ETLA ELINKEINOELÄMÄN TUTKIMUSLAITOS
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
Lönnrotinkatu 4 B, 00120 Helsinki 12, Finland, tel. 601322

Keskusteluaiheita
Discussion papers

Jukka Lassila

INTERMEDIATE-RUN EFFECTS OF FISCAL POLICY WITH BALANCED BUDGET

No 37 4.5.1979

Intermediate-run effects of fiscal policy with balanced budget

Contents   Page

1. Introduction

In this article a theoretical macroeconomic model describing a small open economy is constructed. The economy is characterized by underutilization of production resources due to lack of sufficient total demand, and by well-functioning domestic asset markets. Our intention is to study the effects of various economic policies with the model, but this article contains only one such exercise.

A great deal of this article is a continuation to the row of theoretical studies initiated by the article "Does fiscal policy matter?" by Blinder and Solow. Inspired by Friedman's statements concerning the wealth effects of different ways of financing government's budget deficit they in a simple manner connected stock changes with the conventional IS - LM analysis. In the short-run IS - LM analysis all stocks are thought to be fixed. Yet with the equilibrium values of income and interest rate positive saving and net investment usually occur, government's budget is not balanced and in open economy models current account need not be balanced and also capital flows may occur. Thus all stocks, such as real private wealth, domestic money stock, foreign reserves, stock of physical capital and the amount of securities are changing through time. Blinder and Solow interpreted the usual IS - LM equilibrium as a momentary or instantaneous equilibrium, and defined a long-run equilibrium as a state where all stocks remain constants and which at the same time is also a short-run equilibrium. The model now formed a group of differential equations with respect to stocks and their rates of change. Blinder and Solow then studied the stability of the system and the long-run effects of an increase in public expenditures financed either by printing money or by issuing bonds.

Of the many followers of Blinder and Solow we may mention Branson (1976), Tobin & Buiter (1976) and Turnovsky (1977), which contains several articles of this area.

The model is built and presented in chapter 2. Some general problems connected with theoretical intermediate- and long-run analysis are discussed in chapter 3. The exercise in chapter 4 resembles in method closely that of Turnovsky (1977, ch. 7). The model is respecified in per-unit-of-capital form. We do not, however, study the already widely examined differences between bond-financing and money-financing of the government's deficit, but instead focus on the dynamic effects resulting from the openness of the economy.

Throughout we assume that there are no binding supply constraints on the goods market and that the exchange rates are held fixed. The term "intermediate-run" refers here to states where all real quantities grow at the same rate as the capital stock, described more closely in chapter 4, and "long-run" refers to states where all stocks remain unchanged.

2. The model

2.1. Sectors and markets

The world we consider consists of four sectors: households, firms and the government, which form the home country, and the rest of the world, which is the fourth sector. There exists no private banking sector in the home country. The rest of the world is large enough to be unaffected by domestic activities.

Households earn labour and capital income and use it by consuming, paying taxes or saving. The savings are held in domestic bonds or in money.

Firms produce the total output of the economy and use their income to pay wages and to pay interests on their outstanding bonds and divide the rest to their shareholders. Firms finance and refinance their investment by issuing bonds in the home country and in the rest of the world. The latter bonds are nominated in foreign currency and their interest rate is equal to the foreign interest rate. If bonds issues exceed investment, the difference is distributed to shareholders and goes to the households.

The government finances its expenditures by taxes, by printing money or by issuing bonds in the home country. The rest of the world trades with the home country and buys part of the home country's firms' bonds.

The exchange rates are assumed fixed throughout and all income and wealth variables are expressed in domestic currency.

