

AN EXPLANATION OF APPARENT TIME LAGS IN PORTFOLIO ADJUSTMENT

By

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It is frequently suggested that there is a time lag in the adjustment of economic units to changes in the supply of assets (e.g., money).¹ Such assertions are often supported by statistical evidence, but only rarely (if ever) by logical analysis. There would appear to be no reason for economic units to postpone portfolio adjustment. Rather, the apparent lags can only be justified if there is reason to believe that there are time restrictions on portfolio adjustment, so that complete stock adjustment is spread over several time periods, and may even never be fully completed.

The origins of these time restrictions may be found in the fact that portfolio stock adjustments must be achieved, in part at least, through shifts in the flows of expenditures. It is possible to relate stock adjustments to flow adjustments. The process may be outlined simply if several simplifying assumptions are accepted for expository purposes. The most important of these assumptions is that portfolios consist of assets only, and that liability reactions may be ignored.

*Advisor, Central Banking Service, International Monetary Fund, Washington, D.C. The author is indebted to P. Boxall for drawing his attention to this aspect of the asset adjustment process. However, Boxall is not responsible for the development of the argument (particularly its diagrammatic exposition) presented here. Boxall's comments largely reflected the conclusions of J.M. Parkin, R.J. Cooper, M.K. Danes and I.F. Henderson ("An Integrated Model of Consumption Investment and Portfolio Decisions", a paper presented for the 45th Congress, Australian and New Zealand Association for the Advancement of Science, Perth, August 1973) that are consistent with the process described here. This exposition obviously derives in part from that presented by G.C. Archibald and R.G. Lipsey, "Monetary and Value Theory: A Critique of Lange and Patinkin", *Review of Economic Studies* XXVI (1), No. 69, October 1958, pp. 1-22, and from Patinkin's discussions of convergence in the approach to market equilibrium (see *Money, Interest, and Prices*, Harper and Row, 1965).

¹For example, Milton Friedman bases some of his recommendations regarding monetary policy on the observation that "there is much evidence that monetary changes have their effect only after a considerable lag and over a long period and that the lag is rather variable." (*A Program for Monetary Stability*, New York, Fordham, 1960, p. 87).

Let it be assumed that an economy is in a state of portfolio balance illustrated by point E_b in Diagram 1. It has a stock of money (OM)² and stock of all other assets (OA) that has a market value consistent with the current level of income. This stock of other assets is divided into the same number of units as the number of units of money, each asset unit consisting of the same number of units of each type of asset based on the portfolio structure of assets. The marginal rates of substitution between units of other assets and units of money at the given level of income is indicated by the curve U_b , that has a slope of P at point E_b . If the volume of money is increased to OM^1 in a manner that leads each economic unit to have its holdings increased equi-proportionally ("no distribution effects" may be assumed for pedagogic purposes) and that has no effect on constant-price or current-price incomes or on prices and interest rate, the new equilibrium position will be similar to point E_b^1 (the marginal rates of substitution — indicated by curve U_b^1 — are assumed to be the same with the new level of money holdings).

However, the marginal rates of substitution for portfolio balancing transactions are different from the marginal rates of substitution between assets for portfolio balance equilibrium. The former are the latter adjusted for adjustment costs. OM_t (Diagram 2) is equal to the assumed increase in money (MM^1 in Diagram 1). However, for transactions purposes, the marginal rate of substitution between money and other assets is given, not by the preference schedule U_b , but by the schedule U_t . Assuming that an increase in money (i.e., an allocation of money in proportion to existing holdings) is the only disturbance in the system, there are important adjustment costs in adjusting to a new balanced portfolio situation. There are immediate money, information, and intellectual energy transactions costs. More important, there are utility substitution costs.

If the supply of all other assets is perfectly elastic at current prices and interest rates, portfolio balance based on the increase in money can only be achieved with an equi-proportionate increase in other assets. This assumption of perfect supply elasticity of other assets implies: (1) that the authorities fix and support interest rates on government securities, (2) that there is marked involuntary unemployment and unused capacity in all sectors of production (or domestic supplies of goods and services can be replaced by foreign

²The terms "stock of money" or "money stock" are used here instead of "money supply". The latter is an indefensible juxtaposition. A supply is a flow. The available money is a stock.

