allow for several different specifications of the transfer problem to be found in the literature. Variations on portfolio models may concern methodological as well as "empirical" themes[5]. As far as methodology is concerned, the most important issue is the choice between a general equilibrium framework and alternative ones. By general equilibrium, it is meant instantaneous and simultaneous equilibrium of both asset and goods markets. To this effect, the three blocks -asset stock equilibrium, macroeconomic flow equilibrium and wealth effects- should be pooled together. By contrast, the sequential methodology introduced in Part I leads to take the three blocks separately, since one has to specify the flow of information from one market to the other on which agents base their decisions. Hence, asset market conditions affect investment and production decisions, goods market conditions affect consumption and saving decisions which feed back onto asset markets conditions. As I argued at length in Part I, the major claim of the sequential methodology is not realism, nor does it necessitate making appeal to "fast" asset markets as opposed to "slow" goods markets.

A widely-used "empirically"-oriented specification is the so-called "small country case". This we have already met on various occasions in this work, and I have already stressed how elusive such a "case" may be. As to international financial relations, main criticisms were already made in ch.III, sec.3.3. In this chapter any country can place domestic securities in international markets, albeit at different terms. In the transfer-problem perspective, "smallness" concerns instead the extent of transfer effects produced by the T economy in the R economy.

The other extreme case of asset-market specification -one single integrated world market for all assets- is not without problems either. If one posits that demand functions are the same for all holders of the same asset throughout the world, then one obtains the peculiar result that Americans and Germans should both regard German assets as less (more) risky than American assets, and one is left unable to identify any specific role of international financial flows in the adjustment process. A more sensible procedure seems to be one where asset demand functions are country-specific and worldwide aggregation is avoided.

The international portfolio adjustment. We are now in a position to analyze in some detail the world transfer problem in the case where it takes the form of an **international portfolio adjustment**. In the taxonomy of the financing-utilization patterns, we have here a case where the world R-type economy (or area) is characterized by conditions of excess demand for real means, i.e. excess supply of financial liabilities. As to the T-type economy (or area), there should arise demand for R-denominated assets, i.e. supply of financial means; it is assumed that this takes place through portfolio adjustment (i.e. with no direct displacement of current expenditure).

The financial transfer can be expressed in the Jacobian matrix 8, adapted from system 2 according to the considerations just made above, by imposing exogenous excess supply of the foreign asset (dA6) to be mirrored in an equivalent swap from the domestic asset (-dA6); in particular only two bilateral effects are explicited: R demand for its own domestic asset, and R demand for T domestic asset (the corresponding parameters have unambiguous effects on the solution of the system; see below, App.A.1).

$$(8) \qquad \begin{bmatrix} \alpha_{66}+\alpha^*_{66} & \alpha_{67} \\ \alpha_{76} & \alpha_{77}+\alpha^*_{77} \end{bmatrix} \begin{bmatrix} dr_6 \\ dr7 \end{bmatrix} = \begin{bmatrix} dA6 \\ -dA6 \end{bmatrix}$$

$\alpha_{66}, \alpha_{77}, \alpha^*_{77}$ = own-rate demand elasticity (* denotes foreign demand), α_{67}, α_{76} = cross-rate demand elasticity.

Under the standard conditions of substitutability obtained previously (ch.III, sec.3.3), the determinant is positive, and moreover,

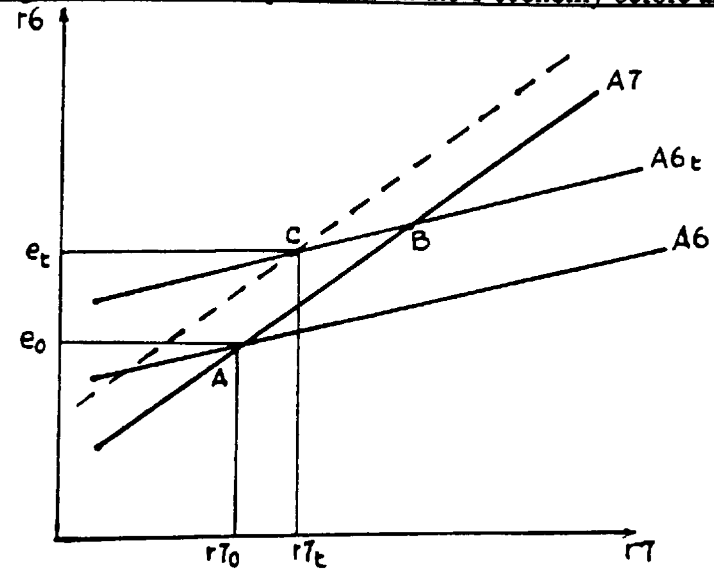
$$dr6 > 0, \qquad dr7 > 0, \qquad dr6/dr7 > 1.$$

Hence, the resulting NFT is:

$$dF/dA6 = \alpha^*_{77} dr7/dA6 - \alpha_{66} dr6/dA6.$$

We can reproduce here the figure showing asset market equilibrium in T before and after the financial transfer.

Fig.1. Asset market equilibrium in the T economy before and after the financial transfer.



Before going on, it is important to figure it out with care how T asset market adjusts itself to the new world situation in terms of actual market operations. The shift from A6 to $A6_t$ in fig.1 represents the consequence of R excess demand for capitals. Our system of equations and fig.1 specify the swap in portfolios from T to R-denominated assets. The money stock is implicitly adjusted via quantity due to the wealth constraint; yet this is not to mean that money and central banks' reaction functions have no role to play at all. A crucial factor in the international portfolio adjustment is that T asset holders wish to sell the domestic asset A7 as the foreign rate r6 goes up; the final equilibrium point of (r6, r7) depends precisely on what form the market response takes. As we know (ch.III, sec.3.3), the standard response in portfolio models is through sole price adjustments, that is, p7 falls until r7 reaches point B for the given A7 stock. As is clear in fig.1, this is the highest possible excursion of r7. Leaving the nominalistic appeal to "smallness" aside, the excursion of r7 turns out to depend on a set of conditions that we might rather call the "tightness" of the situation. (i) What determines the pressure on r6 and on T asset market? (ii) What hampers actual sales of A7? Inspection of matrix 8 hints that the rise of r7 is higher, the greater $(\alpha_{66}+\alpha^*_{66})$, the smaller $[(\alpha_{66}+\alpha^*_{66})/\alpha_{76}]$ and the smaller (α^*_{77}); the economic meaning of these three parameters is straightforward: they indicate, respectively, the tightness of the world market for A6, and the tightness of the market for A7 in terms of domestic and foreign demand.

It is advisable to avoid too mechanical interpretations of those parameters; in particular the tightness of the market cannot be assessed irrespective of central banks' reaction functions. In the first place, the pressure of dA6 on r6 and on T asset market will be inversely porportional to the responsiveness of R own demand (α^*_{66}); and this, as we know from previous analysis (ch.III, sec.2.1), will also depend on how much R new debt is endorsed by R central bank. If R central bank does not purchase domestic assets, the impact on private asset holders, at home as well as abroad, will be maximal - which corresponds to the usual result of no sterilization.

At the same time, those in T who are trying to sell A7 are also demanding foreign currency to buy A6; this is the currency-side of the transfer problem, which is, of course, still there. Again, the currency problem involves a typical sterilization problem; T central bank faces the possibility of exchanging foreign currency for the domestic asset at terms ranging from point B to C in fig.1. The extent of the currency problem, and hence the bank's reaction function, is in turn dependent on (i) the ability to attract compensatory capitals (via α^*_{77}), which, however, by construction cannot compensate for the whole dF; (ii) the ability to dampen the capital outflow (via α_{67})[6]. Even admitting that (α^*_{77} -> 0), point B will be reached only in the case of no sterilization. Note, however, that here sterilization has to be interpreted in a broader sense than the usual one. The counterpart to the transfer of currency is not necessarily domestic money: it may be the domestic security. If the central bank chooses not to sterilize, it also chooses to tighten the market for the domestic security, or to maximize the rise of the domestic rate and minimize the extent of the currency problem.

We can take a pause and see what are the asset-market effects of the world transfer. The oustanding result is that **return rates should rise in both economies** (and they should rise in real terms). If central banks adopt an orthodox reaction function (no sterilization) the impact on return rates will be the highest. If T asset holders regard R assets as riskier, T return rate will rise less than R's.

Comovements in interest rates are a result that conflicts with the extension of the classical transfer theory, which rather predicts countercyclical movements in the absence of an explanation of autonomous demand for capitals on the part of R. The former result has become the dominant one since Neo-Keynesian macroeconomics was "opened" to a world system of goods and capital markets in the 1960's[7]. Here we have obtained this result from few basic principles: (i) the non-stationary world economy implies a world transfer problem between capital demanding and capital supplying economies, (ii) any capital outflow from one economy has a counterpart in excess demand for capitals in another, (iii) world asset markets are integrated.

Real expenditure, income, and the Balance of International Transfers. We can now move to the macroeconomic consequences of the world financial transfer. The general logic is as follows. Asset markets establish the conditions under which deficit spending units in R can carry on their plans; at the same time, also deficit spending units in T will have to take account of the modified conditions on asset markets. Conditions on T and R asset markets change in relation to the NFT both in **price** and **wealth** terms. Equation 4 above reminds us that I_t will vary negatively with asset return rates, but positively with shifts of financial wealth. Whereas the effect due to rising return rates is obvious, the wealth effect we should consider is quite an important feature of the theoretical framework we are dealing with. It will be remembered from Part I, ch.III, that changes in investors' financial wealth affect their probability of default, and hence their willingness to undertake an investment project for any given probability distribution of future returns to the capital good, its current price and the discount factor. Therefore, as a consequence of the NFT, while discount factors rise on both markets, R becomes a safer market for investment than T. **Ex ante** expenditure plans in R may not coincide with **ex post** ones, after the price at which financial means can be raised has been established; some marginal plans may be cut back, but in general the financial transfer to R will be associated with a net positive effect on aggregate demand. Concomitantly, financial conditions for spending units in T are worse; here the cut of marginal plans will have a net negative effect on aggregate demand[8]. I shall simply write that, at the given factor costs, the supply of domestic output is enlarged in R and reduced in T by

$$\Phi^* \equiv dO^*_d/dF > 0 \qquad\qquad \Phi \equiv dO_d/dF < 0$$

Under conditions of constant prices, factor incomes and real output coincide. The equilibrium level of real income in T and R is obtained by taking equation 6 simultaneously for the two economies. The equilibrium conditions may be written so as to highlight that real income must be adjusted to greater supply of domestic output in R and lower in T. The resulting Jacobian matrix is (see App.A.2):

$$(9) \qquad \begin{matrix} k & -m^* \\ -m & k^* \end{matrix} \qquad \begin{matrix} dY/dF \\ dY^*/dF \end{matrix} \qquad \begin{matrix} -\Phi \\ \Phi^* \end{matrix}$$

$k = 1 - c(\omega_d - \omega_m) + t$, c = marginal propensity to consume equal to the average one, $m = c\omega_m$ = marginal propensity to import equal to the import/income ratio, t = tax rate (* denotes the same parameters in R).

The determinant of the system is positive, but real incomes may go either way, since

$$dY/dF = (-\Phi k^* + \Phi^* m^*)/\Delta \qquad\qquad dY^*/dF = (k\Phi^* - m\Phi)/\Delta$$

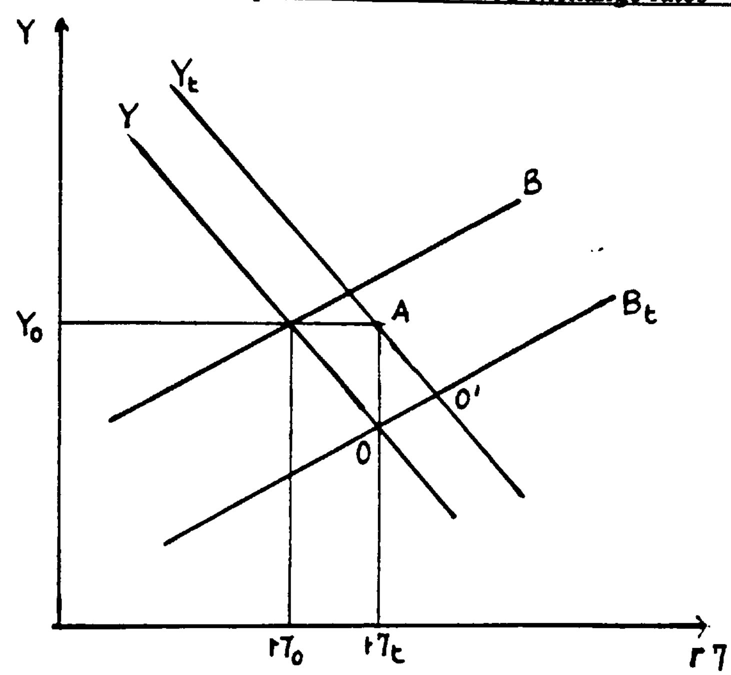
Clearly, the crucial role is played by the relative amplitude of the transfer effect on real expenditure in the two economies, given their structural parameters. An important point is the condition thanks to which T initial loss of domestic output may be offset, or outweighed, by exports via R income growth. ($dY/dF \geq 0$, $dY^*/dF > 0$) obtains if

$$\Phi^*/\Phi \geq k^*/m^* > m/k$$

Since generally ($k^* > m^*$, $k > m$), this condition requires Φ^* to be a multiple of Δ. As Machlup put it (1943, 1963), real gains or losses in the world transfer process are a matter of the relative rate of expenditure effects. This will in turn depend on the financing-utilization pattern; hence we realize that there is no unique solution to the transfer problem.

To grasp the essentials of the transfer problem, a simple flow equilibrium diagram will prove useful (fig.2).

Fig.2. World flow equilibrium under fixed exchange rates



The diagram is drawn in the traditional income-interest space. Y is the real income equilibrium schedule in T, and B is the world flow equilibrium schedule (dB = 0). Asset demand and supply is embodied in the capital- account side of B, which is sensitive to r7 as explained in the first part of the model. The financial transfer to R corresponds to a downward shift of B at the new world equilibrium value of r7. The expenditure effect in T is given by the inclination of Y. Expenditure effects in R feed back to B (upwards) and Y (rightwards).

In order to characterize our present case one may reasonably presume that R agents are willing to spend the whole NFT (i.e. cuts of marginal expenditure plans and of other autonomous expenditures are ruled out from analysis), while the negative effect of NFT on T agents expenditure plans via interest rates is less than proportional; that is to say,

$$\Phi^* = 1 \qquad\qquad \Phi < 1$$

Under such a pattern, one obtains ($dY^*/dF > 0$) for any ($\Phi < 1$), whereas ($dY/dF \geq 0$) further requires ($\Phi < m^*/k^* < 1$). Therefore, no economy will suffer from a real loss only if the contraction rate of real domestic expenditure in T does not exceed the net export multiplier. B_t and Y_t in fig.2 portray the case where ($dY = 0$).

Does world flow equilibrium hold? The BIT comes to be adjusted as follows:

$$dB/dF = m^*dY^*/dF - mdY/dF - 1$$

Once again, there are no endogenous variables to ensure that the BIT will be kept in balance. Under broad conditions, we may only say that a positive NRT is the likely result. As an example, consider again the transfer pattern above. It is easy to see that [$dB/dF = (k^* - m^*)(\Phi m - k)$]. This expression shows up an internal-external conflict; in fact any Φ which satisfies ($dY \geq 0$) also implies ($\Phi < k/m$, and hence $dB/dF < 0$) or that the transfer is undereffected. This outcome (and in general non-zero BIT) means that flow equilibrium conditions are not fulfilled by expenditure effects alone. Fig.2 shows that, at the world equilibrium level of r7, the impact adjustment A leaves T real income too high. Consequently, world flow equilibrium **necessitates** a fall of T real income.

The first possibility is to constrain expenditure effects to world flow equilibrium, that is, to compute D so as to ensure ($dB/dF = 0$) **for the given level of r7**. It must be ($\Phi = k/m > 1$), and consequently, ($dY/dF = -1/m$, $dY^*/dF = 0$); see point O in fig.2. In other words, after an initial adjustment to NFT in which T real expenditure falls less than NFT, and T real income may even rise due to external repercussions, subsequent external imbalances should be corrected by means of a negative counter-effect on T real expenditure until T real income has fallen by the reciprocal of import propensity, and R real income is brought back to its initial level. A possible interpretation is that the fiscal instrument is assigned to the external target.

An alternative adjustment mechanism would start with the fact that external imbalances entail money stock leakages; one might expect an orthodox monetary policy to force asset holders to readjust portfolios towards money thereby pushing the domestic asset rate up[9]. World flow equilibrium will occur at point O', with an improvement in BIT via capital inflows and an income loss, though smaller than in the previous case[10]. Note that the world equilibrium level of r7 now has to be higher. In a sense, we have in fact competition for world finance. The issue at stake is at what price some T domestic assets can be placed in world portfolios to draw compensatory capitals. Anyway, there seems to be no policy mix (in one single country) capable of achieving external balance without real losses if the transfer pattern plays against it.

1.3. Further analytical implications and comparisons.

Transfer effects on demand gained consensus well before the extension of the Keynesian multiplier to international trade, since they provide an explanation of the evidence, which has accumulated since the 1920s, of scant gold flows with small changes in relative prices and large goods movements. In the inter-war debate over the ineffectiveness of the classical mechanism of the real exchange rate (see ch.V, sec.2.1), Wicksell (1918), Bresciani Turroni (1932), Iversen (1935), Kindleberger (1937) all argued in favour of real expenditure effects, an hypothesis which was revaluated even by supporters of the classical theory (Viner (1937, ch.IV.3)). Machlup (1928) and Reuff (1929) sided with Ohlin's (1929) conclusion that the direct transfer of purchasing power would solve the German transfer problem with no need for dramatic changes in relative prices and wages.

The transfer model presented here blends Ricardo-Ohlin's idea that any NFT shifts world demand in favour of T at unchanged real exchange rate with a generalization of Keynes's idea that this should occur through higher interest rates. Modern asset-market analysis (supplemented with "orthodox" monetary policies) shows that the latter is indeed the case. Consequently, domestic demand (say investment) in relation to NFT falls in T and rises in R. Ohlin himself had recognized that in any case a "cumbersome readjustment of production becomes necessary". Factors must move from domestic to export production in T and vice versa in R. In ch.V, we followed Keynes's and others' hints to find out a number of serious difficulties that may be encountered in the sectoral adjustment of prices and output when external and internal equilibrium must hold simultaneously. Under classical assumptions, such difficulties may be due either to insufficient policy coordination (too low monetary expansion in R) or to adverse elasticities (too high supply elasticity in the domestic industry relative to demand elasticity in the export industry in T), or to relative inefficiency in T to provide R with newly demanded goods. If markets are perfectly competitive, wages and prices in T eventually have to fall relative to those in R as much as necessary to effect the transfer in goods at the given level of total output. Does the explicit consideration of the direct transfer effect on R demand dispense with relative deflation in T?