Table 1. Sectoral budget constraints

Sectors	Disposable income			minus	expenditures and changes in assets			equals zero
	Income from production	Interest flows	Taxes and transf.			Bonds	Money	
Households	Y^h	Bn/P	$-U/P$	-	C	$\dot{B}/P + \dot{E}/P$	$\dot{H}/P + \dot{Z}/P$	= 0
Firms	$Y - Y^h - Fn^*/P$			-	I	$-(\dot{E} + \dot{F})/P$		= 0
Government		$-Bn/P$	U/P	-	G	$-\dot{B}/P$	$-\dot{H}/P$	= 0
The rest of the world	sM	Fn^*/P		-	X	$\dot{F}/P$	$-\dot{Z}/P$	= 0
Total	$Y+sM-Fn^*/P$	Fn^*/P	0	-	C+I+G+X	0	0	= 0

Notations:

Y = real output

C = real consumption

I = real investment

G = real government expenditure

X = real exports

sM = real imports in domestic currency

s = ratio of the price level of foreign goods measured in domestic currency to the domestic price level.

P = domestic price level

Y^h = households real income from firms

U = nominal taxes

B = nominal stock of government bonds

F = nominal stock of firms' bonds held in the rest of the world, in domestic currency

E = nominal stock of firms' bonds held by home country's households

H = domestic component of the nominal money stock

Z = foreign reserves in domestic currency

n = domestic nominal rate of interest

n^* = foreign nominal rate of interest

A dot above a stock variable means a derivative with respect to time.

The decision-units operate in three markets. There are two markets for assets and one for goods. Labour market is ignored. Asset markets are for bonds and for money. The number of firms' equities is assumed to be held fixed, they are not traded and they henceforth nowhere enter our analysis.

The formulation of asset markets follows that of Tobin (1969). The demand for any asset depends on the expected real yields of all assets and also on income and wealth positions of the wealth-owners. All bonds and money are assumed to be held by the households. If we denote households' demand for money by J, we can describe asset markets by the following equations. The signs of partial derivatives are expressed above the functions.

(1) Money $\quad J(\overset{+}{Y^d}, \overset{-}{n-\pi}, \overset{-}{\pi}, \overset{+}{V}) = H/P + Z/P$

(2) Bonds $\quad V - J(Y^d, n-\pi, \pi, V) = B/P + E/P$

(3) Households' wealth $\quad V = (H + Z + B + E)/P$

In the demand for money -equation π denotes expected rate of inflation and Y^d denotes households' disposable income:

(4) $Y^d = Y^h + Bn/P - U/P$

The goods market is described by the equation of demand-determined output:

$$(5)\ Y = C(\overset{+}{Y^d},\overset{+}{V}) + I(\overset{+}{Y},\overset{-}{n-\pi},\overset{-}{n^*-\pi},\overset{-}{K}) + X(\overset{+}{s},\overset{+}{D^*}) - sM(\overset{+}{Y},\overset{-}{s})$$

Output and imports are used for consumption, investment, exports and public expenditure. The equation is conventional and needs little further comments. Imports function is very simple. One can rationalize it by assuming that imports consist of raw materials, which are used in the production of domestic goods and which as raw materials can be substituted by domestic goods. Exports depend on relative prices s and on total real demand in the rest of the world, denoted by D^*.

Next we postulate inflation to be determined by a Phillips curve including also expectations. Denoting the foreign price level by P^*, we express inflation rates by p and p^*:

$$(6)\ p = \dot{P}/P\ ,\ p^* = \dot{P}^*/P^*$$

$$(7)\ p = A(\overset{+}{Y/\bar{Y}},\overset{+}{\pi},\overset{+}{p^*})$$

Equation (7) tells us that inflation is assumed to be the faster the higher domestic real output relative to capacity

is, the higher expectations concerning inflation are and the faster import prices are rising.

To close the model we need to spesify the formation of expectations, the government's policy and the firms' bond issue policy and in that connection the determination of Y^h. These questions will be dealt with next.

2.2. Financing and inflation

The simple fact that inflation changes the real values of all nominal debts has important consequences both in reality and in models like the one we are building here. The effects can be, and probably are, smaller when inflation is anticipated than when it is not, but in both cases there are effects.