Diagram 1

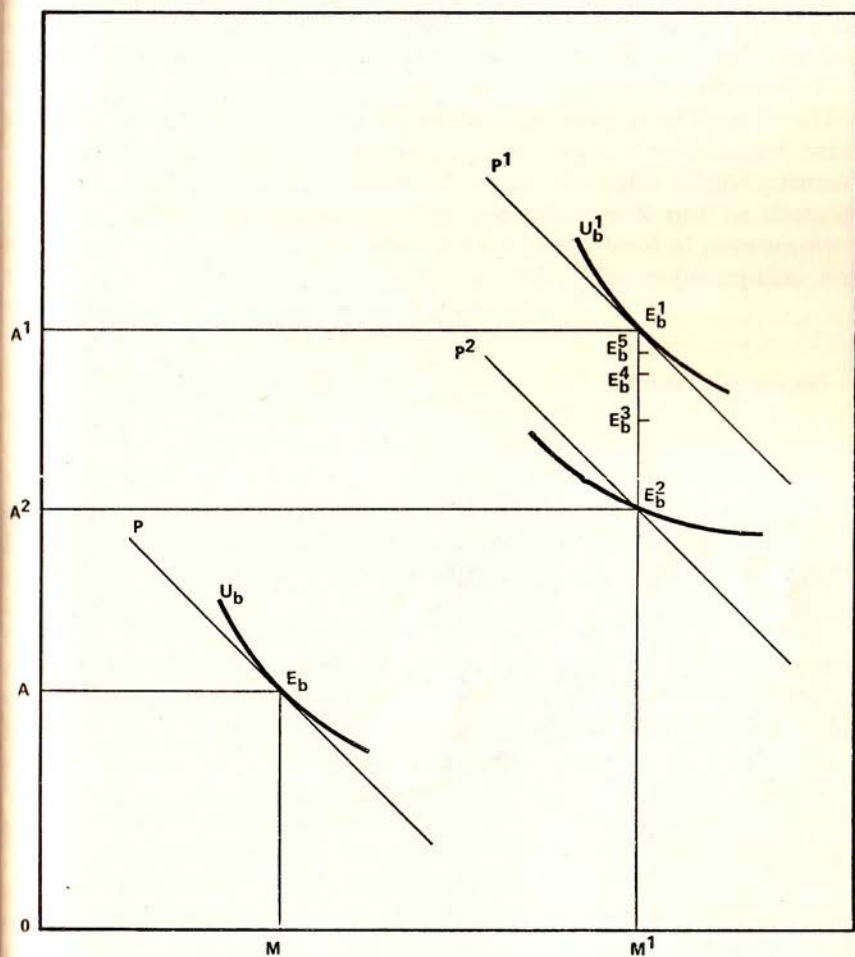
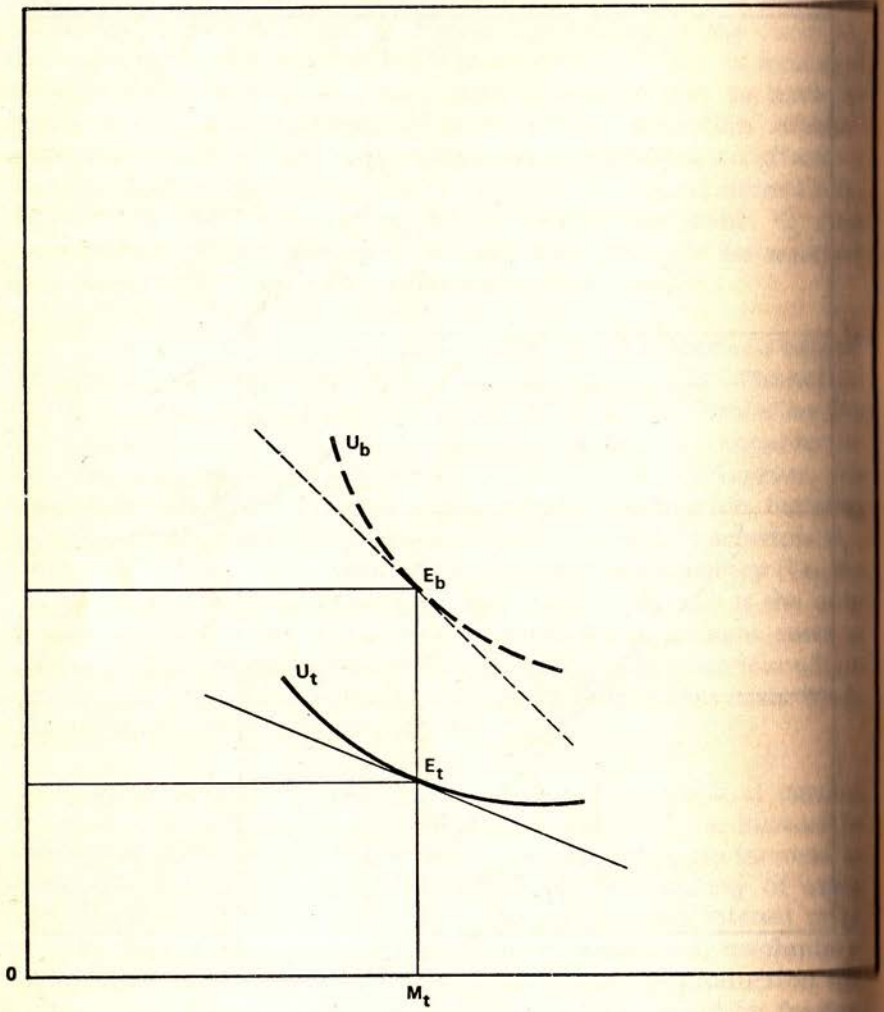


