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BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM

Division of International Finance

REVIEW OF FOREIGN DEVELOPMENTS

March 19, 1970

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A Critique of John Floyd's Theory of   8 pages
    International Capital Movements

In a recent series of papers John Floyd has developed a portfolio theory of international capital movements,[1] integrated this theory with the standard Keynesian analysis, and employed the resulting model to analyze the effects of monetary and fiscal policy on the capital account.[2] He concludes that a distinction must be made between stock and flow adjustments, and that the policy con- clusions of much of the current literature of the Mundell variety are seriously deficient because of confusion over this issue. This view is not original, having been advanced previously by Grubel (AER, December 1968) and Willett and Forte (QJE, May 1969) among others. Floyd's innovation is the examination of this stock-flow distinction within the framework of an amended Keynesian model. I would argue that Floyd's basic conclusions are correct and important, but that the model he used to derive them is in error in several important respects, and that his contribution is therefore limited.

Floyd's argument as outlined in [F2] can be stated as follows. The assumptions of the Keynesian model are retained with the exception of the definition of asset equilibrium. It is assumed

[1] [F1] "International Capital Movements and Monetary Equilibrium," American Economic Review (September 1969).

[2] [F2] "Monetary and Fiscal Policy in a World of Capital Mobility," Review of Economic Studies (October 1969).
    [F3] "Portfolio Equilibrium and the Theory of Capital Movements" paper presented at the Brookings Conference on International Mobility and Movement of Capital (January 1970).

that wealth is held in two forms, money and capital. Capital is
"measured by the perpetual income stream that the stock of capital
goods generates" [F2, p. 505], and depends on the level of income,
given capital's share of output. The relative stock holdings of the
two assets are determined by the interest rate, defined as "the
reciprocal of the price in terms of money of a unit of expected
income in perpetuity" [F2, p. 505], and the interest rate is fixed
at the world level, since the home country is small. Capital movements
occur only when foreigners purchase or sell domestic capital.

Given these assumptions, an increase in the level of the
domestic money supply leads to a one-shot capital outflow as domestic
residents purchase capital assets from foreign holders; with the
return on assets fixed, an increase in one component of wealth (money)
leads to a proportionate increase in the desired level of the other
component (capital).

Expansionary fiscal policy, which raises the level of in-
come and therefore the outstanding stock of capital assets, causes
a once-and-for-all capital inflow. Since the money supply is held
constant in this case and the interest rate cannot change, the desired
wealth holdings of domestic residents remain unaltered and the entire
increase in the stock of capital is purchased by foreigners. In
neither of these cases do policy changes lead to continuing steady-
state capital flows, but rather discrete non-recurring stock adjustments.

If the level of domestic income grows steadily over time,
capital flows occur as the growing capital stock is distributed between
domestic and foreign wealth portfolios. The size of the capital inflow
into the home country will be determined by the rate of growth of the
domestic money supply. At a higher rate of monetary expansion domestic
residents demand a larger portion of the increase in capital assets and
the capital inflow is reduced. From this it follows that the crucial
variable determining international capital flows is the rate of growth
of the money supply. This is in contrast with the prevailing conclusion
of Mundell et al. who assume that capital flows can be altered by
changes in the level of the money supply. Floyd concludes:

> . . . that international movements of ownership claims
> to capital goods are basically of two types. The first
> are once-for-all stock adjustments . . . . These occur
> in response to changes in the level of the money stock
> and the equilibrium level of output. The second are
> continuous flows . . . . As the world stock of capital
> grows through time, its ownership must be allocated to
> the residents of the two parts of the world so as to
> maintain stock equilibrium continuously. The result
> is a continuous flow of purchases of ownership claims
> to capital by the residents of one part of the world
> from residents of the other. Contemporary analysis
> tends to ignore this distinction between stocks and
> flows, interpreting capital movements primarily as
> flows. [F2, p. 515.]

Several points should be made with respect to Floyd's
analysis. First, and perhaps most importantly, by restricting
internationally mobile capital to ownership claims over capital goods,
analysis of the effects of policy variables on movements of short-term

financial assets -- the central concern of the prevailing literature -- is excluded. This exclusion has important implications for the analysis of fiscal policy, since portfolio selection theory suggests that a government deficit, by injecting a stream of financial assets into the economy, leads to an outflow of financial capital.[3] Second, an investment function inconsistent with asset equilibrium and the unwarrented introduction of an extraneous behavioral relation lead Floyd himself to confuse stocks and flows. (The details of this argument are given in the appendix.) As a result, his mathematical derivation prompts him to conclude at several points that a change in the level of the money supply causes a permanent change in the steady-state capital flow, contradicting his own conclusion quoted earlier. Third, the Keynesian assumptions of underemployment and price rigidity would seem inappropriate in an analysis of long-run equilibrium. These assumptions are relaxed in a later paper [F3], but only at the cost of assuming a stationary level of income. Since it is argued in the appendix that under these conditions equilibrium capital flows are zero, this case becomes uninteresting and trivial.

Floyd's amended Keynesian model is not amended sufficiently to incorporate full portfolio equilibrium and his analysis of international capital movements under conditions of asset growth is therefore deficient.

3/ This point is emphasized by McKinnon and Oates in The Implications of International Economic Integration for Monetary, Fiscal and Exchange Rate Policy, Princeton Studies in International Finance, #16.