Consider for example a firm that has, since its birth at time zero, financed its investment by issuing bonds with fixed nominal value. That is, at every moment t,

$$(8)\ I_t P_t = \dot{A}_t$$

where A_t is the nominal stock of bonds. At time T the firm's capital stock and the real value of its debt are related in the following way:

$$(9)\quad K_T = \int_0^T I_t dt = \int_0^T (\dot{A}_t/P_t)dt$$

Using integration by parts[1], the right-hand term can be manipulated:

$$(10)\quad \int_0^T (\dot{A}_t/P_t)dt = \Big/_0^T A_t/P_t - \int_0^T A_t(1/\dot{P}_t)dt$$
$$= \Big/_0^T A_t/P_t + \int_0^T (A_t/P_t)p_t dt$$

where $p = \dot{P}/P$. Assuming that $K_0 = A_0 = 0$, we get

$$(11)\quad K_T = A_T/P_T + \int_0^T (A_t/P_t)p_t dt$$

That is, the capital stock exceeds the real value of debt by the amount of cumulated inflation gains from the real value of debt.

If the firm knows the rate of inflation, p , and wants to have a stock of debt whose real value equals the capital stock, it can achieve this by following the rule (12):

$$(12)\quad \dot{A}_t = I_t P_t + A_t p_t$$

If the rate of inflation is unknown, there is no way the firm can quarantee that the real debt equals the capital stock.

---

1) $\int_a^b uv'dx = \Big/_a^b uv - \int_a^b u'vdx$

The problem of achieving and maintaining a desired real debt stock with nominal debt instruments is of course not limited to firms. The government, e.g., cannot have and maintain a desired real debt stock unless it knows the rate of inflation.[1]

For analytical convenience we wish to have a situation where the firms' real debt equals the capital stock. Otherwise the dynamics of the model would become too complicated. So we assume henceforth that

$$(13)\quad \pi = p$$

and, returning to earlier notations, that

$$(14)\quad I = \dot{E}/P + \dot{F}/P - (E/P + F/P)p$$

and

$$(15)\quad K = E/P + F/P$$

We also assume that firms do not accumulate cash balances, so that the excess of receipts from bond issues over investment is distributed to households. Thus the term Y^h becomes

$$(16)\quad Y^h = Y - F\dot{n}/P + Kp$$

---

1) Turnovsky (1977, Ch. 7) fails to stress this when he considers imperfectly anticipated inflation and at the same time spesifies policies which require inflation to be known.

We also assume that firms have a desired distribution of finance between domestic and foreign debt. The desired ratio of domestic bonds to capital stock is postulated to vary inversely with domestic real interest rate and positively with foreign real interest rate. Thus we spesify

$$(17)\quad E/P = e(\overset{-}{n-\pi}, \overset{+}{n^{*}-\pi})K \;, \quad F/P = f(\overset{+}{n-\pi}, \overset{-}{n^{*}-\pi})K \;, \quad e + f = 1$$

Changes in F affect the volume of foreign reserves Z. We define an auxiliary variable Q to be the difference between Z and F:

$$(18)\quad Q = Z - F$$

Changes in foreign reserves can now be separated into two parts: changes in Q come from the current account and changes in F come from firms' bond issues in the rest of the world.

After replacing equations (13) - (18) to equations (1) - (5) and (7) and noticing that there is only one independent equation in the pair (1) and (2) when the stocks are held constants, we have five independent equations left. These can further be condensed into three, for example (1), (5) and (7), and solved for Y, n and p given Q, H, B, K, s, π, P and all starred variables, and given also the policy variables G and U/P. Replacing the equilibrium values of

Y, n and p into the sectoral budget constraints in Table 1 and specifying the way the budget deficit is financed would result in a system differential equations that describes the time-path of the economy. The properties of this dynamic system are the concern of intermediate- or long-run analysis. Before actually proceeding the analysis we discuss some more general problems connected with it.