The present model answers that this may not be the case. Under broad conditions of constant real exchange rate, the adjustment process may get trapped in lower total output in T. In addition to the relative strength of (Φ, Φ^*) there are two factors which may force Y to fall relative to Y^*: (i) a small expansion of R domestic output (k^* is large), with (ii) low dependence on imports from T (m^* is small). In essence, these factors duplicate the point we already met in the classical analysis, namely that both **the amount** and **the composition** of R demand matter. Factors (i) and (ii) together mean that T finds itself in an unfavourable position to provide R with the goods demanded by spending units. Hence, either the transfer process is extended to an intermediate economy capable of absorbing T goods and feeding R absorption at the same time, or the transfer problem is left undereffected in real terms while the currency problem is solved by the amount of T imports cut. By contrast, most favourable situations arise beyond the point where the gap in T domestic output is bridged by larger exports, that is $(m^*dY^*/dF \geq \Phi)$, which implies $(\Phi^* \geq \Phi k^*/m^*)$ and $(dY^* > 0,\ dY \geq 0)$ as seen above. In sum, the eventuality that expenditure effects may ensure flow equilibrium in the world transfer problem with no changes in real exchange rates and incomes is highly sensitive to specific transfer conditions (we shall go into this point in greater detail in the next paragraph).

In historical perspective, real income changes, more than complementary expenditure effects, have played a leading role in world transfer processes. It was the relative growth of Great Britain and the United States, as the world R economy and the intermediate economy respectively, that eased the transfer of goods by Southern primary economies (see above, ch.IV, sec.3.2). Machlup (1969) gave a similar interpretation to the US-Europe transfer problem in 1950-1970, where he found a significant contribution of relative high growth in Europe. On the other hand, real income adjustments worked perversely in the experience of debtor countries in the late 1920s and in the 1980s (Eichengreen-Portes (1987), Webb (1988)).

The strong implication of the portfolio view of the transfer problem is that we should observe sharp comovements in real interest rates. This is the standard result, at least since Mundell-Fleming models of fiscal expansion with tight monetary policy, and are now our common experience. The transfer approach stresses that cycles of real interest rates (and possibly of real exchange rates) are the normal result in the expanding world economy, rather than a by-product of uncoordinated policies. In the last few years, under the pressure of the World-U.S. transfer problem (see above ch.IV, sec.3.5), there has been a proliferation of literature espousing this view -albeit with little acknowledgement of transfer theories and their findings (see Dornbusch (1987) for an overview).

Yet it would be hard to find prominent interest-effects in the world transfer processes underlying the gold-standard monetary system or the dollar-standard monetary system. Bridging the gap between theory and historical facts requires a great amount of institutional information. For instance, Great Britain in one case, and the United States in the other, were certainly not under the pressure of currency problems; therefore, their central banks did not need to rely on large excursions of asset rates to countervail international portfolio shifts; rather, they adjusted bank rates slightly to obtain compensatory monetary movements. In terms of our model, they could afford a high degree of sterilization and monetization. Moreover, the bulk of the NFT towards Great Britain in 1880-1914 and from the United States in 1950-1970 did not occur through large portfolio substitutions. Then the institutional environment moved closer to the analytical framework of the model, with falling barriers to capital mobility, widening access to world capital markets, narrowing margins for central banks' intervention in domestic debt allocation. It is remarkable that in a context of managed exchange rates, a "small country" like Italy has, over the last decade, followed a pattern quite similar to that of the world R economy (the United States): positive interest-rate differentials, capital inflows to finance real (public and private) expenditure expansion, relative real growth and trade imbalances. I find this symptomatic of the institutional changes mentioned above, and of the growing importance of transfer processes based on international portfolio adjustments as described hitherto.

1.4. Direct expenditure effects and the case of world flow equilibrium.

For completeness, in this paragraph I wish to examine the financing- utilization pattern based on direct expenditure effects. This was in fact the pattern underlying Ricardo-Ohlinian transfer theories in the 1930s and in the 1950s, when the international trade multiplier was introduced. The excercise is a useful one because it helps to specify the conditions under which NFT are completely effected in goods at unchanged real incomes andexchange rates; we shall see that this turns out to be a special case. It should perhaps be added that direct expenditure effects are by no means irrelevant in reality. Direct investments, tax-paid government transfers, factor incomes transfers have been, and are, all important components of past and current world transfers which are most likely related to direct expenditure effects.

The assumption that NFT is financed in T and utilized in R through one-to-one changes in real expenditure avoids asset-rates effects like those that arise in the previous case. The constraint of BIT flow equilibrium is necessary to rule out further discount-rate or exchange-rate effects through the currency problem. The constancy of real incomes thus depends closely on a particular composition of expenditure effects. To show this, I shall follow Johnson's (1956) general treatment of expenditure effects. It is sufficient to consider the Jacobian matrix 9, where ($-\Phi$, Φ^*) still express the expenditure effect of NFT on the two economies. However, we now have that ($\Phi = \Phi^* = 1$). Moreover, I wish to take account of the presence of tradable and non tradable goods: the expenditure effect is split between domestic ($-\Phi_d$, Φ^*_d) and imported goods ($-\Phi_m$, Φ^*_m) in both economies, so that ($\Phi_d + \Phi_m = \Phi^*_d + \Phi^*_m = 1$). As a result, for real incomes and the BIT we have:

$$(10)\qquad \begin{bmatrix} k & -m^* \\ -m & k^* \end{bmatrix} \begin{bmatrix} dY/dF \\ dY^*/dF \end{bmatrix} = \begin{bmatrix} -\Phi_d + \Phi^*_m \\ \Phi_d^* - \Phi_m \end{bmatrix}$$

$$(11)\qquad dB/dF = m^* dY^*/dF + \Phi^*_m - m dY/dF + \Phi_m - 1$$

Now it is easy to find that ($dB/dF = 0$, and $dY/dF = dY^*/dF = 0$) obtains when

$$\Phi_m + \Phi^*_m = 1;$$

in fact, under the above conditions, complementary expenditure effects on imports also entail ($-\Phi_d + \Phi^*_m = \Phi_d^* - \Phi_m = 0$) or else that the change in domestic expenditure is exactly offset by exports in each economy. This result has repeatedly been found in transfer theories, at least since Viner's (1924, 1937) analysis of expenditure effects. Note that if the complementarity condition holds, the real exchange rate need not change regardless of whether prices are flexible or not. Nonetheless, if prices are flexible, as Ohlin (1933) and many others after him admitted, T real exchange rate is likely to depreciate as a consequence, not as a cause, of demand effects. This outcome springs from factor substitution in production on the hypothesis that the export industry is more efficient than the domestic one in both economies.[11]

It is apparent that the possibility of world flow equilibrium is rather specific even in the class of NFT with direct expenditure effects. I shall mention here two well-known applications which show that external and internal flow equilibrium in the course of the world transfer may fail to hold.

One important transfer problem that has been debated at length arises from international direct investment. The phenomenon under consideration is a one-to-one displacement of investment expenditure (say out of internal profits) from T to R. Metzler (1942, 1948) and Machlup (1943, chs.VIII-IX; 1963, ch.XIX) adopted a typical transfer pattern which implicitly assumes that investment goods are non-tradable. As the two authors stressed, in the direct investment transfer the crucial role in the adjustment is taken by expenditure expansion in R. Let us consider the most favourable case ($\Phi_d = \Phi^*_d = 1$; $\Phi_m = \Phi^*_m = 0$). As a result of system 10-11 we have:

$$dY/dF = -k^* + m^*/\Delta$$

$$dY^*/dF = k - m/\Delta$$

$$dB/dF = (m^* - k^*)(k - m)/\Delta$$

Under stability conditions ($k > m$; the same abroad; $\Delta > 0$), real income falls in T, increases in R and the transfer is undereffected.

Another important exception to world flow equilibrium consists of those NFT for which it is not likely that expenditure effects differ from normal expenditure/income proportions. This property was first established by Viner (1927), of course without considering real income effects, but stressing instead the necessity of complementary changes in the real exchange rate. Relevant cases are those where NFT is raised in T and injected into R through disposable income, such as government transfers or debt payments with taxation higher in T and lower in R; or such as the quite interesting case of an implicit transfer due to an exogenous shock to the real exchange rate (Balogh-Graham (1979)). In this case we know immediately that, for stability conditions, the overall expenditure effect cannot amount to unity. Then, even admitting imports complementarity, world flow equilibrium conditions are not ensured, and real incomes with the BIT may change in any direction according to structural parameters, just as in the goods-market system 9 of par.2. Moreover, if direct expenditure effects are not equal to NFT, this means that T is financing NFT partly by disssaving while R is using it partly by accruing wealth, which brings us back to a transfer pattern with portfolio effects.

Leaving portfolio effects aside, it may be interesting to examine the solution of direct expenditure effects whith normal propensities. Hence we now have ($\Phi_d = c_d$, $\Phi_m = m$) and ($c_d + m + s = 1$); the same abroad. Moreover ($m + m^* = 1$) still holds. By simple substitutions in system 10-11 we obtain:

$$dY/dF = (sk^* - s^*m^*)/\Delta$$

$$dY^*/dF = (sm - s^*k)/\Delta$$

$$dB/dF = m^*dY^*/dF - mdY/dF$$

The noticeable point is that now domestic expenditure falls less in T and rises less in R;

consequently, the overall direct expenditure effect is now **positive** in T and **negative** in R by the amount of the respective marginal propensity to save (s, s^*) -or better "not to spend". The equilibrium adjustment of real incomes can be expressed in terms of the relative magnitude of (s, s^*), but it is not possible to have ($dY/dF = dY^*/dF = 0$) simultaneously. Let us check for ($dY/dF \geq 0$) and ($dY^*/dF \geq 0$) separately. Since ($\Delta > 0$) we have, respectively:

$$s^* \leq sk^*/m^* \qquad s^* \leq sm/k \text{ or } \qquad s^*/s \leq m/k < k^*/m^*$$

There is a chance that the transfer takes place with a real gain for one or both if R rate of non-expenditure of NFT is comparatively low. Now suppose that ($s^* = sk^*/m^*$, $dY^*/dF = 0$), it follows that

$$dY/dF = s \qquad dB/dF = -ms$$

That is to say, when R non-expenditure of NFT is sufficiently low as to let direct expenditure of NFT offset the cut of T imports, then, correspondingly, the overall effect on T real income will be positive by the amount of NFT not raised from current expenditure. As a consequence, the net effect on BIT will be negative, or NFT will be undereffected. It is evident that the same BIT result holds in the specular situation in which ($dY/dF = 0$, $dY^*/dF = -s^*$, $dB/dF = -m^*s^*$).

Let me finally draw attention to a particular interpretation of direct expenditure effects put forward in the inter-war debate, especially by Machlup (1928) and Reuff (1929), and which was placed at the centre of the monetary approach to the balance of payments in the 1970s (e.g. Frenkel-Johnson (1976), Johnson (1958, 1977)). We might properly talk of the transfer problem as a monetary problem, or else of the monetary approach as a monetary transfer theory. In fact, the core of the monetary mechanism is the correspondence between excess money balances and excess imports at unchanged real incomes, real exchange rates and real interest rates. Clearly, the economy with excess money balances is R, which faces an economy, T, where money balances are extracted from circulation -as Machlup said, the transfer problem is the problem of extracting money from circulation. In the second place, it is assumed that money imbalances have one-to-one expenditure effects. These will be distributed between tradable and non-tradable goods according to their normal proportions in consumption, and not in relation to total income. Hence ($\Phi_d = \omega_d$, $\Phi_m = \omega_m$; $\omega_d + \omega_m = 1$; the same abroad). Finally, there must be constant real incomes, to ensure stable money demand functions, and external flow equilibrium. This is clearly the same problem as was addressed at the beginning of this paragraph. Therefore we conclude that the whole building rests on the condition that ($\omega_m + \omega^*_m = 1$).

2. Under flexible exchange rates

2.1. The case for flexible exchange rates.

The previous section first confirms that, as has been accepted by transfer theorists since Johnson's (1956) contribution, a definite answer to the transfer problem is not possible unless one is able to specify the financing-utilization pattern and the structural parameters of the economies involved. In the 1950s this conclusion was reached in flow models with direct expenditure effects, like those of sec.1.3, while in sec.1.2 we obtained it in a transfer model enlarged to include asset market equilibrium. However, there has always been a general tendency, especially among Keynesians, towards pessimism: transfer undereffection with T real losses seems the likely result. Yet one should remember that, among the classics, neither Taussig nor Viner believed that direct expenditure effects alone could prevent currency problems and real depreciation, while Keynes warned that real depreciation could become bottomless deflation of T economies. In classic markets, Keynes showed that T real loss was through lower real wages; in polypolystic markets, we have seen that T real loss would be through lower output and employment.

In fact, unless the peculiar complementarity conditions apply, we have seen that the key variable for world flow equilibrium to hold at unchanged real exchange rates and incomes is, in a broad range of cases, a comparatively high real expenditure effect (or a comparative low hoarding rate of NFT) in R. Then pessimism arises either from obstacles to net expansion of world expenditure in the short run (e.g. anti-inflationary monetary policies: Balogh-Graham (1979)) or from unsustainable world growth in the long run (e.g. Machlup (1969)).

If this pessimism has a **raison d'etre**, the case of T economies trading off real losses with external imbalances becomes relevant. We thus come to the other possibility of assigning the exchange rate to the external target, or else of re-introducing real exchange-rate effects via a flexible nominal rate. In this section, the aim is to deploy a transfer model with flexible exchange rate and with as clear as possible specification of the influence of the financing-utilization pattern, of the effects of the exchange rate on assets and goods trade, and of the consequences upon exchange rate dynamics. Exchange rate dynamics in the world transfer process will be investigated further in the next chapter.

2.2. The exchange rate, real interest rates and real income.

For obvious reasons, the transfer problem we are interested in is of the portfolio-adjustment type. Hence the analytical framerwork is the same as that of sec.1.1-1.2. Modifications should be introduced to model the role of the exchange rate on international asset markets and on the internal- external macroeconomic adjustment. The repercussions of macroeconomic flow equilibrium on asset stocks will be discussed separately.

The fundamentals of exchange-rate determination by the asset market were set out in Part I (ch.III, sec.3.3). As was noted then, and also in Kouri's important contribution (1983), standard models (con)fuse asset market and currency market. Of course, the exchange rate is not determined by demand and supply of securities, but by the underlying demand and supply of foreign currency. Thus, while the standard procedure when the exchange rate is endogenous is to eliminate one return rate (usually the foreign one), we shall rather add the missing equation, which is the BIT equation. Let us now look at the asset-market model 2. With static expectations, the exchange rate enters the determination of asset demand functions via wealth effects; home depreciation ($de > 0$) dampens home demand for the foreign asset (A6) and prompts foreign demand for the home asset (A7). By normalizing wealth effects to 1 (instead of the absolute initial value of the stock) we should modify system 2 (matrix 8) so that the corresponding Jacobian matrix now looks as follows:

$$(12)\qquad \begin{bmatrix} \alpha_{66}+\alpha^*_{66} & -\alpha_{67} & -1 \\ -\alpha_{76} & \alpha_{77}+\alpha^*_{77} & 1 \\ -\alpha_{66} & \alpha^*_{77} & 1 \end{bmatrix} \begin{bmatrix} dr6 \\ dr7 \\ de \end{bmatrix} = \begin{bmatrix} dA6 \\ -dA6 \\ 0 \end{bmatrix}$$

The model basically works as was shown in sec.1.2. The starting point is excess demand for capitals (excess supply of liabilities) on the part of R (dA6 > 0). The first row yields the equilibrium value of R return rate (r6) on the world market for its own asset. The second row is the same for T return rate (r7). The third is instead the BIT identity. Both the asset- market equations and the BIT equation display bilateral effects in that R agents demand their own asset (α^*_{66}) and T asset (α^*_{77}). Hence, ($-\alpha_{66}$dr6/dA6 + de/dA6) and (α^*_{77}dr7/dA6 + de/dA6) are capital outflows and capital inflows respectively[12]. They must sum to zero. The general results for (dA6 > 0) are the following (see App.A.3):

dr6 > 0, dr7 > 0, de > 0

that is to say, interest rates should rise and the exchange rate should depreciate.

Let us examine the actual market adjustment with help of fig.3, which reproduces asset-market equilibrium schedules of A7 and A6 (see ch.III, sec.3.3). In order to accommodate a larger share of R assets in T portfolios (A6 shifts rightwards) T agents bid the domestic asset A7 down. The figure depicts a situation where T agents are in fact able to sell A7, whose return rate (r7) rises, and then to demand foreign currency to buy A6, thus pushing the exchange rate up. The fact that, in this particular operation, the foreign exchange market is cleared -or net capital movements are nil- does not mean that there are no transactions as in standard portfolio models. The financial transfer towards R does take place by the amount ($-\alpha_{66}$dr6/dA6 + de/dA6). To clarify this crucial point, it is useful to make use of Kouri's (1983) diagram showing the demand-supply schedules of foreign exchange derived from financial transactions. Figure 4 is built in a way that translates changes in desired asset stocks into excess (flow) demand for foreign exchange. The right horizontal axis measures changes in T desired holdings of A6, the left horizontal axis measures changes in R desired holdings of A7. The two schedules are derived from exchange-rate wealth effects on asset stocks in the third row of matrix 12. Points A, B, C in fig.4 correspond to those in fig.3. At the initial point A, both the asset and foreign currency markets are in (stock) equilibrium. Point B corresponds to excess demand for foreign currency due to the rise of r6 and the consequent demand for A6. Point C is reached as the concomitant rise of r7 and e generates foreign demand for A7 and dampens home demand for A6. The increase in T holdings of R assets and the corresponding NFT are measured by the segment OD.