APPENDIX: The Mathematics of John Floyd's Capital Flow Equation

The derivation of Floyd's basic capital flow equation can be summarized as follows. (The notation and equation numbers are from [F2].)

Residents of a small country (Canada) are assumed to hold two assets in their wealth portfolios, money (M_c) and non-monetary wealth, the latter measured by the income produced by the stock of capital goods. The stock of non-monetary wealth generated in Canada ($\bar{S}_c$) is a function (f_c), depending on capital's share of output, of Canadian income (Y_c). The amount owned by Canadians (S_c) is some fraction (Q) of the total, the rest [(1-Q) $\bar{S}_c$] being owned by the foreign country. Portfolio equilibrium is defined by,

(6) $i = A_c(M_c, S_c)$,

and

(I) $Q = Q(M_c, Y_c)$,

where 1/i is the price of a unit of permanent income from capital and is fixed at the world level.

By definition the Canadian balance of indebtedness (D) is,

(15) $D = (1-Q) \bar{S}_c/i = (1-Q) f_c (Y_c)/i$.

The "capitalized value of the employed capital goods" [F2, p. 509] is given by,

(17) $P_k \bar{K} = f_c(Y_c)/i$,

where P_k is "the price of a unit of capital goods in terms of consumer goods." [F2, p. 509.] Substituting (17) into (15), taking the time derivative of D and ignoring the term involving dP_k/dt, since "it represents capital gains which are not purchased and therefore do not enter as foreign exchange transactions" [F2, p. 510], gives the steady-state capital inflow,

(20) $F = (1-Q) I_c(i) - \dfrac{f_c(Y_c)}{i} \lfloor \lambda_{mc} (dM_c/dt) - \lambda_{yc} (d\bar{Y}_c/dt) \rfloor$,

where,

(19) $I_c(i) = P_k(d\bar{K}/dt)$, and $\lambda_{mc} = \partial Q/\partial M_c > 0$, $\lambda_{yc} = -\partial Q/\partial Y_c > 0$.

Equation (20) indicates that F is a function of four variables: the levels of the money supply and income (since Q is a function of both) and their rates of increase. In particular, as a result of an increase in M_c,

> . . . in the long-run a smaller portion of the flow of new capital investment in Canada per unit time will be accruing to foreigners and . . . the steady-state net capital inflow into Canada will be smaller. [F2, p. 513.]

That a change in the level of one asset should affect the flow acquisition of another contradicts both the theory of portfolio selection and Floyd's own conclusions stated elsewhere in [F2].

This contradiction is caused by two factors. First, although asset demand in equations (I) and (6) is defined in terms of capital measured in permanent income units, after the substitution indicated in (17) the capital flow equation (20) is expressed in units of capital goods. Yet capital goods investment is assumed to depend only on i, the return on the mythical permanent income assets. The return on physical capital differs from i by $\frac{dP_k}{dt} / P_k$, i.e., the capital gain or loss on capital goods. With a return on capital fixed by the world market, investment in Canada will be undertaken only if $dP_k/dt = 0$, i.e., it will occur to the extent necessary to keep i equal to the marginal product of Canadian employed capital. Only under these conditions do the two definitions of capital become equivalent. With Floyd's investment function, this equivalence does not hold, and for example, a situation where $d\bar{K}/dt > 0$ and $dY_c/dt = 0$ is possible. In this case wealth holders must undertake a continuous flow purchase of capital goods whose rate of return is constantly declining in order to maintain a constant stock of permanent income capital assets, and a change in the level of the money supply which causes a change in the latter also alters the former.

A second and related difficulty involves the introduction of the variable Q. The capital flow equation expressed in units of permanent income assets can be found by rewriting (15) as

(15') $D = \frac{1}{i} (\bar{S}_c - S_c)$.

Differentiating with respect to time gives,

(19') $F = \frac{1}{i} [(df_c/dY_c)(dY_c/dt) - (dS_c/dM_c)(dM_c/dt)]$,

since it is clear from equation (6) that, with i fixed, dS_c/dt is a function of dM_c/dt only. Equation (19') demonstrates unambiguously that the steady-state capital flow is independent of M_c and Y_c. Substituting $Q\,\overline{S}_c$ for S_c in (15') however, and using (I) gives,

(19'') $F = (1-Q)\frac{1}{i}(df_c/dY_c)(dY_c/dt)$

$- \frac{f_c(Y_c)}{i}[\lambda_{mc}(dM_c/dt) - \lambda_{yc}(dY_c/dt)]$,

which seems to imply that $dF/dM_c \neq 0$. The difficulty arises because of the substitution,

$S_c = \frac{S_c}{\overline{S}_c}\overline{S}_c = Q(M_c, Y_c) f_c(Y_c)$,

which incorrectly makes S_c a function of Y_c as well as M_c. Put alternatively, Q is not, as implied by (I), an independent behavioral relation, but rather defined by the A_c and f_c functions. If $dY_c/dt >$ (<) dM_c/dt, Q is continuously declining (increasing) over time. Moreover, it must be decreasing in such a manner that at each moment in time $Q(df_c/dY_c) \div f_c(Y_c)\lambda_{yc} = 0$ and $(dS_c/dM_c) = \lambda_{mc} f_c(Y_c)$ as a comparison of (19') and (19'') indicates.