3. Some problems with theoretical intermediate- and long-runs

There are several problems connected with theoretical analysis of "intermediate" or "long" runs or "stationary states". They may be classified at least to four categories: existence, stability, meaningfulness and analytical manageability.

Existence: These problems may arise for several reasons. models that are originally specified for short-run analysis need not have any long-run solutions. For instance, the long-run may imply more restrictions (equations) than there are endogenous variables in the system. Or the equations may be contradictionary in the sense that no long-run equilibrium is possible. As an example of the latter case, consider a fixed-price model where exports are exogenous and no international capital flows take place. The long-run requirement that current account must be balanced is then

$$(19)\quad X - sM(Y) = 0$$

If we at the same time follow Tobin and Buiter (1976) and define as a fiscal policy variable $G' = G + (1-u)Bn$, that is, government expenditure plus debt interest net of taxes on such interest (u is the tax rate), the government's budget balance requirement is given by

$$(20)\quad uY - G' = 0$$

Only by chance can both (19) and (20) be fulfilled.

The existence of the long-run equilibrium may also depend crucially on some minor point in model specification. For example, Turnovsky has noted that the existence of wealth effects on consumption is necessary for Blinder's and Solow's long-run equilibrium.

Stability: Given that a long-run equilibrium exists, the economy is not moving towards it unless the dynamic system is stable. Many authors stress that there is no quarantee that the world is stable, so that the "correspondence principle" should not be used. Unfortunately formal stability analysis tends to become very complex even in rather small and simple systems, and results may change notably from minor changes in model specification.

Meaningfulness: The concept of long-run equilibrium used e.g. in Blinder and Solow (1973), Tobin and Buiter (1976) and Branson (1976), namely that all stocks must be constants, is not very interesting, because it means that saving and net investment must cease. We shall later use a somewhat more satisfying definition of a long-run equilibrium, only it is called intermediate-run equilibrium, namely that all income and wealth variables, measured in real terms, grow at the same rate as the capital stock. This definition too has many unappealing features. Central role is given to the capital stock which, from an empirical point of view, is perhaps the most unreliable variable of all. Also, many functions must be homogeneous of degree one, which restrict their generality.

Another dissatisfying feature of many long-run analysis is the central position of the government's budget constraint. As Fischer (1976) has noted, most of the results of Tobin and Buiter are due to the power of this budget constraint. If the constraint is similar to (20), the long-run multiplier dY/dG' is $1/u$ irrespective of the rest of the model, and only stability of the system need be considered. Thus the specified exogeneity of G' and u turn out to be crucial to the results.

Analytical manageability: As noted earlier, stability considerations become very complex when the number of dynamic variables increases. To study the stability of systems of four differential equations is usually impossible (without numerical methods). Allowing, for example, inflation to be imperfectly anticipated in the model developed in chapter 2, as it certainly is in reality, would yield a system of at least five differential equations and its stability analysis would be quite impossible.

In what follows we have tried to pay attention to some of the difficulties mentioned above. An intermediate-run solution exists and is characterized by a common rate of growth of all real income and wealth variables. The role of the government's

budget constraint is reduced by balancing the budget mainly by taxes; this also simplify the dynamics. In fact the system we have specified, especially the connection between the capital stock and the real value of firms'debt, turns out not to be extremely complex. But a price must be paid for that: assumptions are rather strong, and particularly that of perfectly anticipated inflation is restrictive and regrettable. Still the model hasn't become anything like too simple: very few clear results can be derived.