Fig.3. Asset market equilibrium in the T economy before and after the financial transfer with flexible exchange rate

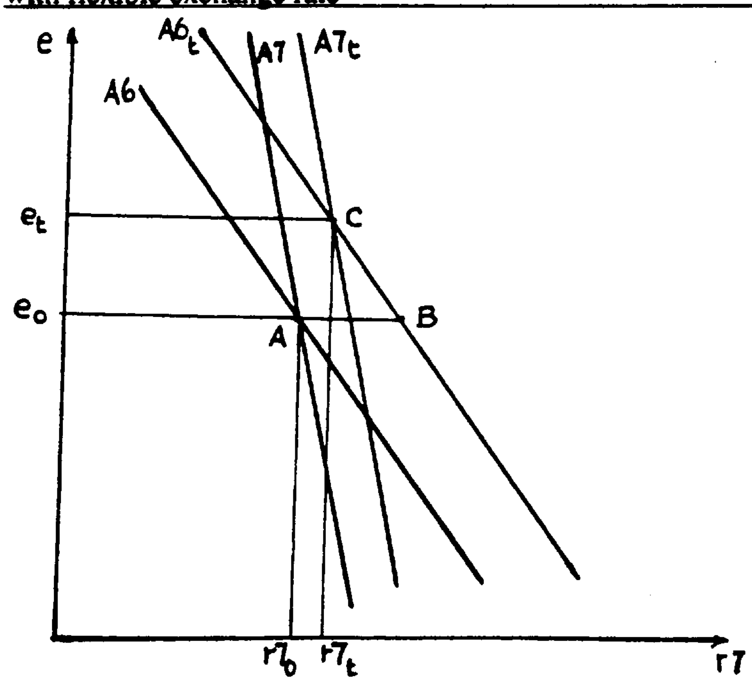
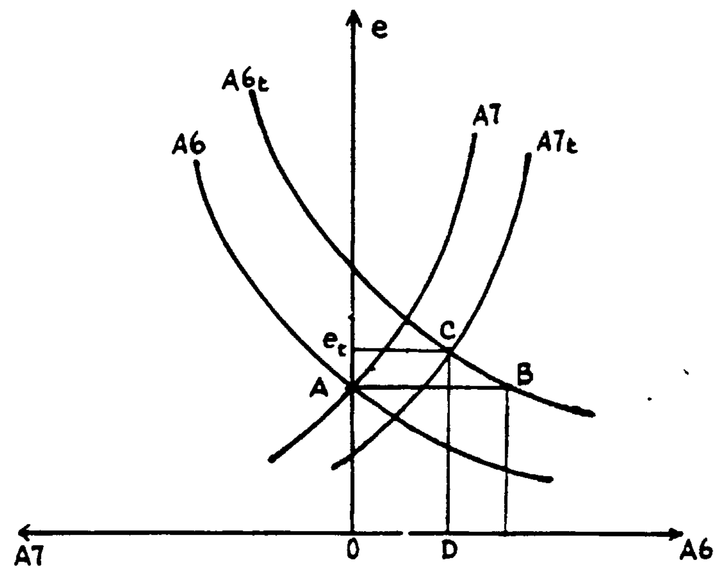


Fig.4. The foreign exchange market (T economy) with demand and supply derived from financial transactions



We have now to consider the repercussions of the financial transfer on expenditure decisions. The basic fact is that deficit-spending conditions are easier in R and tighter in T. Let us still define ($-\Phi$, Φ^*) the change in expenditure plans in T and R as in sec.1.2. Moreover, the (real) exchange rate is also involved. At this stage, to keep things as clear as possible, I shall only make explicit the traditional demand effects of the exchange rate: depreciation increases demand for T export goods and decreases demand for R export goods. Note, however, that substitution effects are inbuilt in the transfer problem, since depreciation occurs together with opposite shifts of domestic expenditure in T and R (this point was treated at length in ch.V)[13]. Finally, the endogeneity of the exchange rate allows for one further equation, which is of course the BIT equation. This equation will have to display income effects on trade as well as exchange-rate effects on trade; exchange-rate effects on capital movements should also be considered.

Therefore, the Jacobian matrix of goods market equilibrium now becomes (see App.A.4):

$$(13) \qquad \begin{bmatrix} k & -m^* & -\varepsilon_x \\ -m & k^* & \varepsilon_m \\ -m & m^* & 1+\beta \end{bmatrix} \begin{bmatrix} dY/dF \\ dY^*/dF \\ de/dF \end{bmatrix} = \begin{bmatrix} -\Phi \\ \Phi^* \\ 1 \end{bmatrix}$$

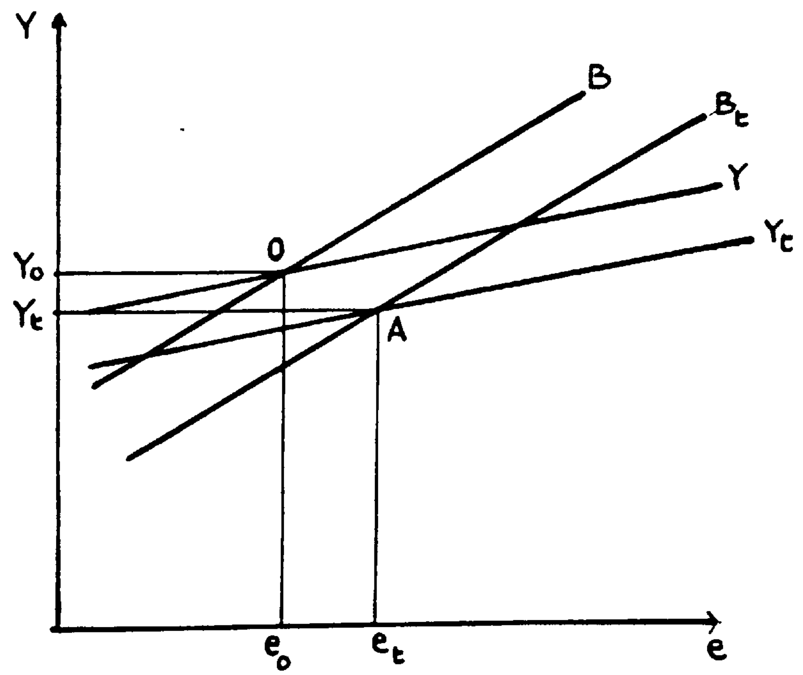
ε_x = T exports elasticity, ε_m = R exports elasticity, $\beta = \varepsilon_x + \varepsilon_m - 1$ = total trade-balance elasticity.

In this part of the model the financial transfer ($dF < 0$) is inherited from the international portoflio adjustment yielded by matrix 12. As a consequence, real expenditure falls by Φ in T, grows by Φ^* in R, while BIT is worsened by dF. In the partial model of matrix 12 we saw how the financial transfer may be compensated on the foreign exchange market. This extension to the whole macroeconomic equilibrium makes explicit the interaction between asset transactions and goods transactions that pass through the foreign exchange market. The specific exchange-rate effect on both kinds of transactions is captured by $(1 + \beta)$: depreciation improves the balance of goods transactions if $(\beta > 0)$, while it surely improves the balance of asset transactions through wealth effects (normalized to 1). Given stability conditions ($k > m$, $k^* > m^*$), the determinant of matrix 13 is positive, while the solutions of all the endogenous variables are ambiguous.

dY ? dY^* ? de ?

In a simple flow equilibrium diagram we obtain

Fig.5. World flow equilibrium under flexible exchange rates



The diagram shows the schedules of T real income (Y) (the first row of matrix 13) and of world flow equilibrium (B) (the third row of matrix 13) with reference to T real income and the exchange rate. The world financial transfer shifts B to the right, while its expenditure effects shock Y downwards. Positive expenditure effects in R move shcedules in the opposite directions. Point A is an example of world flow equilibrium in the course of the transfer.

The general result obtained above may seem disapponting; yet it contains an important message. When the exchange rate is framed in the macroeconomic adjustment to the world transfer, the presumption that the T economy should depreciate in order to establish flow equilibrium is no longer granted. The reason is quite simple: if income effects are strong enough to effect the transfer, the impact depreciation may be reversed in order to keep NRT in line with NFT, and point A may fall to the left of O. Thus we may possibly have $(dY < 0,\ dY^* > 0,\ de < 0)$.

2.3. Further analytical implications and comparisons.

The involvement of exchange rates in the world transfer process is by no means novelty. We saw in the previous chapter that as early as the 1920s and 1930s there was widespread awareness that transfer problems may dictate exchange-rate dynamics. Explicit models in this vein, where the exchange rate is moved by capital transfers, can be found in Robinson (1937), Kindleberger (1937), Machlup (1939), Nurkse (1944)[14]. However, as Kouri observed quite correctly (1983, pp.116-118), those early models treated NFT as pure currency problems, or with unsatisfactory specification of the financial and real repercussions that have been expounded in the first part of this chapter. The development of the asset-market approach to the exchange rate has been a decisive step forward.

An instructive further comparison to make is with Mundellian world models which predict that expenditure expansion in one economy necessarily feeds real income in the other through depreciation (see e.g. Dornbusch (1980b, ch.XI)), in spite of a higher real interest rate. The crucial difference between such traditional models and the model presented here lies in that the former do not recognize the transfer problem at all; thus real income must rise in T because this is the only means to drive the interest rate to the higher world level, given a fixed real stock of money; in addition, depreciation is the only means to raise T real income. To put it crudely, foreign expansion and depreciation pull Y up along B in fig.5. In the transfer model, T interest rate rises because financial means has to be transferred from T to R, and B shifts to B_t. Then the causation goes from asset markets to goods markets, with expenditure and exchange-rate effects as intermediate links. It is no surprise that final outcomes may not be so clear-cut as in Mundellian models[15].

That exchange-rate dynamics should eventually be framed in the analysis of world circulation (not exhaustion) of capitals and goods has only come onto the agenda in the last few years (Dornbusch (1987a))[16]. I have already alluded to these advances in sec.1.3 above, in the analogous context of the determination of interest rates. Some general comments are in order. One trend in the recent literature is towards a fully neoclassical flow-theory of international transfers (Frenkel-Razin (1987, Part II) is the most representative work). The background theory is one of "open-economy" intertemporal optimization; saving is future consumption and the real interest rate measures the time discount of preferences and hence the marginal productivity of real capital; current production and future consumption are reallocated towards economies with growing real interest rate (R-type economies). The macroeconomic implication is that world investment and saving should rise, so that R ends up with a negative saving-investment balance matched by the same positive balance in T. Real depreciation then performs the goods transfer from T to R. Another trend is less pretentious as to microfoundations, but works with the same macroeconomic model (see e.g. Branson (1985)). The first objection is quite radical, and goes back to the serious difficulties met in the extension of Walrasian microfoundations to open monetary economies and discussed in Part I. Abandoning the Walrasian core, one has to take uncertainty and liquidity preference into account in a way that leads to money and finance non-neutrality. For instance, the real interest rate is modestly the deflated yield of an asset (as it is in all empirical applications), and cannot be confused with the reciprocal of the price of

Arrow pure securities. The disconnection between saving and future consumption, between saving and current investment, may require important real effects for macroeconomic flow equilibrium to hold. Note a simple point here. **Ex post** it is necessarily true that $[(k - m)(dY/dF) - \Phi = -(k^* - m^*)dY^*/dF - \Phi^*]$, that is to say, the usual bilateral saving-gap identity holds; but this is not to imply that the **ex ante** transfer effects (Φ, Φ^*) are to be equal in the two economies. On the contrary, we have reason to expect them to be different, since they depend on the relationships between asset-market conditions and deficit-spending decisions in the two economies. Were (Φ, Φ^*) equal, we know that the transfer process would require Y to fall relative to Y*. On the whole, as far as the transfer mechanism is concerned, these new theories, like those of the 1930s, oversimplify the financing-utilization pattern[17].

Income effects, for not always well-founded reasons, have progressively disappeared from macroeconomic models with flexible exchange rates. Yet they are obviously important in tracking the path of the exchange rate in the course of the transfer process, as the above exercise shows. If we have reason to believe that real expenditures and real incomes are affected by the world transfer, then we cannot expect the exchange rate to bear the whole burden of trade adjustment. This point is particularly relevant to the proliferation of models of the United States as world borrower (e.g. Branson (1985) and the others already cited above) and, in a future perspective, as world interest transferor (e.g. Krugman (1985)), which are essentially currency transfer models. Fitoussi and Phelps (1988) have stressed the initial depressive effect on Europe of the massive switch of real and financial resources in favour of the United States in the last decade, even under an appreciating dollar.

On the other hand, it is true that flexible exchange rates are likely to operate when income effects are insufficient, or undesirable, means to achieve world flow equilibrium. It is interesting to find that our benchmark case of sec.1.2, where $(\Phi < 1, \Phi^* = 1)$ is assumed, gives much more definite results. It will be remembered that, under fixed exchange rates, this transfer pattern would impose $(dY < 0, dY^* = 0)$ to achieve world flow equilibrium. Now we have:

$dY\ ?$ $\qquad dY^* > 0 \qquad de > 0$

i.e., world flow equilibrium necessarily lies to the right of O in fig.5. This solution looks more familiar. It may be interpreted as saying that depreciation **may** dispense T with real loss and allow R to retain some real gain. Yet whether T real loss occurs or not is still undetermined, since this depends on the actual magnitude of Φ; the traditional Mundell case ($dY > 0$, $dY^* > 0$, $de > 0$) obtains if Φ lies below one and above a critical value than can easily be computed from the solutions given in App.A.4.

I shall only mention for the sake of completeness the classical transfer pattern in which ($\Phi = \Phi^* = 1$). This case yields ($dY < 0$, $dY^* > 0$, $de > 0$); hence, if the displacement of real expenditure in T is exactly compensated by larger real expenditure in R, the exchange rate will depreciate to ensure world flow equilibrium, but not as much as necessary to prevent T real loss.

The findings in this chapter may be seen as a vindication of the classical presumption that the real exchange rate should have a role to play in the world transfer problem. Certainly, the view of the transfer problem as a financing-utilization problem, and the explicit consideration of expenditure effects of financial transfers, change the analytical picture substantially with respect to the classics' limitation on the currency problem. It is true that there is no unique solution to the transfer problem regardless of the financing-utilization pattern; and it is true that world flow equilibrium with no changes in real exchange rates and incomes is possible. Yet we have seen that the latter is an outcome due to quite specific complementarity conditions of domestic and import expenditure effects. On the other hand, we cannot take it for granted that flexible exchange rates are capable of joining world flow equilibrium with no real losses for anybody.

Appendix

A1. Solution of system 2.

System 2 represents asset market equilibrium. Two assets are considered explicitly: a (composite) T domestic asset (A7) and a (composite) R foreign one (A6). A third asset, money (A2), is always in quantity equilibrium because of the wealth constraint in both countries. Equations express world conditions of asset market equilibrium (* denotes R foreign variables).

(A1) $$A_t\alpha 6_t(r_a)/e + A^*_t\alpha 6^*_t(r_a) = A6_t$$

(A2) $$A_t\alpha 7_t(r_a) + eA^*_t\alpha 7^*_t(r_a) = A7_t$$

(A3) $$\Sigma_a A_a p_{at}/P = A_t$$

(A4) $$\Sigma S_a A^*_a p_{at}/P^* = A^*_t$$

where e is the nominal exhange rate, which is assumed to be fixed; hence eq.1 expresses the world stock of A6 in foreign currency; eq.2 expresses the world stock of A7 in home currency; eqs.3 and 4 are expressed in respective currencies. The solution vector consists of four endogenous variables for the two countries [r6, r7, A2, A2*]. Let us now solve explicitly for the two return rates.

An operational assumption, explained in the text, is that asset demand functions of R agents for A6 and A7 only display own-rate derivatives. The solution is studied under the vector of exogenous variables [dA6, -dA6] which denotes excess supply of R asset (dA6 > 0) and corresponding excess supply of T asset. The signs in the coefficients matrix are derived from portfolio theory in ch.III, sec.3. The resulting Jacobian matrix is

(A5) $$\begin{bmatrix} \alpha_{66}+\alpha^*_{66} & -\alpha_{67} \\ -\alpha_{76} & \alpha_{77}+a^*_{77} \end{bmatrix} \begin{bmatrix} dr6 \\ dr7 \end{bmatrix} = \begin{bmatrix} dA6 \\ -dA6 \end{bmatrix}$$

α_{66}, α_{77}, α^*_{77} = own-rate demand elasticity, α_{67}, α_{76} = cross-rate demand elasticity.

The determinant of the Jacobian is therefore:

$$\Delta = (\alpha_{66}+\alpha^*_{66})(\alpha_{77}+\alpha^*_{77}) - (\alpha_{76}\alpha_{67}) > 0$$

The positive sign is ensured by normal conditions of asset substitution (see ch.III, sec.3). In fact, if T agents rank A6 more uncertain that A7, we have, in absolute value,

$$\alpha_{66} < \alpha_{67} < \alpha_{76} < \alpha_{77} \qquad\qquad (\alpha_{66}\alpha_{77}) > (\alpha_{76}\alpha_{67})$$

The addition of α^*_{66} and α^*_{77} to the first term surely confirms such conditions. The solution of the vector of endogenous variables is the following:

$$dr6/dA6 = [(\alpha_{77}+\alpha^*_{77}) - \alpha_{67}]/\Delta > 0$$

$$dr7/dA6 = [-(\alpha_{66}+\alpha^*_{66}) + \alpha_{76}]/\Delta > 0$$

The same conditions of asset substitution which yield ($\Delta > 0$) also imply the positive sign of dr6/dA6 and dr7/dA7. Consequently, excess supply of R asset raises return rates in both countries.

A.2. Solution of system 6.

System 6 is the goods-market system. Under the macroeconomic analysis developed in the text, we may write the usual aggregate function of GDP, which in flow equilibrium must equal factor incomes, for the two economies:

(A6) $\quad Y_t = P_{dt}O_{dt}(Y, r7, A) + P_{xt}Q_{xt}(P_x, Y^*, A^*)$

(A7) $\quad Y^*_t = P^*_{dt}O^*_{dt}(Y^*, r6, A^*) + P^*_{xt}Q^*_{xt}(P^*_x, Y, A)$

$0<O'_d(Y)<1$, $O'_d(r7)<0$, $O'_d(A)>0$, the same abroad.

The transfer problem can be formalized as an exogenous shock to demand for domestic output in both countries simultaneously in such a way as to highlight that real income must be adjusted accordingly. The transfer expenditure effect may be represented as follows

$$\Phi^* \equiv -dO^*_d/dF \qquad\qquad \Phi \equiv dO_d/dF$$

Since we consider T to be the home economy, hence ($dF < 0$) and ($\Phi^* > 0$, $\Phi < 0$). Note that in our case of international portfolio adjustment, Φ derives from ($dO_d/dF = O'_{d(r7)}dr7/dF < 0$). Given conditions of unchanging prices, and ignoring for the moment wealth effects, in both economies it must hold that

$$Y_t - O_{dt}(Y) - X_t(Y^*) = O_{dt}(F)$$
$$Y^*_t - O^*_{dt}(Y^*) - X^*_t(Y) = O^*_{dt}(F)$$

Recalling that $[O_{dt}(Y)]$ results from the adjustment in domestic consumption and import consumption after taxation, the Jacobian matrix, with appropriate signs derived from ($dF < 0$), is:

(A7) $$\begin{bmatrix} k & -m^* \\ -m & k^* \end{bmatrix} \begin{bmatrix} dY/dF \\ dY^*/dF \end{bmatrix} = \begin{bmatrix} -\Phi \\ \Phi^* \end{bmatrix}$$

$k = 1 - c(\omega_d - \omega_m) + t$, c = marginal propensity to consume equal to the average one, $m = c\omega_m$ = marginal propensity to import equal to the import/income ratio, t = tax rate (* denotes the same parameters in R).

The determinant of the system is:

$$\Delta = 1 > kk^* - mm^* > 0$$

The sign is positive because stability conditions for the closed economy impose that $(k > m,\ k^* > m^*)$.

The vector of endogenous variables has solutions

$$dY/dF = (-\Phi k^* + \Phi^* m^*)/\Delta$$

$$dY^*/dF = (kD^* - mD)/\Delta$$

The sign of changes in real incomes is indeterminate since it depends on the relative magnitude of expenditure effects $(-\Phi, \Phi^*)$ as discussed in the text.