Diagram 2



supplies with no price effects), (3) that foreign and domestic private securities are completely substitutable, and (4) that the increased domestic demand for securities has no effect on the prices of securities in foreign capital markets.

With perfect asset supply elasticity, an attempt by any economic unit to substitute other assets for money can only lead to a transfer of money to other units with repercussive adjustment effects. Given that prices and incomes are fixed by the elasticity of domestic supplies and imports, an increase in assets other than money, leading to a consequent increase in total assets, can only be achieved by a substitution of asset accumulation for consumption. This substitution involves a reduction of consumption with a consequent rising marginal utility of consumption. That is, the rates of substitution between asset accumulation and consumption will not be those of schedule U_b but those associated with a lower level of consumption that imply relatively higher marginal utility for consumption and lower utility for accumulation, i.e., schedule U_t .

Thus, in any period immediately after the assumed increased in money, the accumulation of other assets will not be that given by the portfolio balance schedule of preferences (U_b), but that given by the transactions balance schedule (U_t). That is, the portfolio balancing accumulation of other assets will not be $M_t E_b$, but $M_t E_t$. Hence, at the end of the first period after the initial disturbance, instantaneous responses to portfolio unbalance will lead to a transactions equilibrium distribution of assets (E_b^2) consisting of OM_b^1 of money and OA^2 of other assets (Diagram 1). However, as long-term portfolio balance (E_b^1), with given money balances of OM_b^1 , is only possible with other asset holdings of OA^1 , there will be further readjustments in the second period (assuming that there are no other disturbing events) along the lines indicated for the first period adjustment. Thus, instantaneous transactions balances can lead to a crawling long-term balance sheet adjustment process — from E_b^2 to E_b^3 - E_b^4 - E_b^5 ... converging on E_b^1 .