4. Fiscal policy effects with balanced budget and perfectly anticipated inflation

4.1. Respecification of the model

Since we wish to consider intermediate-runs where saving and investment do not cease, we use a method similar to Turnovsky (1977, Ch. 7) who adopted it from a work by Sargent. We express all income and wealth variables in per-unit-of-capital form. To be able to do this, we must assume that all functions thus far specified are homogeneous of degree one in income and wealth variables. We use small letters to denote the new scaled variables.

$$(21)\quad y = Y/K\ ,\ c = C/K\ ,\ i = I/K\ ,\ g = G/K\ ,\ x = X/K,\ d^* = D^*/K$$
$$m = M/K\ ,\ y^h = Y^h/K\ ,\ y^d = Y^d/K\ ,\ j = J/K\ ,\ v = V/K$$
$$b = B/KP\ ,\ h = H/KP\ ,\ z = Z/KP\ ,\ q = Q/KP\ ,\ u = U/KP$$

Notice that from (17) also $e = E/KP$ and $f = F/KP$. Before presenting the model we make two notational simplifications. First, we rewrite the Phillips curve because of the assumption of perfectly anticipated inflation:

$$(22)\quad p = a(\overset{+}{y},\overset{+}{p^*})$$

Second, we use r and r^* as symbols of real interest rates:

$$(23)\quad r = n - p\quad ,\ r^* = n^* - p$$

In per-unit-of-capital form the government's budget constraint becomes

$$(24)\quad u - g - bn + (i+p)(b+h) + \dot{b} + \dot{h} = 0$$

Following Turnovsky, we define a neutral debt policy as one in which $\dot{b}$ and $\dot{h}$ are zero, so that the real debt grows at the same rate as the capital stock. We assume that the budget is balanced by taxes, so that

$$(25)\quad u = g + bn - (i+p)(b+h)$$

Households' real disposable income in per-unit-of-capital form now becomes

$$(26)\quad y^d = y - fn^* + p - g + (i+p)(b+h)$$

so that it varies positively with real output and inflation and negatively with real domestic interest rate (via functions f and i) and public expenditures.

The equations describing the instantaneous equilibrium can now be expressed as

$$(27)\quad y - c(y^d,v) - i(y,r,r^*) - x(s,d^*) + sm(y,s) - g = 0$$
$$(28)\quad j(y^d,r,p,v) - h - q - f(r,r^*) = 0$$
$$(29)\quad v - j(y^d,r,p,v) - b - (1-f(r,r^*)) = 0$$
$$(30)\quad v = 1 + h + q + b$$
$$(31)\quad p - a(y,p^*) = 0$$

Replacing (26) and (30) into the rest of equations and noticing that there is only one independent equation in (28) and (29), we are left with three independent equations. We use them to give the instantaneous equilibrium values of y, r and p, given all other variables.

Notice that the scaling of variables into per-unit-of-capital form does not alter any interpretations with the short-run analysis, because there all stocks are held constants. Scaling becomes important only when time passes: the constancy of scaled exogenous real income and wealth variables, g and d^*, for example, means that at every moment they must grow at the rate i, which is the rate of growth of the capital stock. Comparative-static analysis deals with the levels of the scaled variables, whereas the growth aspect is inherent in the per-unit-of-capital specification.

Because of the assumptions concerning budget balancing, anticipated inflation and firms' bond issue policy, there are only two variables whose dynamics must be examined, namely q, the difference between real foreign reserves and firms' foreign real debt, and s, the ratio of foreign goods' price level measured in domestic currency to domestic goods' price level. Notice that when q's evolution is found, all items forming the money supply are known: f is determined by the real interest rates and h by the budget.

4.2. Instantaneous equilibrium

We now turn to study how the instantaneous equilibrium changes when q, s and g change. We mentioned above that the instantaneous equilibrium itself determines how q and s change whereas g is a policy variable. Taking total differentials of equations (27), (28) and (31) we get

$$\begin{bmatrix} 1 - c_y\frac{dy^d}{dy} - i_y + sm_y & -c_y\frac{dy^d}{dr} - i_r & -c_y\frac{dy^d}{dp} + i_{r*} \\ j_y\frac{dy^d}{dy} & j_y\frac{dy^d}{dr} + j_r - f_r & j_y\frac{dy^d}{dp} + j_p + f_{r*} \\ -a_y & 0 & 1 \end{bmatrix} \begin{bmatrix} dy \\ dr \\ dp \end{bmatrix} =$$

$$\begin{bmatrix} 1 - c_y & x_s - sm_s + m & o_v \\ j_y & 0 & 1 - j_v \\ 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} dg \\ ds \\ dq \end{bmatrix} \qquad (32)$$