A.3. Solution of system 2 augmented with the foreign exchange equation.

The following analysis solves the asset-market system 2 under flexible exchange rate by expliciting the foreign exchange equation. The latter imposes equality between demand for and supply of foreign currency as derived from asset transactions. Focusing on asset return rates and the exchange rate, under the assumption of static expectations, we have:

$$\text{(A1)} \qquad A_t\alpha 6_t(r_a)/e_t + A^*_t\alpha 6^*_t(r_a) = A6_t$$

$$\text{(A2)} \qquad A_t\alpha 7_t(r_a) + e_tA^*_t\alpha 7^*_t(r_a) = A7_t$$

$$\text{(A8)} \qquad A6_0 - A_t\alpha 6_t(r_a)/e_t = A^*_t\alpha 7^*_t(r_a) - A7_0/e_t$$

Eqs. A1 and A2 are the same as those in App.A.1. Eq.A8 reads as follows. The left-hand term expresses demand for R currency as capital outflows $(K_t < 0)$ springing from the difference between the initial and the desired stock of R asset. The right-hand term expresses supply of R currency as capital inflows $(K_t > 0)$ due to the difference between initial and desired stock of T asset. The exchange rate enters all three equations via wealth effects. Cet. par., as e increases the domestic value of R asset increases and its desired stock decreases $(dA\alpha 6/de = -A\alpha 6_0/e_0)$; at the same time the foreign value of T asset decreases and its desired stock increases $(dA^*\alpha 7^*/de = A^*\alpha 7^*_0/e_0)$. By setting all initial nominal magnitudes equal to 1, wealth effects can be normalized to unity. Therefore the Jacobian of eqs.A1-A2-A8 is:

$$\text{(A9)} \qquad \begin{bmatrix} \alpha_{66}+\alpha^*_{66} & -\alpha_{67} & -1 \\ -\alpha_{76} & \alpha_{77}+a^*_{77} & 1 \\ -\alpha_{66} & \alpha^*_{77} & 1 \end{bmatrix} \begin{bmatrix} dr6 \\ dr7 \\ de \end{bmatrix} = \begin{bmatrix} dA6 \\ -dA6 \\ 0 \end{bmatrix}$$

The model basically works in the same way as the one in App.A.1. The starting point is excess demand for capitals (excess supply of liabilities) on the part of R $(dA6 > 0)$. Now define

Δ_1 = the determinant of system 2 (matrix 5)

$\Delta_2 = \alpha_{77} + \alpha^*_{77} - \alpha_{67}$

$\Delta_3 = \alpha_{76} - \alpha_{66} + \alpha^*_{66}$

For conditions of asset substitution recalled in App.A.1 we have:

$$\Delta_1 > 0, \qquad \Delta_2 > 0, \qquad \Delta_3 > 0$$

The determinant of matrix A9 results to be:

$$\Delta = \Delta_1 - \alpha_{66}\Delta_2 + \alpha^*_{77}\Delta_3$$

As we shall see, standard results obtains for ($\Delta > 0$), which is the likely case since α_{66} is the smallest derivative of asset substitution. Then the solution vector of endogenous variables is the following:

$$dr6/dA6 = \Delta_2/\Delta > 0$$

$$dr7/dA6 = \Delta_3/\Delta > 0$$

$$de/dA6 = (\alpha_{66}\Delta_2 + \alpha^*_{77}\Delta_3)/\Delta > 0$$

A.4. Solution of system 6 augmented with the foreign exchange equation.

We shall study macroeconomic flow equilibrium under a flexible exchnage rate by augmenting the goods-market system 6 with the foreign exchange equation. The latter now equates foreign currency demand and supply as determined by trade and financial transactions. Trade transactions are governed by T exports (supply of R currency) and T imports (demand for R currency). Financial transactions, given desired asset stocks and return rates, are only given by exchange-rate wealth effects like those analyzed above. Trade transactions also enter real income determination, since T exports add up to T aggregate demand and T imports to R aggregate demand. Therefore we should rewrite system 6 as follows:

(A10) $\quad Y_t - O_{dt}(Y) - X_t(Y^*,e) = O_{dt}(F)$

(A11) $\quad Y^*_t - O^*_{dt}(Y^*) - X^*_t(Y,e) = O^*_{dt}(F)$

(A12) $\quad X_t(Y^*,e) - X^*_t(Y,e) = -F_t(e)$

Recalling the elaborations in App.A.2, as to expenditure effects, and in App.A.3, as to exchange-rate wealth effects, setting ($dF < 0$) we obtain the following Jacobian:

(A13)
$$\begin{bmatrix} k & -m^* & -\varepsilon_x \\ -m & k^* & \varepsilon_m \\ -m & m^* & 1+\beta \end{bmatrix} \begin{bmatrix} dY/dF \\ dY^*/dF \\ de/dF \end{bmatrix} = \begin{bmatrix} -\Phi \\ \Phi^* \\ 1 \end{bmatrix}$$

ε_x = T exports elasticity, ε_m = R exports elasticity, $\beta = \varepsilon_x + \varepsilon_m - 1 =$ total trade-balance elasticity.

The determinant of the system has value:

$$\Delta = \varepsilon_x k^*(k - m) + \varepsilon_m(k^* - m^*) > 0$$

The sign is certainly positive because stability in isolation ($k > m$, $k^* > m^*$) is assumed. The solution vector of endogenous variables is:

$$dY/dF = [\varepsilon_m m^*(\Phi^* - 1) - \varepsilon_x k^*(\Phi - 1) - \varepsilon_m \Phi(k^* - m^*)]/\Delta$$

$$dY^*/dF = [\varepsilon_m k(\Phi^* - 1) - \varepsilon_x m(\Phi - 1) + \varepsilon_x \Phi^*(k - m)]/\Delta$$

$$de/dF = 1 - [\Phi^* m^*(k - m) + \Phi m(k^* - m^*)]/\Delta$$

The signs are indeterminate unless specific relations between (Φ, Φ^*) are established. I give here the solutions for the two main cases discussed in the text.

The case of international portfolio adjustment in which it is assumed $\Phi < 1$, $\Phi^* = 1$, yields

$$dY/dF = [-\varepsilon_x k^*(\Delta - 1) - e_m \Phi(k^* - m^*)]/\Delta \quad ?$$

$$dY^*/dF = [\varepsilon_x(k - m\Phi)]/\Delta > 0$$

$$de/dF = 1 - [m^*(k - m) + \Phi m(k^* - m^*)]/\Delta > 0$$

The sign of dY^* and de is positive for ($\Phi < k/m$) which is fulfilled by the asumption $\Phi < 1$).

The "classical case" in which it is assumed that $\Phi = \Phi^* = 1$, yields

$$dY/dF = -\varepsilon_m(k^* - m^*)]/\Delta < 0$$

$$dY^*/dF = [\varepsilon_x(k - m)]/\Delta > 0$$

$$de/dF = (k - m)(k^* - m^*)/\Delta > 0$$

Notes

(1) And also to Longfield (1840), Bastable (1890) and Nicholson (1897).

(2) For obvious reasons I shall only specify functions of the home economy. Those of the foreign economy are analogous.

(3) On the degree of sterilization as a parameter not fully under control of the central bank see above ch.III, sec.2.3.

(4) To be precise, there is one such element, which I shall disregard to keep manalysis manageable: the money interest rate. As was shown in Part I, the money interest rate is in fact a component of factor costs, which may link asset markets to the supply side of goods. For instance, to the extent that asset market adjustment requires a higher money rate, this will be transmitted to supply prices by price-makers. As a consequence, smaller quantities at higher prices will be offered; in the short run at least, the producer real wage and labour share fall. Hence, such a result seems to enhance the traditional contractionary effect of increasing interest rates. For a detailed analysis see Fitoussi-Phelps (1988, ch.IV) and the literature quoted therein.

(5) See also Allen-Kenen (1980), Frankel (1983).

(6) This point is akin to the treatment of the discount rate in the classical model in ch.V, sec.2.2. See the interesting positions of Machlup (1928) and Ohlin (1929) as to the ability of Germany to attract capitals during war payments, and more generally Keynes (1930, ch.XXI).

(7) For qualifying issues and results, especially as to world-economy models, see Dornbusch (1980b, Part IV) and Kenen (1985).

(8) Equation 3 also shows a wealth component in the consumption function. This was derived in ch.III from precautionary considerations analogous to those made in the case of investment. Hence the effects of changes in asset markets conditions described in the text may be extended to consumption.

(9) The reader will recognize the affinity with Keynes's model of the discount rate analyzed in ch.V, sec.2.2. In the monetary framework adopted in Part I, the discount rate has in fact to be the intermediate link between external imbalances and the rise of domestic rates.

(10) The figure does not take account of further repercussion effects on and from R real expenditure and income.

(11) See Viner (1937, ch.IV, sec.7), Samuelson (1952, 1954), Johnson (1975, 1976). For further treatment of this point see Aquino (1986, ch.I, sec.3). A simple way to verify this property is by noting that the cut in domestic output in T frees factors by the amount $(-\Phi_d n'_d)$ while the increase in R demand for T exports calls for factors by the amount $(\Phi^*_m n'_x = \Phi_d n'_x)$. Clearly, if the export industry is more efficient than the domestic one $(n'_x < n'_d)$ there will be (i) excess factor supply or (ii) excess output supply in the export industry. Since in R exactly the same happens with opposite sign, as a result T real exchange rate should depreciate, whether measured at market prices or at factor costs.

(12) For simplicity's sake, exchange-rate wealth effects on each asset stock, and in the BIT equation, are normalized to 1 instead to the absolute values of the stocks.

(13) The substantial simplification I am making is to ignore further consequences of price effects of changes in the nominal exchange rate: namely, effects on import consumption propensity and on export firms' price decisions (the basic analytical blocks can be found in the macroeconomic model of Part I, ch.III). The first is the well-known Laursen-Metzler effect; the fact that depreciation increases import

prices will tend to depress the marginal consumption propensity; hence this effect should strengthen the negative transfer impact in T (the opposite in R). On the other hand, optimal price making is not insensitive to the exchange rate even in the absence of imported factors; when the nominal rate changes, also markups should be changed, but with a dampening effect on supply prices (this point will be refined in the analysis of exchange rate dynamics in ch.VII, sec.1.3).

(14) And in later refinements such as those by Johnson (1956) and Metzler (1966).

(15) For a critical discussion of the traditional model of world economy and of alternative formulations, with particular reference to the recent US-Europe experience, see Fitoussi-Phelps (1988, chs.III-IV). In their own proposal, they focus on the price effects of rising interest and exchange rates in imperfectly competitive goods markets. As noted earlier (see n.4 and n.13), the result in T should be contractionary on quantities and inflationary on prices; the real money stock is reduced, which may account for the possibility of real loss in the depreciating country. However, this and other modifications do not pay attention to the transfer expenditure effects implied.

(16) Relevant references are Sachs-Wyplosz (1984), Branson (1985), Feldstein (1986), Dornbusch (1986), Claassen (1987), Frenkel-Razin (1988, Part II).

(17) Finally, let me add a side remark. In virtually all the studies under consideration here, the key role in world shifts of financial and real resources is played by fiscal shocks on the saving-investment balance. This may be justified on the empirical grounds of recent experience, but it should be clear that there are no good theoretical motives for private deficit spending to be ignored. Moreover, it is difficult to believe that investment is left unaffected by a fiscal shock; there may be some crowding out or, by contrast, some sort of acceleration phenomenon. After all, the public share in U.S. external debt is only about 20%. Even less believable is the case that active fiscal policies make sense in the perfect market economies that purport to explain them.

CHAPTER SEVEN

EXCHANGE RATE DYNAMICS IN THE WORLD TRANSFER PROCESS

Introduction

This chapter addresses some issues in exchange rate theory from the world-transfer viewpoint. The message from preceding chapters is that in early developments of modern exchange-rate theory the commitment to conditions of neo- or new-classical steady state diverted attention from actual macroeconomic processes of the international circulation of goods and capitals. No doubt, the rigorous specification of the conditions of stock equilibrium has been a decisive advance, but when the theorist moves from asymptotic equilibrium to historical time he should be aware that the real world is continuously engaged in the transfer of financial and real means: current accounts are never zero, nor are capital flows. The transfer approach emphasizes that real exchange-rate dynamics is part of the expanding world economy: it is largely dictated by the necessity of transferring capitals and goods towards deficit-spending economies in the world (and conversely, towards rentier economies in the world). If nominal exchange rates are free to float in the place of goods prices, they will take part in the world transfer process. What results is not **necessarily** disequilibrium or "overshooting" phenomena, nor is it merely imputable to policy mismanagement.

Having reached this point, two questions arise: How does the exchange rate work in fact, and does it work well? Anyone sees that the two questions are related, though they are different in nature. The former has a positive outlook, the latter has a normative one. I will seek an answer by first investigating what the exchange rate should be expected to do -that is, analysing what is commonly called its "fundamental path" (sec.1). Then I will examine how well the asset-market, forward-looking component of exchange rate determination may be expected to reflect the fundamentals (sec.2).

1. Fundamentals

1.1. The efficiency of the world economy.

Exchange rate theory has always revolved around an idea of efficiency, at least since Milton Friedman's (1953) advocacy of flexible rates: fixed prices destroy efficiency. The free floating regime has been strongly supported by the profession on the grounds of the old "trade-elasticity optimism" or of the brand new "asset-market-efficiency optimism". The latter now lies at the core of modern economics of international finance and exchange rates.

Part I (ch.I) set out a preliminary treatment of the issue of efficiency. The main conclusion was that exchange rate theory, if exchange rates are to be the prices at which currencies are exchanged, is misplaced in an Arrow-Debreu economy. In such an economy the exchange rate cannot be "the price" of anything since there is no room for allocative choices across different numeraires, if any. The exchange rate performs the function of a price only if currencies exist and serve as means of payment and store of value; but, as we know from monetary theory, this indicates that future markets are not complete, that is to say, all available information is insufficient to achieve Arrow-Debreu "market general efficiency" (MGE). Therefore, the study of the exchange rate, like that of money, should be framed in an economy imperfectly informed and hence constrained to less than Pareto-optimal realizations. This is not to mean that free currency markets and exchange rate flexibility are undesirable, but that "the desirability of market-produced exchange-rate changes must be valuated; there is no automatic appeal to optimality" (Frankel (1985b, p.24)).

Going down the ladder of achievements we first meet informational efficiency. The distinction between MGE and IE was also drawn in ch.I. The latter is a local property of specific markets and cannot be taken to imply the former. Bearing this caveat in mind, we may look at two remarkable results of the early generation of asset-market models. Firstly, they showed that changes in asset prices and exchange rates ensure that the allocation of the world stock of wealth is optimal in terms of return-risk diversification, as valued by means of available information. Secondly, exchange rates are as variable as "fundamentals" of asset choice, or perhaps as "news" on them. Short-run deviations from purchasing power parity, and hence trade imbalances, may take place, but these models predict "long-run" spontaneous adjustment towards full stock-flow equilibrium (steady state). The efficient information hypothesis (EIH) has several questionable implications, which were pointed out in ch.III (sec.3 and App.A.1) and will be discussed in the appropriate context of sec.2 below. For the time being, let us recall that one such implication is rational expectations -in the weak form which restricts subjective expectations to coincide with the central value of the probability distribution of outcomes (correctness). Therefore, the EIH simply shifts the problem onto the stochastic model which agents believe to generate the probability distribution of outcomes -the so-called "fundamental model".

The supposed fundamental model of exchange rate dynamics in the world economy has changed substantially in the last few years. In a nutshell, the exchange rate should be expected to effect goods transfers rather than to prevent them. Goods have to follow capitals in the expanding world economy, and this principle has modified the requirements of the exchange rate to the following: (i) a correct distribution of capital flows, (ii) securing world flow equilibrium with no real losses (hence with no interference of monetary authorities on point (i)). The proliferation of models of a world borrower, and then world interest payer, mentioned in the previous chapter testifies this shift of focus. As a whole these represent the last generation of asset-market efficiency models. The EIH is still at work since the correct distribution of capital flows, and hence the correct exchange rate dynamics, is obtained by feeding expectations with the solution of the fundamental model of world flow equilibrium for the exchange rate. Interestingly, the case of a borrowing economy entails at least two stages of world flow equilibrium (or a two-stage transfer problem): the stage when the rate of borrowed capital inflows is equal to that of goods deficits, and the stage when the flows of interest payments are equal to those of goods surpluses. Quite correctly Dornbusch asked:

If as a result of debt accumulation, via the transfer problem or via risk premia, an ultimate depreciation is required, why should we expect an initial appreciation? [...] It turns out that all the parameters in the model -trade elasticities, wealth elasticities, risk premium responses, etc.- matter for this question. Even in very highly simplified models no firm conclusions emerge about the path of the exchange rate (1987, p.6).

In fact, this was also our finding in ch.VI (sec.2.2), though a presumption in favour of depreciation for T economies, and appreciation for R economies, emerged. However, we also concluded that this is per se unlikely to prevent real income effects if the transfer pattern is unfavourable to T. Such a result sets further limits on the achievements of flexible exchange rates.

Whereas the previous chapter gave us the static comparative results of exchange rate changes in the world transfer process, the present section will explore in greater detail the possibility of different fundamental paths of the exchange rate.

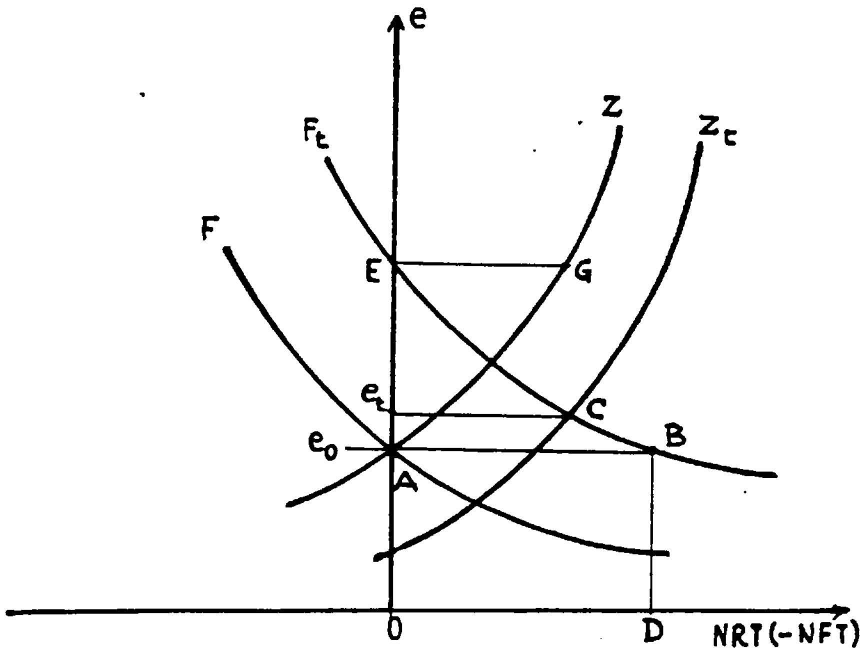
1.2. The paths towards world flow equilibrium.