However, unless an economy has no transactions with non-residents and has massive involuntary unemployment and unused capacity, it is unrealistic to assume that there is perfect elasticity of supply for securities and physical assets with no offsetting monetary effects. To the extent that there are domestic supply inelasticities, prices will rise and the constant-price value of money balances will be reduced (differences in supply elasticities will lead to a complex readjustment of the composition of units of other assets). To the

extent that the adjustment process leads to increased imports of goods and services or securities, and the monetary authorities do not offset the domestic monetary effects of the loss in international reserves, the current price value of money balances will be reduced. Consequently, even after one adjustment period, transactions equilibrium will not be achieved at a point similar to that of E_b^2 (Diagram 3 — the same as E_b^2 in Diagram 1) but at one similar to that of E_b^1 , with lower constant price money balances, and a smaller stock of assets other than money that is consistent with portfolio balance.

The adjustment process can be regarded as one that immediately pushes the structure of balance sheets from that represented by point E_b along a path $E_b E_b^2$, but that from period to period diverts path $E_b E_b^2$ to path $E_b E_b^1$. However, this longer-term path is subject to short-term utility of consumption pressures (arrow XZ) and constant-price money balance effects (arrow XY). These will reflect current-price effects arising from foreign payments that reduce the current price and hence, equally, the constant-price value of balances, and supply inelasticity effects that reduce the constant-price equivalents of given current price balances. Hence, the adjustment path tends to return towards its origin.

The actual adjustment path followed will depend on the elasticity of the supply of domestic factors and the availability, at constant or only slowly rising prices, of foreign resources and securities. If domestic supplies of resources are very inelastic, or foreign resources and securities are very elastic, the adjustment path will be similar to that of curve $E_b T^2 E_b$. If the reverse holds, it will be similar to that of $E_b S^2 E_b$. The greater the inelasticity of domestic supplies and the elasticity of foreign supplies, the closer it will be to path $E_b T^1 E_b$ than to that of $E_b T^2 E_b$. The greater the elasticity of domestic supplies and the inelasticity of foreign supplies, the closer it will be to $E_b S^2 E_b$ than to $E_b S^1 E_b$.

More important, there is no reason for a single injection monetary expansion to lead to a return to the original constant-price equilibrium position. If there is any involuntary unemployment or unutilized capital capacity, the original money creation can lead to a new equilibrium position that requires increased physical output (i.e., employment and capital utilization) during the adjustment process. If domestic supplies are very inelastic or foreign supplies are very elastic, a monetary injection is likely to lead to an adjustment path similar to that of ETE (Diagram 4). Monetary expansion will do no more than create inflation or balance of payments deficit. If