The fact that asset prices and the exchange rate co-determine the composition of portfolios per unit of time is only one part of the story. The exchange rate is actually determined by foreign currency demand and supply; asset transactions are only one component of the foreign exchange market, the other being goods transactions. The interaction between the assets and goods markets is crucial to the transfer process, and hence to the exchange rate within it. Fig.1 elicits a few interesting observations on exchange-rate dynamics, especially if one is prepared to admit that world flow equilibrium (point C) will not be reached instantly. Note that this stage of analysis implies nothing as to exchange rates volatility around the trend, since it rather aims at understanding the trend itself.

Fig.1 reproduces fig.4 of ch.VI with the addition of goods transaction (and deletion of compensatory foreign capitals for clarity). The F schedule is equivalent to the A6 schedule in fig.4; the Z schedule is derived from the BIT equation in matrix 13 (ch.VI) under the assumption of effective total trade elasticity ($b > 0$). The right horizontal axis measures negative NFT and positive NRT. The shift of F from A to B is the initial demand for foreign currency from asset transactions. In what follows it will be assumed that conditions of depreciation prevail (see ch.VI, sec.2.2); yet different adjustment paths will be possible.

The exchange rate will approach the dearer value at point C as depreciation itself, and possible income effects (shifts of Z), improve NRT. Point C indicates world flow equilibrium, where T is transferring capitals and goods by the amount OD.

Fig. 1 The foreign exchange market (T economy) with demand and supply derived from financial and trade transactions.



In a standard ("dual") exchange-rate model, e would immediately jump to point E to clear financial operations, and then one would observe that at point E a surplus of trade operations by EG should emerge, which implies a reversal to appreciation. But until C is reached, such a representation either describes one single clearing operation in one single time unit or it implies disequilibrium on the foreign exchange market through time. This openly contradicts the basic tenet of these models that markets always clear. In order to have the market cleared per unit of time, the path of the exchange rate between e_0 and e_t should be dictated by the interaction between asset-market decisions and goods-market ones. Suppose NFT unfolds steadily through time. Above Z (Z_t) (dF/dt > dZ/dt), goods markets respond with a lag, hence e has initially to go up along a supply schedule of compensatory capitals, and then fall back to point C as positive trade balances become predominant. Along Z (Z_t) (dF/dt = dZ/dt), goods markets are responsive enough to depreciation; a smooth upward sloping path from A to $\dot{C}$ may well result if F and Z shift in parallel; both diagrammatically and empirically we observe that this may be the case if income effects come about rapidly[1].

In sum, the exchange rate path towards flow equilibrium depends on the responsiveness of compensatory capitals, on the parameters of international trade and on expenditure-income effects. In current terminology, we may talk of "overshooting" for all temporary exchange rate values above e_t, not for those below. The nature of e_t itself is more controversial. In the stock equilibrium methodology also e_t is above its "long-run equilibrium" value since NRT is not zero, which implies wealth effects on asset stocks and changes in NFT. In the early generation of asset-market models e_t was not relevant information; it is instead relevant in the transfer approach since the exchange rate must take a value liable to effect the goods transfer. What happens beyond point C, and what the "long-run equilibrium" value of the exchange rate will be is open to dispute.

1.3. The long-run evolution of the world economy. Pitfalls in current acount wealth effects.

This issue was already put forward in ch.IV in relation to the sustainability of different world scenarios. It was stressed then that the world-transfer approach concentrates on flow equilibria associated with world expansions and tends to push steady state equilibria in the background of analysis -what matters are ever-changing transfer problems. By contrast, the steady state is an integral part of stock equilibrium theories of the exchange rate as an effective achievement. A closer comparison between the two views may be instructive.

Let me first recall that exchange rate theory now offers two main models of long-run adjustment. One is based on the exchange rate value which sets trade balances to zero; the other is based on the value which equates trade surpluses with interest payments[2]. The two models obviously provide different anchoring for the exchange rate; clearly, for a deficit country, the latter prescribes more depreciation than the former. The adjustment mechanism is different too. However, the message is the same: there exists an inbuilt tendency for the exchange rate to drive the world economy towards zero current accounts, i.e. stock equilibrium and steady state.

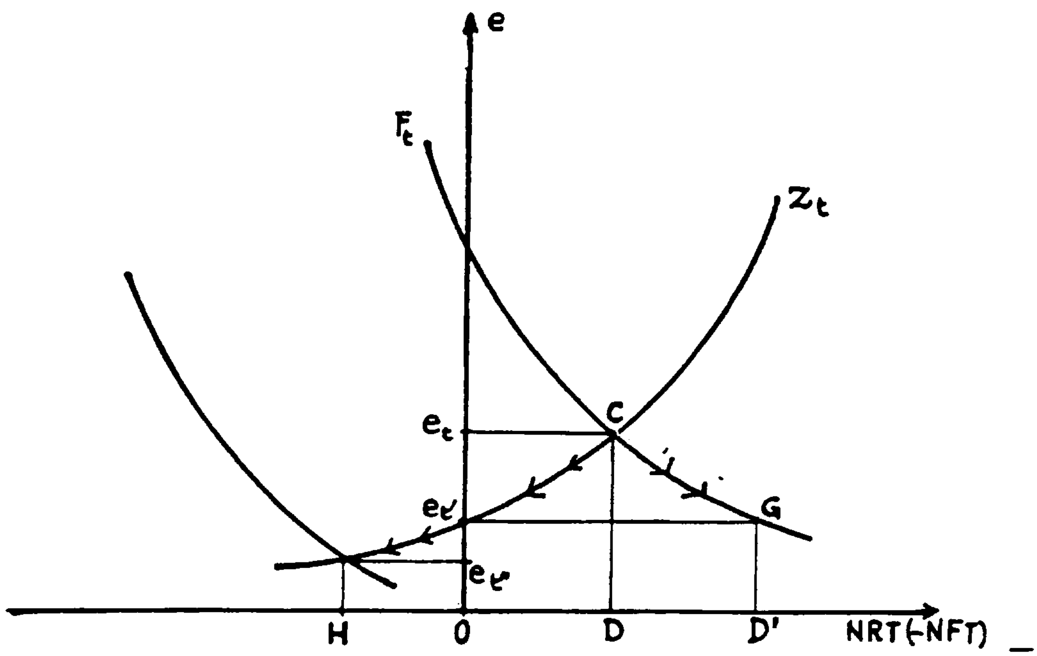
Long-run models which do not include interest payments are based on a key principle of asset market theory: trade imbalances amount to wealth effects. Here a financial transfer should be interpreted as a single finite episode of stock adjustment. At a point like C in fig.1, T runs a trade surplus and T asset holders should accept R assets in excess of the initial desired increase OD. The basic adjustment mechanism is usually derived from the equilibrium equation for the foreign asset (see ch.VI, sec.2.2):

(1) $$(A6_t + Z^*_t)e_t = \alpha 6A_t$$

where $(Z^*_t > 0)$ is a trade surplus in foreign currency which acts as an asset supply shock. If $(dA6, dA = 0)$, the only possible solutions are $(de < 0)$ and/or $(d\ \alpha 6 > 0)$, that is a combination of exchange rate appreciation and foreign return-rate increase. The market process is generally attributed to the attempt of T asset holders to sell off excess R assets, thereby pushing their price and the price of currency down. Note, therefore, that the stock adjustment in this model gives the opposite picture of the flow adjustment: the surplus T economy appreciates while R return rate possibly increases. More generally, this result has been inetrpreted as confirming the traditional idea that a surplus economy should appreciate, while a deficit economy should depreciate, "without reverting to the traditional flow theory of foreign exchange" (Frankel (1983, p.95)).

If one tries to reproduce the above type of long-run adjustment in the diagram of the foreign exchange market one realizes that some difficulties exist[3]. Fig.2 reproduces the basic case in exchange-rate models in which the long-run adjustment is entirely due to exchange-rate wealth effects; hence the schedules of financial transactions (F_t) and trade transactions (Z_t) do not shift from the previous position. Point C is such a position of world flow equilibrium inherited from fig.1. The adjustment path described by equation 1 results in a downward movement along F_t until $e_{t'}$ is reached where trade balances are null and stock equilibrium holds. The rate of appreciation $(e_{t'}/e_t - 1)$ is given by the slope of the trade schedule. The accumulation of R asset corresponding to T surpluses is equal to DD' and depends on the slope of the financial schedule (i.e. the responsiveness of T demand for R asset to appreciation). Note that e falls because there is ongoing excess supply on the financial side between C and G.

Fig.2 The foreign exchange market (T economy) and the long-run evolution of the world economy.



In my view, this mechanism hides a piftall due to the misinterpretation of trade imbalances as wealth effects and from ignoring the explicit conditions for the foreign exchange market to clear[4]. To exemplify this, let me call R currency "dollar" and T currency "lira"; for e_t liras per dollar T exporters have excess dollar balances over importers while there are no transactions from the financial side. As a matter of fact, the situation can be settled either (i) by exporters hoarding dollar balances directly in their dollar accounts abroad, or (ii) by exporters going through the exchange market and bidding up liras against dollars[5].

Now, as originally conceived, wealth effects arise from undesired windfalls, gains or losses brought about by changes in goods or asset prices (apart from "helicopter" phenomena hitting asset stocks); accordingly, it can be argued that stocks will be promptly corrected to their initial level. Apart from these cases, portoflio theory itself holds that accumulation of wealth always takes specific forms and explains how any specific store of value comes to be **willingly** held in the public's portfolios through appropriate changes in its price. In our example, if the importer chooses procedure (i), one should conclude that he wishes to increase his deposit -and this is a stock equilibrium. On the other hand, the importer may choose procedure (ii) and the exchange rate will be fixed at a value such that someone else is willing to increase his own dollar assets -this is, once again, a stock equilibrium. Indeed, windfall wealth effects are already embodied in such transactions via the effect of the exchange rate on foreign asset demand. In general, in a regime of free fluctuation, trade imbalances are to be met by **desired changes in the foreign position** so that, **ceteris paribus**, no further in-built adjustment can be expected.

It follows firstly that the claim of also basing long-run exchange rate dynamics on asset markets "without resorting to the traditional flow theory" is groundless. Rather, exchange rate dynamics after trade imbalances, other things equal, can only result from the necessity that transactions on current account should be matched by those on capital account, **the two being independent ex ante**: this is precisely the task of the exchange rate. Hence, for any ($Z_t > 0$), the correct steady state equation is[6]

$$(2) \qquad Z^*(e,...) + F(e,...) = -Z_t^*$$

The solution is shown in fig.2 by the downward movement along the Z schedule up to the steady state value $e_{t'}$. This not simply a matter of graphical amendment.

Equation 2 states that the long-run dynamics of payments and exchange rates must be taken over by the trade balance itself: deficit forces depreciation to swallow foreign assets (capital inflows), surplus boosts appreciation to enlarge their share in portfolios (capital outflows). This inolves a critical passage: how is it that at some point in time trade transactions come to predominate over financial transactions? There is no definite, once-and-for-all answer. It seems only possible to provide a menu of ingredients: if the determinants of world demand for R assets do not change through time, if the world financial transfer to R can be regarded as a single, finite stock adjustment, if this is not affected by factors of selfsustained persistency (or contraction), or else if it is "efficient", if the trade balance responds to exchange rate dynamics correctly, then we may expect to observe a well-behaved cycle of the exchange rate[7].

Let us now turn to models which include interest payments as a long-run feature. The case seems unassailable when the inital financial transfer is borrowed; the interesting implication is that we have a new transfer problem in the opposite direction, which leaves non-trade transactions in their dominant position. Switching from T to R economy is quite mechanical since the NFT is actually given by the difference between capital outflows (K) and interest payments (YF); since the latter fall due on a permanent basis, while the former stem from a finite stock adjustment, there will be a point in time when interest payments exceed capital outflows. Recall that the initial financial transfer was

$$-(F_0 + dF/dA6) = -\alpha_{66}dr6/dA6 + de/dA6 = dK/dA6$$

Suppose capital outflows take place at a constant time rate ($dK/dt = k$); if i6 is the average interest rate on cumulated credit, interest payments at time t amount to ($YF_t = kti6$), hence the NFT in each period is

(3) $$F_t = -k(1 - ti6)$$

and the steady state equation of the foreign exchange market is

(4) $$Z^*(e,...) + Ki6 = 0$$

F_t diminishes through time and turns to positive after 1/i periods. This corresponds to leftward shifts of the F_t schedule in fig.2; as long as NRT is positive, $\dot{e}_t$ appreciates on the foreign exchange market. As already observed, current models are mostly assuming a pure currency transfer problem; quite simply, if OH is the permanent interest inflow given by the foreign asset stock OD, the equilibrium exchange rate will be $e_{t'''}$. The reader may apply the transfer models of ch.VI to derive a variety of different results. Which means that the long-run value of the exchange rate is not unique, but depends on the financing-utilization pattern of interest payments.

Admitting the case that capital movements in the long run entail an interest-payments transfer problem avoids the analytical difficulties met in models based exclusively on wealth effects. However, the time profile of the cycle of world payments and exchange rate is by no means less nebulous. For equations 3 and 4 to work on a predictable basis, the "if's" we met previously still remain. The one relative to international trade elasticity will be examined in the next paragraph; the one relative to the "efficiency" of the world financial transfer will be the subject of the section on expectations.

1.4. Pifalls in international trade elasticity.

The existence of, and convergence to, world flow equilibria as well as to steady state equilibria ultimately relies upon "old-fashioned" well- behaved price elasticities of international trade, a point made plain by the class of models discussed in par.2. The era of asset-market models of the exchange rate has been one of disguised "elasticity optimism" -this has been a step backward. We still face a number of unsettled questions with regard to goods movements and relative price changes, which I now briefly review again. First, relative price changes, net of exchange-rate adjustments, have always turned out to be slight as compared with large and continued goods movements in the same direction (see also above, ch.V, sec.2.1). Second, changes in nominal exchange rates have often proved to exert relatively little effect on goods movements (e.g. the dollar depreciation after 1985). We have seen that an explanation may lie in the fact that real exchange rates are unlikely to bear the whole burden of adjustment, which they share with real expenditure and income effects. However, fitting these facts into transfer models only through manipulation of elasticity or by appeal to additional forces is somewhat unsatisfactory. Plenty of evidence now suggests that (i) supply prices of tradable goods may be adjusted to changes in nominal exchange rates (rather than the other way round) -which is known as **incomplete pass-through**- and that (ii) prices of tradable goods on the origin market (on which measures of real exchange rates are ususally based) may differ from prices of the same goods on the outlet market (on which import price indexes are based) -which implies a power of **price discrimination**[8]. This is tantamount to abandoning both alternatives of perfectly competitive and Keynesian markets, the third alternative being the broad family of imperfectly competitive markets. This field is exteremely vast[9]; the point I shall consider is limited to uncertainty in production and pricing. I shall show that the imperfectly competitive features of the "polypolystic" goods markets that characterize our model of the open economy (see ch.III, sec.5, ch.VI, sec.1) carry over to international trade in a way that may account for incomplete pass-through and price discrimination, and hence, ultimately, for the failure of predictions based on simple trade elasticity conditions[10].

Let me recall briefly the core of the polypolystic model. The (boundedly) rational production plan of the j-th individual firm was shown to be

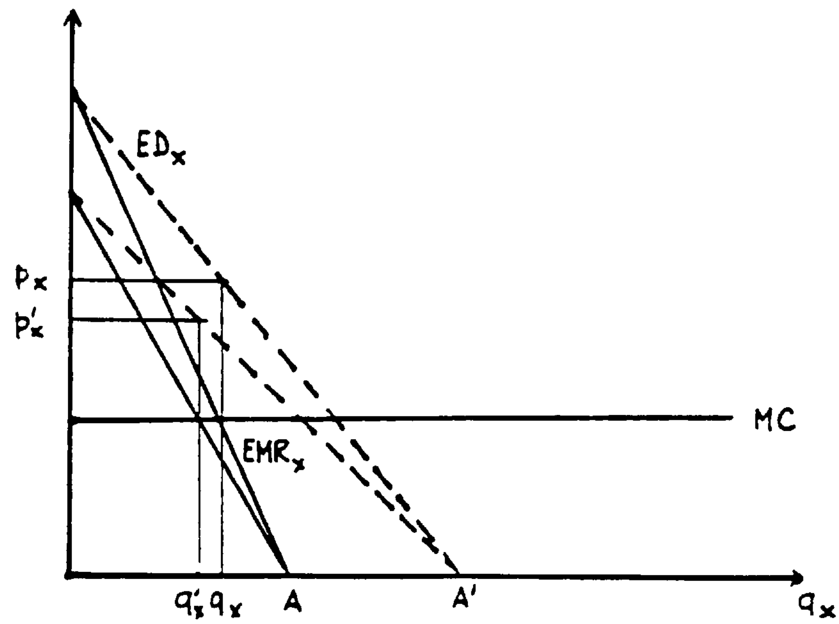
$$q_{j0} = E_j(q_j) = E_j[Q(p_{j0})] - E_j(Q_{\hat{j}})$$

where i denotes all non-j firms, Q is market demand and $Q_{\hat{j}}$ is non-j supply; the resulting optimal pricing rule was

$$p_{j0} = \mathbf{w}_0 \mathbf{n'}_{j0} \mu_j \qquad \mu_j = \varepsilon_j/(\varepsilon_j - 1)$$

where $\mathbf{w}_0$ is the vector of factor costs known at time 0, $\mathbf{n'}_{j0}$ is the vector of marginal inputs for the plan q_{j0}, ε_j is the market demand elasticity at the point of quantity supplied, which is inversely proportional to the number of firms in the market. *Given that all firms* adopt the same decision rule, so that market shares are rationally expected to remain equal and small, and assuming CES market demand it follows that ($\varepsilon_j = \varepsilon_{\hat{j}} = \varepsilon$) for all firms and any quantity supplied. Also assuming that price-makers take average productivity as the norm of costs, and ignoring non-labour costs, the marginal cost reduces to ($\mathbf{w}_0 \mathbf{n'}_{j0} = w_0/\lambda$, where λ is average labour productivity). The resulting diagram of the polypolystic firm's production plan is reproduced here for convenience.

Fig.3. The polypolystic firm's production plan



It will be remembered that the competitive nature of the above decision model is not based on "objective" market parameters (such as the infinite elasticity of demand), but is due to the specification of firms' information set. Competition lies in the absence of direct knowledge of firm-specific past and present variables on the part of other firms, and hence in the absence of strategic interaction **at the planning stage**. A typical conjectural rational rule applies here: the rule is correct in so far as nobody deviates from it. This kind of situation, which seems so akin to the perception of competition by businessmen, engenders strong inhibitions to the use of firm-specific instruments to exploit the market, the most remarkable case being the price. The market pricing rule dictates that supply prices follow marginal costs (which are market-specific) whereas expected changes in demand (which are firm-specific) will normally be matched by stock adjustments of employable resources.

The emergence of a macroeconomic pattern with quantity adjustments has already been illustrated in previous applications. To appreciate the role of the nominal exchange rate in the adjustment process of trade, let us consider what happens in T. The impact of the transfer gives rise to a one-to-one cut back in output and input in the non-tradables industry. The switching of employable resources from the production of non-tradables to that of exportables is virtually blocked until factor costs fall as much as necessary to induce all firms in the export industry (denoted by x) to expect to sell more; the relationship between factor costs cut and expected output expansion is given by the slope of the expected marginal revenue ($-1/\varepsilon_x$); the relationship between expected output expansion and factor employment is given by the coefficients of the input-output function (for labour, the average labour productivity, λ_x). Of course, the whole reasoning is based on unchanging expected output -or expected marginal revenue (EMR)[11]. By excluding (anticipated) increases in the autonomous component of R demand for T export industry, it is easy to see that nominal devaluation is a means of raising EMR rather than reducing marginal costs. However, the working of changes in exchange rates is more complex than in perfect competition models.

In the first place one has to specify the industry structure. Having chosen to focus on product specialization, it follows that T and R export industries are populated by T- and R-located firms respectively. The tradable good of each country is imperfect substitute with the home non-tradable good as well as with the foreign non-tradable good (for simplicity direct substitution between the two tradables is excluded). Let (ε_x, ε^*_x) respectively be the price-elasticity of R demand for T good, and the price-elasticity of T demand for R good; it is also assumed that the characteristics of the internal and external demand for each tradable good are the same. Changes in the determinants of demand other than the prices of tradable goods are excluded. Changes in the exchange rate are here treated as announced once-and-for-all modifications of the official course of the home currency[12]. In these types of models, changes in the exchange rate are by necessity introduced as equivalent changes in variable (labour) costs (e.g. Dornbusch (1987), sec.IIIA); by contrast, the case of national product specialization and poly-polystic market enables one to examine directly the relationship between price decision and exchange rate. In this respect, the choice of the currency of invoice becomes critical; it will be convenient to assume that all firms in both countries invoice in domestic currency[13]. Hence the decision problem will, for all firms in T, be the following:

$$\max\ [p_{jx0}q_{jx0} - w_0 q_{j0x}/\lambda_x]$$
$$\text{s.t. } q_{jx0} = E_j[Q(p_{jx0}/eP^*_d)] - E_j(Q_j)$$

where e is the nominal exchange rate. By analogy we obtain for R firms:

$$\max\ [p^*_{jx0}q^*_{jx0} - w^*_0 q^*_{j0x}/\lambda^*_x]$$
$$\text{s.t. } q^*_{jx0} = E^*_j[Q^*(ep^*_{jx0}/P_d)] - E^*_j(Q^*_j)$$

Let us first consider T firms (the subscript j is dropped). The specification of the demand forecast in their decision problem implies that, under the Cournot-Nash conjecture on competitors and for ($de \neq 0$, $P^*_d \equiv 1$),

$$(5)\qquad EMR_x = p_{x0} + q_{x0}[(\partial q_x/\partial p_x)(dp_x/e) - (\partial q_x/\partial e)(p_{x0}de/e^2)]^{-1}dp_x$$

The expression in square brackets yields the expected loss of output due to changes in the supply price, and it takes account of the fact that the supply price in domestic currency may differ from the market price on the foreign market in foreign currency because of changes in the nominal rate. Noting that de is market-specific and common knowledge, knowing that ($\partial q_x/\partial p_x = -\varepsilon_x q_x/p_x$, $\partial q_x/\partial e = -\varepsilon_x q_x/e$), and assuming that the change in the nominal rate is fully exogenous ($de/dp_x = 0$), the EMR and the market mark-up for all firms in the industry become

$$(6)\qquad EMR_x = p_x(1 - e/\varepsilon_x)$$
$$p_{jx0} = \mu_x w_0/\lambda_x$$
$$\mu_x = e_x/(e_x - e)$$

Consequently, the correct specification of the market mark-up should include the nominal exchange rate.

Obviously, the same applies to R industry; it is sufficient to use the same procedure as above by substituting (e^*, $e^* = 1/e$) appropriately to obtain

$$(7)\qquad EMR^* X\ p^*_x(1 - 1/eJ^*e^*_x)$$
$$p^*_{jx0} = \mu^*_x w^*_0/\lambda^*_x$$
$$\mu^*_x = e^*_x/(e\varepsilon^*_x - 1)$$

Now let firms' expectations be consistent, so that [$P_x = E(p_{jx0})$, $P^*_x = E(p^*_{jx0})$] are the average market prices of T and R tradable good in the respective currencies.

The first observation regards the real exchange rate, which results

$$r = eP^*_x/P_x = e \quad \frac{\mu^*_x w^*_0/\lambda^*_x}{\mu_x w_0/\lambda_x}$$

that is to say, the real exchange rate reflects the foreign structure of costs and demand relative to the domestic one. For obvious reasons of specialization we should not expect ($r = 1$). Changes in the real exchange rate occur to the extent that marginal costs and/or the mark-up in the industries of the tradable goods do change in R and/or T. Of course, changing the nominal rate is another way of changing the real one. In perfectly competitive economies, where ($de \neq 0$, $dP_x \to 0$, $dP^*_x \to 0$), the nominal rate has one-to-one effect on the real one. Now this is no longer the case; it is easy to verify that, in general, the profit-maximizing firm in a polypolystic market should adjust its supply price to changes in the exchange rate. From eq.6 the elasticity of T firms' supply price relative to the exchange rate will be:

$$0 < \delta p_x/\delta e < 1, \text{ for } e_x > 1$$

Devaluation ($de > 0$) operates through an increase in the EMR; more precisely it imposes a rotation to the right around A and A' in fig.3; concomitantly, m is also increased. In fact devaluation turns out to be similar to a reduction of foreign demand elasticity with respect to the firm's supply price; in practice, the firm perceives the opportunity to offset some of the expansionary exchange-rate effect on demand with a profit-maximizing increase in the supply price; hence the exchange-rate pass-through is less than complete and the market price of T tradable good in foreign currency falls less than the devaluation rate.

As for R firms the result is, in general, that

$$-1 < \delta p^*_x/\delta e < 0 \text{ for } e^*_x > 1.$$

T devaluation forces R exporting firms to reduce their market mark-up and supply price in order to compensate for the contractionary exchange-rate effect; the market price of R tradable good on T market rises less than the devaluation rate.

Put otherwise, T devaluation is also a means whereby the real labour cost of exports can be reduced for a given nominal wage rate (in R the real labour cost of exports rises correspondingly). This is simply a side effect of changing mark-ups; in fact, if w, w* are the nominal wages,

$$w/P_x = \lambda_x/\mu_x \qquad\qquad w^*/P^*_x = \lambda^*_x/\mu^*_x$$

Hence one notes that the negative correlation between real labour cost, output and employment in the two countries does not spring from respective labour markets.

Let me only note on passing that the situation portrayed by fig.3 can be interpreted as one of price discrimination. The new and steeper EMR, which is specific to the foreign market, leads the firm to expand output and to charge a higher price exclusively on the foreign market, whereas the price it charges and the output it expects to sell on the domestic market remain unchanged. Let us denote the domestic supply price of H firm with p'_x; then one observes three prices for the same tradable good: p'_x, on the domestic market, p_x, the invoice export price (in domestic currency), ep_x, the final market price on the foreign market. One needs all three prices to explain international price statistics of most manufactured goods (see also Cowling-Sugden (1989))[14].

As a general consequence of polypolystic competition, and of national product specialization, we should expect asymmetric effects of T devaluation. T supply prices will rise so that T market prices on R markets will fall less than the rate of nominal devaluation; T exports will grow with an ex-post elasticity lower than the "true" demand elasticity. R supply prices will be reduced and hence R market prices on T markets will increase less than the rate of nominal devaluation; T imports will shrink less than the amount that would be given by demand elasticity. The relative price of imports to exports, in the respective home currencies, will fall substantially; the real exchange rate may still display depreciation in favour of T if supply price adjustments in the two industries do not offset the rate of nominal devaluation. The relative price of exportables to non-tradables in each country even moves the wrong way: T export industry enjoys domestic appreciation, while R export industry suffers from domestic depreciation[15].

All in all, the resulting picture is one of dampened movements in real exchange rates, with weakened effects of nominal ones. The trade schedule Z_t in fig.2 ought to be convex to the origin, and we should expect a much deeper fall of e to keep overall payments in balance. In any case, the relationship between the rate of nominal devaluation, real depreciation and the trade-balance adjustment cannot be derived directly from historical demand elasticities as in the classical model.

2. The exchange rate as an asset price and the efficiency of the world economy

2.1. The imperfect information hypothesis.

Opening this chapter I have stressed that a shift of focus has taken place in the last few years as to the efficiency standards of exchange rate performance. Gradual and prolonged currency cycles (like the rise and fall of the dollar between 1980 and today) are not in accordance with early exchange rate models of instantaneous stock equilibrium, especially if rational expectations are added. So-called "persistency" is thus a problem in that setup (Dornbusch (1987), Biasco (1987)). It is instead in accordance with the fundamental path emerging from world transfer models, especially if static expectations hold or, which amounts to the same thing, if agents cannot extrapolate instantly the whole future path of R asset supply and return rate. The heart of the whole machinery anyhow lies in asset markets, not because trade transactions do not matter for exchange rate dynamics, but because asset markets should provide world distributions of financial means necessary to make activity expansions effective. Hence we would like such distributions to be consistent with the actual worth of the projects to be financed, and correspondingly, exchange rates not to interfere but comply with the resulting world transfer patterns. The issue of asset market efficiency is therefore crucial also in the context of the world transfer problem examined in this work.

Persistency **can** hide efficiency failures. To put it in traditional terms, the **ex-post** capital transfer to the R economy may exceed the **ex-ante** efficient transfer consistent with the net worth of the economy's assets. Graphically (see fig.1 above), the R asset schedule F_t might not be stable in the adjustment process (e.g. it might move rightwards), whereas the efficient use of all available information would imply that lenders send R no more and no less than OD. A possible cause I wish to draw attention to is the exchange-rate component of expected returns to R asset[16].

As a matter of fact, the picture offered by the fluctuation of major currencies is one in which exchange-rates variability is not justified by fundamentals (excess volatility), existing assets are continuously traded on the basis of patently contrasting judgements of current information so that active strategies may be consistently profitable (heterogenous beliefs), longer-term information (e.g. forward premia) is underemployed, and capitals are misallocated (e.g. overallocated to one country with respect to world efficiency criteria)[17].

A common reaction to these findings has been to save the EIH by throwing some spanner in the works, such as myopic behaviours (Frankel (1985a), Krugman (1985)) or "fads and fashions" (Dornbusch (1982)). Since these behaviours cannot be derived from the untouched EIH they appear to be purely irrational. On the other hand, the evidence of random walks à la Meese and Rogoff (1983) tells us nothing about the market structure and agents' behaviour: it only tells us that exchange rates behave like outcomes in a fair chance game. For instance, one might argue that if the expected value of the game does not fall short of the entrance cost, it is rational to become a pure gambler. It is easy to understand that bettors' guesses would disturb the exchange-rate path with respect to the fundamental one; if the expected value of the game must also pay for the probability that the game comes to an end, a "speculative bubble" would take off. Rationalization of the "casino market" and of destabilizing "bubbles" has been an interesting achievement (Dornbusch (1982), Dornbusch-Frankel (1987, pp.19-ff)).

However, it entails an essentially non-economic view of financial activity; financial profit, if any, would be the gift of pure luck rather than the reward for some form of economic rationality. Moreover, such an explanation still has to assume EI as the gravity force of bubbles. Both theory and evidence (see e.g. Frankel (1985b)) cast doubts on the idea that take-offs and crash-landings of bettors' bubbles can be a convincing portray of normal financial activity.

On the whole, the present state of analysis offers a polar choice between fully rational and fully irrational asset markets. Neither side seems, however, able to give us a robust understanding of international investment, exchange rate dynamics and their effects on the world economy. If the postulate of perfect rationality is hardly defendable against the evidence, irrational decision-making would imply systematic losses or casino-like wins.

By contrast, the hypothesis advanced here can be put as follows: international investment is not a lottery; it is what professional investors, and popular wisdom, think it is -an economic activity based on "professionalism and expertise in picking winners" (Levich (1980, p.101)). **This is possible because**, firstly, publicly available information is incomplete, secondly it is not the same for all agents, and, thirdly, it is not freely disseminated by the market. The imperfect information hypothesis is now attracting more attention in exchange-rate theory (Dornbusch (1989)). The paragraphs that follow contain some very preliminary examples which show how basic forms of informational imperfection may generate **socially undesirable** outcomes from **individually rational** decisions. The focus will be on two particular efficiency failures among those recalled above: misallocation and excess volatility; these are in fact particularly important from the world transfer-problem viewpoint.

2.2. Expectations with incomplete information.

Perhaps the most critical subset of information is not state information, but process information: information on other agents' decisions and on subsequent evolutions of decision variables. In other words, we have not only uncertainty over the possible future states of the world, but also over the structure of the world itself. To go back to Dornbusch's puzzle quoted above, is it rational to expect that the expanding economy in the world will appreciate (by how much, when...) to obtain the goods transfer, or to expect that it will depreciate (by how much, when...) to pay for interests? The transfer models presented in this work show that a variety of world models, of world equilibria, and of related exchange-rate paths, are possible on different patterns of interaction between financial and production decisions. For instance, the fact that world financial transfers take place through time rather than instantly is irrelevant in asset-market efficiency models, whereas this should be seen as a signal of lenders' lack of the information necessary to anticipate the whole transfer pattern.

To grasp the consequences of limited information in forward-looking decisions we may make use of the the basic asset market model introduced in ch.III (App.A.1). The portfolio specification of the equation of each period's rate of adjustment in the exchange rate was shown to be,

$$\varepsilon_t = ay_t + b(\varepsilon^*_{t'} - \varepsilon_t)$$

where all small-case letters are rates of change in the following variables y_t = interest differential (foreign - domestic), ε_t = current spot exchange rate, $(\varepsilon^*_{t'} - \varepsilon_t)$ = expected appreciation (.<0) or depreciation (.>0) rate between [t, t'=t+1].

The exchange rate depreciates in the current period ($\varepsilon_t > 0$), as the foreign interest differential increases ($y_t > 0$) or as expectations of capital gains arise ($\varepsilon^*_{t'} - \varepsilon_t > 0$). The fundamental path of the exchange rate was found to be:

$$\varepsilon_t = ay_t$$

where static rational expectations ($\varepsilon^*_{t'} - \varepsilon_t = 0$) are implied. It will be useful to consider the "fundamental" view according to which, because of random expansions and contractions in world asset supply, the interest- differential changes y_t occur randomly around its "long-run" value; hence [E(y) = 0]. Now we shall examine more closely the expectations formation process.

There is no difficulty in following the prescription that expectations should be based on all the relevant economic knowledge. I shall not question here whether the existence and adoption of "the" unique model of the market for all agents is believable;

rather, I shall characterize the situation under consideration as one where agents have limited knowledge and information, that is they use a partial reduced-form of the market with information on decision variables limited to the current period (on this methodology see above, ch.I, sec.2.3). In other words, our agents know the fundamental equation of the exchange rate, hence they aim at anticipating the future values of y; in so doing, however, they face limitations on two sides: (i) they have only a partial reduced-form model of y, and (ii) they have only current information on the relevant variables (say z_t).

The forecast model will be:

$$\varepsilon^*_{t'} = g(z_t)$$

which derives from

$$\varepsilon^*_{t'} = ay\sim_{t'}$$

$$y\sim_{t'} = d\sim z_t \qquad\qquad d\sim\; > 0$$

$$y_{t'} = y\sim_{t'} + \Phi_{t'}$$

$$\varepsilon^*_{t'} = g\sim z_t \qquad\qquad g\sim = ad\sim\; > 0$$

where $y\sim_{t'}$ is the estimated value of $y_{t'}$, z_t is a measure of the current observable change in foreign asset supply relative to the domestic one (with $E(z) = 0$), and $\Phi_{t'}$ is a random forecast error. Therefore, the equilibrium adjustment of the exchange rate will be:

$$(8) \qquad \varepsilon_t = \omega_0 a y_t + \omega_1 g\sim z_t$$

$$\omega_0 = 1/(1+b),\ \omega_1 = b/(1+b)$$

Three observations are in order.

First, (ω_0, ω_1) are measures of the effect of forecasts. Current exchange rate dynamics reflect current changes in the interest differential as well as the current relative growth of R asset, which lenders follow to anticipate the future exchange rate. Eq.8 has the nature of an acceleration equation. For instance, under conditions of relative growth of R asset ($y_t > 0$, $z_t > 0$), R currency will rise at a pace faster than the efficient one ($\varepsilon_t > ay_t$).

Second, the consequence of the use of a forecast model with limited knowledge and information at this stage is clear: the exchange rate runs ahead of its efficient path because agents understand correctly that the path is traced by the relative growth of R asset, but are unable to discount immediately the complete transfer pattern. To obtain a clearer idea of this fact, one may compute the appreciation rate by taking the difference of equation 8 in t' and t; one thus obtains:

(9a) $\varepsilon_{t'} = \omega_1 g\sim\gamma_{t'} + g\sim z_t + \omega_0 a\Phi_{t'}$ $\qquad \gamma_{t'} = z_{t'} - z_t$

(b) $\varepsilon_{t'} - \varepsilon_t = \omega_1 g\sim t_{t'} + \omega_0 a(y_{t'} - y_t) + \omega_0 a\Phi_{t'}$

Note the first term in equation 9a ($\omega_1 g\sim\gamma_{t'}$); this is clearly a trend term containing the acceleration rate of the relative growth of R asset, and it is inserted into exchange rate dynamics by the forward-looking activity of lenders. This term would vanish from the exchange rate path only if lenders knew and expected [E(z) = 0, E(γ) = 0,], which brings us back to the case of static rational expectations. In all other cases in which agents look ahead, but not infinitely ahead, the exchange rate path will turn out to be accelerated with respect to the efficient one.

Third, 9a also illustrates the interesting fact that lenders' forecast model is actually reflected by exchange rate dynamics (if $\gamma_{t'}$ is random and hence adds up to the error component of the forecast), though this achievement is due more to self-fulfilment than to complete knowledge of the economy. The forecast of appreciation ($\varepsilon^*_{t'} - \varepsilon_t > 0$) will be confirmed by 9b (lenders will be on "the right side of the market", $\varepsilon_{t'} \geq \varepsilon_{*t}$)[18] until there is positive relative growth of R asset reflected in an actual increase in the interest differential ($y_{t'} - y_t > 0$) from one period to the next. This signals that as long as R asset relative supply increases there will be capital transfers in excess over the efficient amount.