Diagram 3

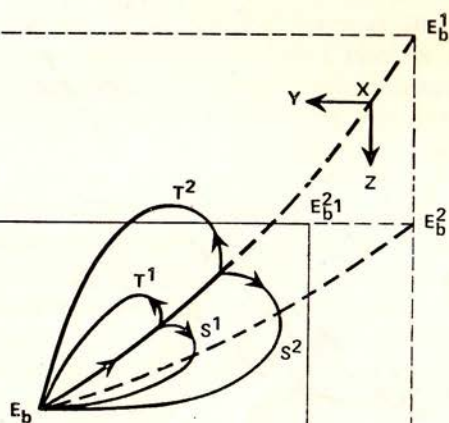
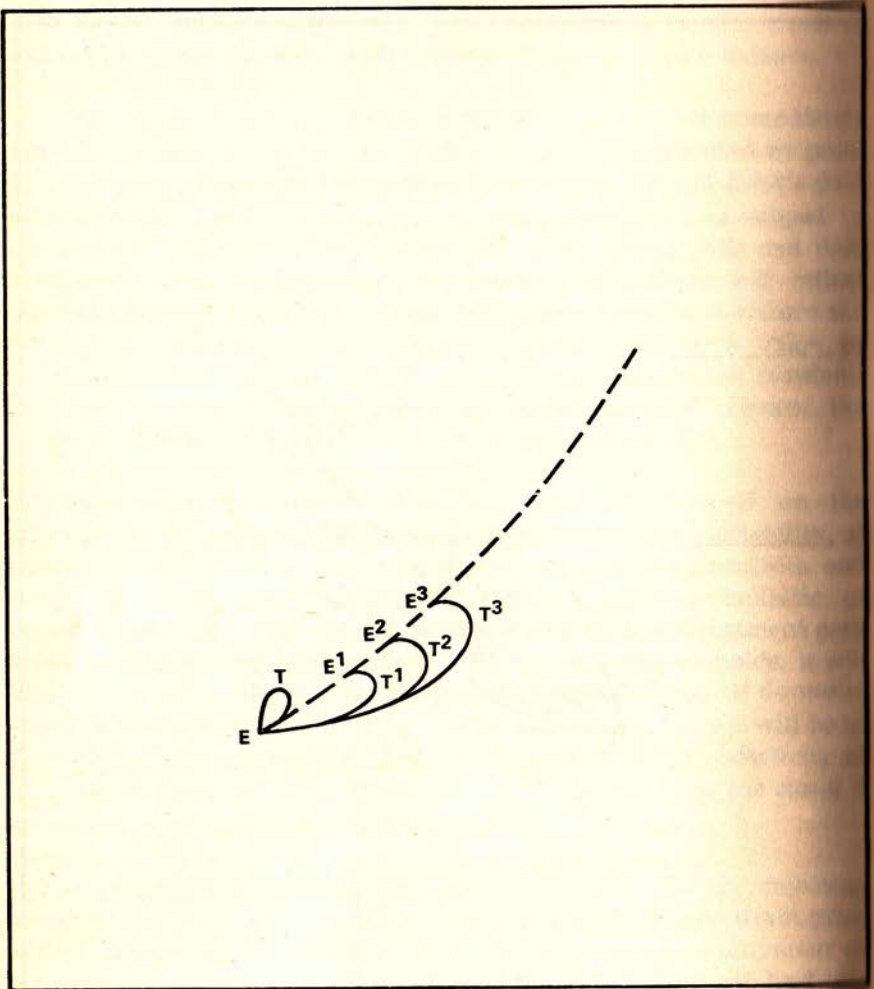


Diagram 4



domestic supplies are elastic and the impact of increased domestic demand is directed to domestic output, the path will be closer to that of $ET^3 E^3$, involving a larger stock of physical assets in the community. The elasticity of domestic output and the inelasticity of foreign supplies will determine whether the expansion path is most similar to that of $ET^1 E^1$, $ET^2 E^2$ or $ET^3 E^3$. In a fully employed open economy, monetary expansion will lead to inflation and foreign deficit (the degree of inflation being in inverse ratio to the openness of the economy). In a depressed fairly self-contained economy, monetary expansion will lead to an increase in the community's physical capital.

This exposition has been presented in the simple (if traditional) terms of an exogenous increase in the stock of money. It could have been similarly presented in alternative forms (e.g., a decrease in the money stock, a change in the stock of government debt, a change in the desired value of physical capital, etc.). A change in the availability of any assets, or in the demand for them, will, with almost instantaneous reactions equalizing current marginal rates of substitution between asset acquisition and consumption, lead to a continuing process of adjustment towards equality of the marginal rates of substitution between asset holdings (or, allowing for liability incurment, portfolio structures) and continuing consumption. Any change in asset availability, or demand will appear, statistically, to produce a lagged demand. This, however, is a convergent process (i.e., adjustment paths, ETE , $ET^1 E^1$ in diagram 4) which never actually reaches the final points E , E^1 , E^2 etc.; rather, they approach these growth paths. Concurrent, complete stock-flow is only possible in a stationary state.

The adjustment process involves the substitution of, or addition to, consumption utility for the utility of portfolio positions. Portfolios are large in value terms relative to both the value of the current utility that they provide and to the level of current expenditures. At the same time, the value of the current utility provided by portfolios tends to be relatively small compared to the total value of current expenditures. Consequently, the marginal utility of present consumption foregone will be large, or the time preference discounted utility³ of additional consumption achieved will be small relative to the marginal changes in the values of portfolios. In any

³Time preference is here defined as an influence leading individual economic units to adjust their expected income streams so as to maximize their long-run utility.

given period, the net gain in marginal utility from foregoing or adding consumption by adjusting portfolios is likely to reach the limits set by adjustment and transactions costs rather quickly.