2.3. Excess volatility. Asymmetric information.

Limited information is not the end of the story. For any given chunk of information -it will be remembered- the hypothesis that it is processed efficiently bears implications that are either counterfactual (e.g. the absence of asset trading) or non-economic (it is rational to behave as pure gamblers) or even paradoxical (e.g. who is going to produce information if information is a public good?). Path-breaking works and modern principles on the impossibility of efficient information were discussed in ch.I(sec.2.2). The point of interest here is that incomplete information creates an incentive to gathering further information; private incentive lies not in the amount of information publicly available, but in the worth of the private further bit that one is able to secure for oneself. Hence, information takes the nature of a public good. Producing information has a private cost that must be rewarded; but if information is fully revealed through competitive contracting no one will ever bear the cost of producing information. This point is better understood if one bears in mind that EI may prevent stock adjustments; if information is costly, those who paid for it would not be able to adjust the asset stock profitably by actually acquiring or releasing the asset. Therefore, a necessary condition of profitability for the informed to enter the market may be that of effective trades. As will be seen, these actually occur if a class of agents is prevented from getting the correct information.

As we know, our basic asset market model implies a foreign-asset demand function with constant elasticity of substitution (a, b), equal for all agents (n), such that once expressed in rates of change it results

$$k_{nt} = a_n y_t + b_n(\varepsilon^*_{t'} - \varepsilon_t) - \varepsilon_t$$
$$\Sigma_n k_{nt} = 0$$

where ($k_{nt} > 0$) indicates excess demand (stock increase), and $a_n = a$, $b_n = b$ for all n. I reproduce here fore convenience the fundamental solution of the market, which is

$$\varepsilon_t = ay_t$$
$$k_{nt} = 0 \qquad \text{for all n}$$

Note that the second equation shows that asset market equilibrium in each period obtains with no asset trades.

The standard asset market model with asymmetric information assumes that a class of agents observes a correct signal of the fundamental variable while the remaining agents observe nothing else than the market price (see e.g. Andersen (1985)). As a first step, I instead assume that the agents who are informed on the correct evolution of the interest differential in the relevant decision period (y_t) face agents who have information on y_t affected by a "white noise"[19]. With respect to the fundamental model under the EIH, I reformulate the informational assumptions as follows:

(i) all agents use the same decision variable y;

(ii) agents have differentiated access to information on y_t, and accordingly they are distinguishable as "insiders" (i, with information $\{\Omega_{it}\}$) and "outsiders" (o, with information $\{\Omega_{ot}\}$);

(iii) outsiders never observe y_t but observe ($y^\wedge_t = y_t + v_t$), where v_t is a random error i.i.d. $N(0, V_v)$, $V_{yv} = 0$.

After these modifications the asset market system becomes:

(10)
$$k_{it} = ay_t + b(\varepsilon^*_{t'} - \varepsilon_t) - \varepsilon_t \qquad i = 1,\dots,I$$
$$k_{ot} = ay_t + b(\varepsilon^*_{t'} - \varepsilon_t) - \varepsilon_t \qquad o = I+1,\dots N$$
$$Ik_{it} + (N - I)k_{ot} = 0$$

Since here I am not interested in the effects due to the relative weight of the two classes (Grossman and Stiglitz (1980) show that there should be an optimal number of outsiders), I shall make the useful assumption that they have the same dimension; this renders the individual exchange across the two classes equivalent to the aggregate exchange bteween the two classes as a whole.

In the first place, it is easy to see that the rational expectation is still static, which is consistent with the following solution:

(11)
$$\varepsilon_t = ay_t + (a/2)v_t$$
$$k_{it} = -k_{ot} = -(a2/2)v_t$$

It is immediately clear that the single market outcomes under asymmetric information yield values that differ from the efficient ones of the fundamental solution. Various characterizations of such outcomes are worth emphasising.

1. Asymmetric information generates equilibrium asset trades. Suppose ($y_t > 0$) and note that

(i) for $v_t > 0$: $\varepsilon_t > ay_t$, $k_{it} < 0$

(ii) for $v_t < 0$: $\varepsilon_t < ay_t$, $k_{it} > 0$

In case (i) outsiders overestimate the increase in y_t and their demand is greater than the optimal one. The increase in e_t is also greater than the efficient one, or else the exchange rate "overshoots". Insiders gain from knowing the correct information y_t as they are able to sell an overvalued asset to outsiders who believe it to be undervalued (in fact, $y_t - \varepsilon_t > 0$). In case (ii), for opposite reasons, insiders can buy an undervalued asset from outsiders for whom it is overvalued.

It is also interesting to note that the two groups are mutually useful. Insiders can profit from costly information thanks to outsiders; outsiders bear a smaller loss in efficiency thanks to the informational arbitrage offered by insiders. In fact, were the former alone the deviation ($e_t - ay_t$) would be greater. But see also the next point.

2. Informed speculation will not totally eliminate exchange-rate deviations, if information is costly. In fact, consider the deviation as perceived by informed agents ($w_t | \Omega_{it} = \varepsilon_t - ay_t$) and speculation intervention as (cw_t; $c < 0$). Speculation would work like a "filter rule", and from 11 [$w_t = -(a/2)v_t$, $E(cw_t \mid \Omega_{it}) = 0$] (see also Fama (1970, p.385)). That is to say, "stabilizing" speculation in a "white-noise" market has zero expected return, or negative expected return if costs are considered. The economist would like the speculator to behave even more socially, so that the exchange rate is kept constantly on the efficient path. To this effect, let us add the speculative component ($-cw_t$) to the informed side of market 10; we obtain:

$$\varepsilon_t = ay_t + a(2 - c)^{-1}v_t$$

then let us add the efficiency condition ($\varepsilon_t = ay_t$): clearly, this further condition can be fulfilled if c is now endogenous, and ($|c| \to \infty$). "Thus, the problem seems not to be one of excessive destabilizing speculation, but rather one of the absence of speculation [...]" (McKinnon (1979, p.156)). But from the market-equilibrium condition we also know that for ($\varepsilon_t = ay_t$, $k_{it} = -k_{ot} = 0$), that is, unlimited "fundamentalist" speculation would exhaust any profitability from information and would record **actual** negative returns net of costs. In conclusion, deviations w_t cannot be filled if they embody the normal return to the cost of the information $\{\Omega_{it}\}$.

3. **A form of "informational equilibrium" exists.** It exists because public data cannot reveal inefficiency **statistically**. An important consequence is that the reference to the fundamental path of the exchange rate is irrimediably lost. This is tautological for outsiders. Ask an outsider to examine the time series of e_t generated by 11 and to test whether the exchange rate follows the "fundamentals" or not. **His** "fundamentals" are (ay_t); hence $[\varepsilon_t - ay_t = -av_t]$: the exchange rate deviates from the fundamental path only by a random factor with zero expected value. Moreover, ask him whether he thinks he is playing in a "fair" market. Again, since ε_t still takes up the statistical properties of y_t, the outsider will be unable to reject the martingale hypothesis $[E(\varepsilon_{t'}|\Omega_{ot'}) = \varepsilon_t]$. Statistically, the outsider should conclude that the exchange-rate market is efficient and "fair".

The foregoing general implications of equilibrium asset-trading under asymmetric information suggest that the "normal" state of foreign exchange markets should display as much inefficiency as necessary to secure profitable trade between informed and uninformed. Further aspects will be pointed out in the rest of the chapter, in the context of other stylized forms of interaction between differently informed groups.

2.4. Excess volatility: inferential behaviour.

Outsiders may follow an alternative strategy to the use of poor public information on y_t. They may believe that "the market is always right", and simply follow up the market. "Knowing that our judgment is worthless [...] we endeavour to conform with the behaviour of majority or the average" (Keynes (1937, p.114)). Indeed, if the insider information is not protected, outsiders will be able to correctly infer y_t from the going ε_t (technically, this happens whenever the function $[\varepsilon_t(y_t)]$ is invertible and unique). This is a general property proved by Grossman-Stiglitz (1980); it pinpoints the EIH as the outcome of an inference process based on repeated occurrence of market equilibria, but at the same time it falls back into the public-good paradox of information. A typical form of protection of private information considered in the literature is the presence of further "noise" in the inverted function $[y_t(\varepsilon_t)]$. In this paragraph I shall examine the case in which the outsiders try to learn the function $[y_t(\varepsilon_t)]$ under the crucial assumption that the outsiders **never** observe y_t and hence are endowed with a whole **noisy time series** of y. Consequently, the insiders' and the outsiders' information sets are respectively

$$\{\Omega_{it}: \varepsilon_0, ..., \varepsilon_t; y_0, ..., y_t\}$$
$$\{\Omega_{ot}: \varepsilon_0, ..., \varepsilon_t; y_0, ..., y_t\}$$

I shall follow the principle that agents process information rationally by assuming that outsiders use an OLS estimation procedure. The outsiders' inference problem is the following:

estimate market equation	$y_t = f(\varepsilon_t)$
given information set	$\{\Omega_{ot}\}$
with equation	$y_t = f_0 + f\varepsilon_t + v_t$

The estimation problem is split into two stages. In stage I outsiders observe market realizations 11 and make estimaton I. Then, they enter the market on the basis of estimation I and at the end of stage II they revise their estimation.

Stage I. Now, remember that the fundamental "true" equation has ($f_0 = 0$, f = 1/a). One checks easily that if the outsiders were endowed with the correct information set $\{\Omega_i\}$, by applying OLS they would obtain precisely ($f\sim_0 = 0$, $f\sim = 1/a$). But the outsiders could get $\{\Omega_i\}$ only by observing repeated market outcomes 11 with symmetric information, which cannot be if information is costly. Therefore the problem of inference is of some relevance only in the presence of different information sets. In this case, outsiders' first-stage inference on market realizations 11 is clearly affected by "measure error" due to the informational noise embedded in their information set $\{\Omega_{ot}\}$. As a consequence, outsiders will obtain unbiased estimators, but with unduly greater variance. Let them not reject the hypothesis ($f_0 = 0$) and reject the hypothesis ($f = 0$). Therefore, they will base their inference of y_t, which they do not observe, from ε_t, which they do observe, on the following estimated equation:

(12) $\quad y\sim_t = f\sim_I \varepsilon_t$

The consequence of the informational noise at this stage is that the probability ($f\sim_I \neq f \neq 1/a$) is positive and relatively large.

Stage II. Before going into the estimation problem, let us look first at the effect of inferential behaviour on market equilibrium, assuming again that ($\varepsilon^*_{t'} = \varepsilon_t$) for all agents:

(13)
$$k_{ot} = ay\sim_t - \varepsilon_t$$
$$k_{it} = ay_t - \varepsilon_t$$
$$k_{it} + k_{ot} = 0$$

which yields

(14)
$$\varepsilon_t = a(2 - af\sim_I)^{-1} y_t$$
$$k_{it} = -k_{ot} = a[1 - (2 - af\sim_I)^{-1}]y_t$$

From equation 14 it follows that

$$f_{II} = \alpha + \beta d\sim_I \qquad \alpha = 2/a,\ \beta = -1$$

that is to say, market realizations are **not** independent of outsiders' inference, and the structural parameter is a linear function of the estimator.

This highlights a crucial point. As already stressed, the asset market has no such a thing as a "physical" structure; its structure consists of agents' decision rules, which reflect agents' beliefs. When decision rules or beliefs change, the market structure also changes. In such an environment, structural stability, which is necessary for consistent and "objective" inference, is highly problematic. Rather, a sort of "Heisenbergian" interaction between subject and object takes place. This fact has been attracting increasing attention in the critical examination of rational- expectations' axioms (e.g. Frydman-Phelps (eds.,1983), Bray-Kreps (1986), Pesaran (1987, ch.III)) and has deep repercussions on the functioning of asset markets.

In the first place, let us check for exchange-rate efficiency. Efficiency would require ($f_{II} = 1/a$) and hence ($f\sim_I = 1/a$). But we know that, for any finite estimation, ($f\sim_I = f_I$) with positive (relatively large) probability; therefore, for any finite market realization

14 (f_{II} = 1/a) unless ($f\sim_I$ = 1/a) was drawn by chance. Since ($f\sim_I$ < 1/a, f_{II} > 1/a) and ($f\sim_I$ > 1/a, f_{II} < 1/a), if ($f\sim_I$) is held fixed the foreign rate will respectively undershoot or overshoot the efficient values around the expected value..

Now, let the outsiders revise their estimation periodically[20]. They observe a finite sequence (II) of market realizations 14, where ($f\sim_I$) acts as a fixed parameter, and at the end of this sequence they compute their stage-II estimation. By applying OLS to 14, the outsiders obtain

$$(15)\qquad \begin{aligned} f\sim_{II} &= f_{II}(1+\rho_{II}) \\ &= (\alpha + \beta f\sim_I)(1+\rho_{II}) \\ E(f\sim_{II}) &= \alpha + \beta[f\sim_I + f\sim_I E(\rho_{II})] \\ &= \alpha + \beta f\sim_I \end{aligned} \qquad \text{where} \qquad \begin{aligned} \rho_{II} &= D_{vy}/D_y \\ \\ E(\rho_{II}) &= V_{vy} = 0 \end{aligned}$$

In other words, stage-II estimation will be based on market realizations depending on stage-I estimation, and so on. Stage-II estimator differs from the structural parameter by a factor ρ, that is, the sampling correlation between the informational noise v_t and the corret y_t; under the assumption (V_{vy} = 0), stage-II and each further stage-by-stage estimation are still unbiased. However, all this entails that learning introduces structural modifications as learners apply their findings, so that the market structure is modified in a cumulative distortion process. What the outsiders will discover is no longer the "true" parameter, but a function of their own original belief[21].

The above model leads us to the following conclusions.

(i) For any finite estimation, ($f\sim_N \neq {}_N$) with positive (relatively large) probability.

(ii) Whatever ($f\sim_I$) is taken, estimations of the structural parameter will be centered on a function of ($f\sim_I$).

(iii) Outsiders' estimation revisions introduce cumulative modifications in the market structure.

(iv) Inference is efficiency-preserving only if at the very beginning outsiders get ($f\sim_I$ = 1/a) in some way.

Our propositions are in line with the finding in the recent literature that, in the presence of imperfect information, even correct inference may not preserve informational efficiency[22]. In fact, the market retains the general characteristics of asymmetric asset trading previously obtained (see sec.2.3). That is to say:

(v) Market equilibrium is fully consistent with the gaining by insiders of a return from correct information[19].

(vi) The reference to the fundamental path is lost since the actual market structure is now 13; inefficiency cannot be detected statistically by means of public data[20].

(vii) If exchange-rate deviations from efficiency (or actual changes in the "true" return rate) just compensate for information costs, there will be no profitable stabilizing speculation.

If these propositions are correct, one should be prepared to accept some form of "fundamental noise" in international asset and currency markets. One may also subscribe to Stiglitz's general point that efficiency market theories "are not robust to slight alterations in the informational assumptions" (1985). This is only a first step towards understanding more worrying deviations from desirable states of affairs in world asset markets as well as mitigating full reliance upon their allocative virtues.

Notes

(1) On the absence of sizeable swings or overshooting in the upward trend of the dollar between 1980 and 1985 see the interesting observations by Goodhart (1987, 1988).

(2) See, for an overall view, Branson (1983, 1985).

(3) The difficulties here are analytical in nature. That world payments dynamics should bear upon shifts of wealth due to trade imbalances has also raised empirical skepticism (Tobin (1981), Dornbusch (1987)).

(4) More extended treatment can be found in Tamborini (1988).

(5) As is well known, the rational choice will be based on the observation of the covered interest parity. If this holds perfectly, the exporter will be indifferent. On the covered interest parity see ch.III, App.A.1.

(6) Portfolio models of the exchange rate consistent with this view of the foreign exchange market have been developed by De Macedo-Tobin (1980) and Kouri (1983).

(7) I have analyzed these ingredients in some detail in a previous work (1988) where I reached a rather pessimistic conclusion as to the pie.

(8) The reader can find the evidence at the industry level in Dornbusch (1987b), Fitoussi-Phelps (1988), Froot-Klemperer (1989) with regard to the US trade with industrialized countries, Giovannini (1988) for Japanese tradable commodities, Cowling-Sugden (1989) who consider the European car market.

(9) See, for a general perspective, Biasco (1986), Dornbusch (1987b), Holland (1987), Giovannetti (1987).

(10) Since national product specialization is assumed, the model presented here is comparable with the larger and larger number of models of international monopolistic competition: e.g. Kravis-Lipsey (1977), Krugman (1986), Dornbusch (1987b, sec.III.B), Giovannini (1988). One obstacle on the the way of the application of these models in open macroeconomic issues is perhaps that their results are highly sensitive to very specific microeconomic circumstances that cannot plausibly be taken into account at a larger scale of analysis. In this respect, the polypolystic model has the advantage to yield the basic effects of international imperfect competition in otherwise competitive markets (i.e. "large" numbers of "small" firms producing a homogeneous national product).

(11) A well-known problem involved here is that the cut in factor incomes is unlikely to leave domestic demand unaffected; hence the overall result will depend on the reaction of the foreign component.

(12) This is surely restrictive and inappropriate to a freely floating regime. However the analytical advantage is that we will thus be able to reach a simple and clear expression for the position of the exchange rate in the pricing equation. Moreover, such a basic equation will yield the same qualitative results as more complete models which include exchange rate uncertainty and risk aversion, when the exchange rate change is perceived as persistent (see e.g. Giovannini, 1988, p.53, Proposition 3).

(13) There are numerous studies which show that the choice itself of the currency of invoice should depend on the characteristics of the market and on the attitude of the firm towards uncertainty; see e.g. McKinnon (1979, ch.IV), Giovannini (1988).

(14) This last result immediately raises the question of the persistence of price discrimination. In the presence of perfect international arbitrage R consumers ought to buy T tradable good on T market until T firms raise the domestic supply price (p'_x). Well-known arguments have long been raised against the perfect arbitrage hypothesis whether on theoretical or empirical grounds; a recent line of research relates weak arbitrage to uncertainty (e.g. Giovannetti (1987) and the literature quoted therein). This explanation

can be integrated into the polypolystic framework; in fact, we know (see again ch.III, sec.4.3) that firms' forecast errors generate a price scatter around the market demand, from which firms draw individual market power; hence the problem of arbitrage arises on domestic and international markets alike. Not only does each individual firm price the same good differently on the two markets, but all firms in the same industry may price the same good differently if they perceive different demand conditions. Therefore, arbitrage should operate across national borders as well as across suppliers. However, scattered price differences for the same good are likely to persist if consumers' information is limited and search is costly. This phenomenon combines with firms' fallibility to spread market power over "small" market shares, and to inhibit the use of the price to clear the market, even in an otherwise competitive environment.

(15) The treatment here has been limited to a short-run perspective. Deeper and longer-run effects on sectoral supplies due to entry and exit elicited by changes in the mark-up in the export industry are not considered. However it is intuitive that the traditional appeal to free entry, or to costless and frictionless contractions and expansions of suppliers, no longer holds under the assumptions which characterize polypolystic markets. For thorough discussions of these aspects see Biasco (1986, 1987).

(16) It should be pointed out that there are other important determinants of the demand for R asset which may change in the course of adjustment. One is centainly R real income. To the extent that R income increases, R asset demand should also increase, either directly to re-establish the stock-flow norm or indirectly via lower risk premia (see also Tamborini (1987)). A much wider picture of factors of inefficiency in currency cycles has been drawn by Biasco (1987).

(17) I am also making reference, to mention only few, to Levich (1980, 1985b), Frankel-Froot (1986, 1987), Group of Thirty (1988), Goodhart (1988), Koromzay-LLewellyn-Potter (1988).

(18) The "right side of market" rule is widely used in the financial community (Levich (1980, p.104 ff.), Bilson (1983, p.155 ff.)); this rule rates forecasts positively when they have the same sign of the actual price change, regardless of the minumum deviation from the latter.

(19) The literature is rather silent on the width and depth of imperfections in information, and this paper cannot afford an explanation. Of course, informational differences can be more serious and pervasive than "white noise" in the interest differential. They may stem from market realizations themselves (e.g. Tobin (1981, p.123 ff.)) or from agents' perception and judgement of information (e.g. Kaen-Roseman (1986)). Moreover, their importance grows as y_t extends, as it should, to a full vector of decision variables (suffice it to think of returns to equities). The model presented here only makes the simplest case to introduce to the effects of imperfect information. To keep the treatment manageable information costs will not be explicited, but will be kept in the background as an incentive for informed to trade effectively.

(20) Note, however, that the forecast errors $(y\sim_t - y_t)$, if $(f\sim_I)$ is kept fixed, are a linear function in (y_t, v_t) that cannot reveal any systematic pattern.

(21) It is sufficient to note the following chain derived from the above expressions:

$$f_{II} = \alpha + \beta f\sim_I,\ f_{III} = \alpha + \beta[\alpha + \beta(\alpha + \beta f\sim_I(1 + \&_{II})], \ldots,$$
$$f_N = \alpha + \beta[\alpha + \beta f\sim_{N-2}(1 + \rho_{N-1})].$$

Therefore the N-th stage structural parameter will be a linear function in the original estimated parameter $(f\sim_I)$ and the cumulated sampling errors up to (ρ_{N-1}). A major consequence is that the stochastic process of market realizations is no longer stationary and independently distributed **across different decision regimes**. This particularly concerns the econometrician, who is forced to make efficiency tests across outsiders' estimation revisions (since the former is unlikely to know the pattern of revisions of the latter). The longer the time series the higher the probability of importing such shifts into the decision regime, which render linear parametric models unusable. Such changing patterns, which have frustrated the econometric approach to efficiency (Levich (1980, 1985a)), and may account for poor out-of-sample performance, can only be puzzling if the market structure is conceived as something physically independent of agents' beliefs and decision models.

(22) More sophisticated studies of learning have found out some conditions or estimation techniques thanks to which the process does converge to unbiased estimators which "discover" the "objective" market structure (see e.g. Bray (1982), Bray-Kreps (1986)). However, it also seems widely agreed that such cases cannot be regarded as sufficiently representative (see again Bray-Kreps (1986), Frydman-Phelps (1983), and Pesaran (1987, ch.III). Recent works by Tabellini (1988) and Lewis (1989) have shown that learning a structural parameter introduces greater variability in exchange-rate dynamics; however, the "Heisenbergian" problem is absent from these models because they leave the unknown parameter unaffected by learners' behaviour.

(23) It is easy to verify from 14 that for say ($f\sim_I > 1/a$) outsiders overestimate the change in the interest differential; then, as already explained, the foreign rate "overshoots" and insiders sell an overvalued asset. Just the opposite happens for ($f\sim_I < 1/a$).

(24) This can be seen by taking the outsiders' "fundamental rate" ($\varepsilon\sim_t = (1/f\sim_I)y_t$). Then, according to data generated by 11, ($f\sim_I$) being equivalent to a fixed parameter, ($\varepsilon_t - \varepsilon\sim_t$) is a linear function in (y_t, v_t) with zero-expected value. Moreover [$E(\varepsilon|\Omega_{ot}) = \varepsilon_t$] or the martingale hypothesis holds.

CONCLUSIONS

1. Time, uncertainty and the non-neutrality of money and finance. The implications for international monetary economics

The relevance attached to international monetary matters at all levels of the economic profession suffers from serious inconsistency with the use of monetary theories which purport to graft money onto Walrasian first principles of value and exchange. As has been firmly established in general equilibrium theory, those principles simply render money "inessential". Furthermore, those same principles hardly justify the existence of such things as "nations" whose citizens subscribe to different monetary consistitutions, and where monetary authorities commit themselves to keeping external payments in balance. The purpose of the first part of this study was the search for monetary foundations consistent with the role that monetary and financial instruments actually play on the international stage, as well as in international economics textbooks.

The search pursued in this study has been inspired by recent developments in monetary theory which have probed the dimensions of time (in particular sequential time) and uncertainty (in the meaning of incomplete information). To recall Radner's famous statement, an economy which uses money must be a sequence economy (1968), but it must also be "an economy which makes it too costly or impossible to engage in all desirable Arrow- Debreu trades" (Hahn (1988, p.957)). One reason why not all possible contingent markets are opened should be incomplete (incompletable) information on all possible future states of the economy. If this is the case, as is known from information theory, the economy will be constrained to suboptimal positions. The first conclusion is therefore that a sequence economy which uses money along with other stores of value (a "financial economy" as it has been named here) cannot be modelled to mimick a Walrasian economy.

In particular, agents will not have enough information to maximize intertemporal utility consistently. It is in this connection that a well-known piece of Keynes's monetary theory, precautionary behaviour, has recently been revived in decision theory (sometimes under the name of "flexibility"). Precautionary behaviour has been introduced in our analysis as behaviour aimed at minimizing the probability of default intrinsic in an uncertain economic choice; it has been shown how precautionary behaviour dictates the consumer choice of the whole amount of financial wealth as well as the share of the perfectly liquid (fixed-price) asset in it -i.e. the monetary reserve. In this picture money is the perfectly liquid instrument for transferring wealth across markets (the transaction motive) and through time (the store-of-value motive), where the two motives are almost indistinguishable from a decisional viewpoint and in no case can survive separately.

It was said in advance at the beginning of Part One that my aim was not to model the creation of money, but to investigate the reasons for the use of an artifact with money's specific characteristics. Having singled out time, uncertainty and precaution as possible reasons, we cannot but take the existence of different monetary constitutions as a matter of fact; yet by incorporating monetary authorities into the same decisional framework as all other agents, it becomes understandable why monetary authorities, too, have a desired reserve of (international) money as an objective. There remains, however, a crucial distinction: the desired stock of international monetary reserve (or broadly speaking the balance of international payments) can by no means be introduced among private agents' objectives or constraints; it is a specific commitment of the monetary authority, and it can be perceived by private agents to the extent that the monetary authority is able to enforce it. As a consequence, the external constraint is properly a macroeconomic constraint, in the sense that it defines a property of the system as a whole which is not common to the individual parts of it. Money is doubly "essential" in international economics.

Viewing time and uncertainty as the essential features of the financial economy, and caution as the rational attitude in the face of them, we have been able to establish two further features which have extremely important consequences in the relation between microeconomic decisions and macroeconomic outcomes. The first is that any uncertain decision cannot be explained independently of the conditions under which the agent can minimize the probability of default; for at least three crucial economic decisions - consumption, production and investment- these conditions are essentially established by the money and asset markets. The second feature is that, under precautionary behaviour, the asset market can possibly offer efficient means to minimze the (subjective) probability of default, but it cannot be expected to perform the function that it does in Arrow-Debreu theory, that is, to transmit signals for optimal intertemporal production decisions from consumers to producers (actually most of those signals do not even exist in consumers' minds). In Keynesian macroeconomic terminology we have a saving-investment intertemporal coordination problem (Leijonhufvud (1969)).

Along these lines, the open macroeconomic model that has been obtained displays essential Keynesian, or perhaps New Keynesian, features. The fundamental determinant of employment and production of real resources in any single economy is realized investment; however, realized investment can fall short of firms' desired investment, because of finance constraints on the asset market, while both can fall short of full-employment investment because of lack of coordination between today's saving on the part of consumers and tomorrow's expected scale of production on the part of firms. Consumption has second-order importance, since it only amplifies additional demand. Goods prices are the result of firms' uncertain decisions as to the current level of demand; price making also involves conjectures about competitors' behaviour, and we have seen that under the informational conditions that may characterize a competitive market the Cournot-Nash equilibrium may be self-fulfilling. As a consequence, prices will simply reflect productivity, factor costs and the elasticity of market demand.

Another key achievement of the first part of the work was therefore that opening the financial economy, in the theoretical as well as in the political meaning, is a relevant issue in so far as asset markets are not Arrow-Debreu efficient and money and finance are non-neutral; only in this case, in fact, can integrating asset markets have effects on investment and production decisions. The proposal of a transfer-theory approach to international payments, and generally to the creation and disitribution of real resources in the world economy, is a simple corollary to this conclusion.

2. The world transfer of financial and real resources

Worldwide integrated financial economies should operate in such a way that supply of finance from excess-saving decision units matches demand for finance of excess-spending decision units. In each economy, and in the world economy as a whole, the former group is generally representd by households and the latter by private businesses and public agencies. The transfer- theory approach is simply a means to study such a process under n-1 balance-of-payments constraints. In this perspective, the textbook idea that transfer problems only arise in connection with extraordinary events like war payments or official debts is misleading; also misleading is the other textbook idea that important capital movements are only those springing from portfolio and speculative motives. All these cases simply play different roles in the world process of forwarding financial and real resources to spending economies.

An important consequence of this approach is that it shifts the focus of analysis, and perhaps of policy too, from stationary state conditions to "sustainable" world flow equilibria. As a matter of fact, in so far as some economy in the world is expanding (i.e. neither investment nor saving are nil) there will generally take place a world transfer process towards the expanding economy. Such processes are continually in motion, and it seems unwise to dismiss them as mere transitory stock adjustments towards new stationary states, as current analyses mostly do. On the other hand, it is perfectly true that flow equilibria are not, theoretically, steady equilibria; therefore, Part Two began with the taxonomy of different patterns of world transfers, and with examination of their likely degree of "sustainability" when compared with theoretical stationary states. I wish to stress that at this level of static-comparative analysis, some doubts have emerged as to the current practice of identifying "the three zeroes" (zero budget deficit, zero current account and zero capital account) with world general equilibrium; as great scholars of the 1930s and 1940s -like Frish and Kalecki- noticed, "the three zeroes" by themselves may not correspond to desirable states for all participants in the system, in which case (lump) transfers would be necessary anyway. As far as the study of the world transfer process is concerned, the old criterion of the balance of autonomous payments, which leaves only the stock of official reserves unchanged, seems still valid and viable.

Transfer theories elaborated since the Napoleonic Wars offer us a richness of insights into the relationships between shifts of monetary and financial means and shifts of real resources across economies. This rather extended and heterogeneous literature has been organized according to Johnson's (1956) principle of the "financing-utilization pattern", which identifies the sources in the transfer economy (T) and the uses in the recipient economy (R) of the original financial transfer. Within this framework I have identified as "classical" those transfer models which view the transfer problem as a pure currency problem, that is to say a shift of "gold" from T to R. Classical models typically base the transfer mechanism on the real exchange rate, whether the nominal rate is fixed or flexible as in modern applications (e.g. to the U.S. future debt service). The real exchange rate may be activated by a pure quantity-of-money effect or by effects operating through the discount rate and domestic prices. The prediction of this class of models is generally that the real exchange rate is effective in preserving world flow equilibrium; T economies will depreciate and will provide R economies with goods transfers by the same amount as financial transfers, with real loss no greater than the goods transferred. It is quite important to observe that the classical transfer theory explains exchange-rate dynamics in a way radically different from analytically equivalent modern stock-theories. The latter view changes in the real exchange rate either as a phenomenon of market disequilibrium or as an undesirable side-effect of uncoordinated policies, whereas the former holds that real exchange rates must change to allow for world autonomous redistributions of financial and real resources.

Apart from this up-to-date contribution to the understanding of exchange-rate dynamics, the classical theory suffers from numerous shortcomings, which were pointed out in early inter-war debates and which carry over to the present. Never have there been such massive shifts of "gold" as actual world transfer processes would require; adjustments of goods relative prices, net of those in nominal exchange rates, hardly account for observed quick, large and persistent goods movements; we have several historical instances of sizeable changes in real outputs and incomes in connection with transfer problems. According to the present study the limits of the classical transfer theory lie in its undue simplification of the financing- utilization pattern as well as in its theoretical model of the open economy.

In the first place, we should take into account that autonomous financial transfers should be withdrawn from some source in T and injected somewhere in R independently of their international vehicle. This was the idea that emerged after the inter-war debate and which has been recast here in the macromodel of the open financial economy elaborated in Part One. In both economies the financial transfer may impinge either on existing asset stocks (e.g. a portfolio adjustment) or on current expenditure flows (e.g. direct investments or tax-paid government transfers) or on both in some proportion. In any case, if assets matter for agents' ability to take positions on goods markets as was explained in Part One, we should expect financial transfers to have effects on those markets independently of changes in real exchange rates. We have thus been able to compare a variety of results ranging from traditional transfer theories to current macro-economic theories of the open economy.

	T economy		
Financing-utilization pattern(T and R)	Real exch.rate	Real income	BIT
Asset stocks	=	+ -	-
	=	-	=
	+	+ -	=
Current expenditure	=	-	-

Traditional transfer theories of direct expenditure effects (bottom row in the above table) sought to show that goods transfers and world flow equilibrium can be obtained even at a constant real exchange rate. I have not found sufficient analytical support for this claim if income repercussions are taken into account; I have instead found confirmation of the fear expressed by early Keynesian analyses of real losses in T coupled with a negative balance of international transfers (BIT). The transfer pattern involving asset stocks (top row) gives a more complex model which is directly comparable with Mundell-Fleming models and their current developments. Here the adjustment mechanism is based on T portfolios shifting in favour of R assets in an upward world movement of (real) interest rates. Concomitantly, asset-constrained expenditures should fall in T and grow in R. As long as the real exchange rate does not change, whether T loses real income or not depends on the relative extent of expansion in R -a standard Mundellian result. However, if the external constraint is introduced (BIT should be nil, second row) it turns out that T is likely to suffer from real losses even though R expenditure expands by the full amount of the financial transfer.

The role that flexible exchange rates can play has been analyzed at length. In the model adopted here the exchange rate should keep demand and supply of foreign currency in balance, as seems obvious, and not just maintain asset stock equilibrium. Does the assignment of the exchange rate to external flow equilibrium support the idea that real income will not change? The answer is that if the transfer pattern is unfavourable to T, as explained above, the nominal depreciation may be insufficient to prevent real income from falling (third row); the standard Mundell-Fleming result -a real gain in both economies- only obtains under a specific transfer pattern with overexpansion in R. The current practice of ruling real income adjustments out of payments models with flexible exchange rate is therefore not fully justified.

On the whole, most likely results deny that changes in the real exchange rate and in real expenditures and incomes can be regarded as mutually exclusive in the world transfer process.

3. The world transfer problem and the exchange rate regime

The preceding conclusion is of some relevance to the issue of the role of the exchange rate regime in the world transfer problem. On the one hand, the results of the general model vindicate the classical view that the real exchange rate should be involved in world transfer processes; on the other, as soon as the assumption of pure exchange economy is abandoned, it turns out that the whole burden of adjustment will not be entirely borne by goods relative prices while leaving the nominal exchange rate and real incomes unaffected. This point of view seems thus to lead straightforwardly to the new optimistic versions of the world transfer problem under flexible exchange rate that have cropped up after the experience of the United States in 1980-85. In fact, in these versions the nominal price of R currency, by appreciating, adjusts itself perfectly to R requirement of capitals and goods, with no real losses and with no interference of central banks. Then, as R borrowing is exhausted, R currency will depreciate and will thus keep the current account in balance. However, according to many leading scholars the recent, ongoing experience of currency fluctuation has not fulfilled hopes and predictions drawn from this scenario. In the last chapter I sought to show that problems arise, once again, from the underlying macromodel of the open economy.

In the model proposed here, financial non-neutrality introduces effects of finance displacement from T to R which are usually absent from the world models under consideration. Moreover, the model, as regards pricing on international markets, also mitigates the "elasticity optimism" which is embodied into current exchange rate theory. Currency appreciation in R- (depreciation in T-) economies is certainly a powerful element in the world transfer process; yet its ability to avoid real income effects cannot be taken for granted.

Furthermore, a crucial point concerns the informational assumptions in the asset-market sector of the model. The standard assumption is one of efficient information, whence follows the ability of the exchange rate as an asset price to drive the world economy to general equilibrium. However the efficient information hypothesis in many ways conflicts with theoretical consistency and factual observations.

It is seldom recognized that for the exchange rate to work as a price the economy should suffer from lack of information and of general efficiency. An efficient market organization -as was shown in Part One- gives no rationale for the existence of money, nor **a fortiori**, for the existence of national monies and exchange rates as prices. If for some reason different numeraires exist, then there will only exist conversion rates, pure numbers with no allocative function whatsoever. It might be argued that all available information in the economy is insufficient, so that the use and exchange of currencies is justified, but that it is processed efficiently by the asset market. Were this the case, information would become a public good, there would be no effective asset trade and no reward for information seekers, and the market would eventually be indistinguishable from a gambling casino. As a matter of fact, there is now a strong tendency in the literature towards attributing all troubles of foreign exchange markets to pure gamblers (e.g. rational bubbles) or to pure irrationality.

By contrast, I have suggested that exchange rate theory, as well as regime prescriptions, should be framed in a world of imperfect information and markets bound to more modest, perhaps conflicting, achievements than general efficiency. As a consequence of the imperfect information hypothesis, asset trade actually takes place thanks to differences in information sets and financial payments begin to flow internationally; exchange-rate changes do not follow their fundamental path but either overshoot or undershoot. Quite importantly, these results can be characterized as "informational equilibrium": informed agents will not smooth down these imperfect vibrations from which they earn the return to their information costs; uninformed agents are unable to detect the "unfairness" of the market statistically. We have seen that under some basic examples of imperfect information (expectations under limited information, asymmetric information and inferential behaviour), the claim that the exchange rate, driven by the borrowing requirement of the R economy, grants an efficient solution of the world transfer problem cannot be taken at face value. If the R economy borrows at positive pace and pays increasing interest rates, the exchange rate may appreciate faster than efficiently, and international lending may grow unbounded simply because the exchange rate is expected to appreciate. The faith in perfectly forward-looking financial agents was misplaced; blaming all sins on actual, boundedly rational and poorly informed ones is ungenerous. The conclusion to be drawn is instead that the preference for the system of flexible exchange rates in the face of world transfer problems may remain disappointed in three respects: first, the international transfer of resources may be set free from central bank interventions, but it may be distorted by the allocative inefficiency generated by imperfect exchange- rate dynamics; second, international payments may show no tendency to be self-corrected; third, the problem of sustainability is therefore not resolved, but comes up again in terms of assessment and management of the expanding economy's foreign debt.

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