The sign pattern of the determinant is rather clear:

$$\begin{vmatrix} + & + & - \\ + & - & (-) \\ - & 0 & + \end{vmatrix}$$

The sign in brackets is minus provided t[illegible]lation reduces the demand for money more than the increase in households' real disposable income caused by inflation increases the demand for money; also the term f_{r^*} is negative confirming the sign.

Expanding with respect to the lowest row gives the determinant

$$(33)\quad D = -a_y D_{31} + D_{33}$$

Both D_{31} and D_{33} are negative. The sign of D is unclear because of $-a_y$. D_{31} consists inflation and real interest terms and D_{33} consists output and real interest terms. We assume that the latter outweigh the former so that D is negative, but the reader may well feel uneasyness about this point.

Under this assumption increases in g and q increase both y and p , which are familiar results. The effects of an increase in s on real output and inflation depends on the term $x_s - sm_s + m$, which expresses the direct effect of an increase in foreign prices relative to domestic prices on the balance of trade. If an increase in foreign prices makes the trade balance better both y and p will increase, and if the trade balance gets worse both y and p will decrease. Notice that this term does not include the effect on the trade balance of the change in y caused by a change in s.

The signs of effects on domestic real interest rate are all unclear. Rather surprisingly, even the effect of an increase in q, which is an increase in real money supply, on the real interest rate is ambiguous. If one assumes that the wealth effects on consumption are negligible, domestic real interest rate will fall if the term $1-c_y\frac{dy^d}{ydy} - i_y + sm_y$, which is the inverse of the almost simple multiplier, exceeds the term $-a_y(-c_y\frac{dy^d}{ydp} + i_{r^*})$, which describes the effect that an increase in real output has through inflation on real domestic demand.

Real output, inflation and real interest rate can now be expressed as functions of g, s and q:

$$(34)\quad y = y(\overset{+}{g},\overset{?}{s},\overset{+}{q})$$

$$(35)\quad p = p(\overset{+}{g},\overset{?}{s},\overset{+}{q})$$

$$(36)\quad r = r(\overset{?}{g},\overset{?}{s},\overset{?}{q})$$

4.3. Stability

The dynamics of the system can be described by the following pair of differential equations.

$$(37)\begin{cases}\dot{q} = x(s) - sm(y,s) - f(r,r^*)n \\ \dot{s} = s(p^* - p)\end{cases}$$

Current account changes q and the difference of inflation rates changes s. Stability of (37), with a given g, depends on the trace and determinant of (38):

$$(38)\quad \begin{bmatrix} -sm_y y_q - f_r r_q n^* + f_{r*} p_q n^* & x_s - sm_s - m - m_y y_s - f_r r_s n^* + f_{r*} p_s n^* \\ -sp_q & (p^* - p) - sp_s \end{bmatrix}$$

Necessary and sufficient conditions for stability are that the trace of (38) is negative and that the determinant is positive.

Let us first assume that firms' borrowing from abroad is not sensitive on real interest rates, that is, let's drop all terms including f_r and f_{r*} out. Then the trace condition is met provided that the foreign rate of inflation does not exceed domestic rate of inflation too much. Then the determinant requirement depends crucially on the term $x_s - sm_s + m - m_y y_s$, which describes the total short-run effect of an increase in s on the trade balance. If this effect is positive, the determinant will also be positive. If the effect is negative, instability is possible.

If the firms' borrowing from abroad is very sensitive to real interest rates the picture gets foggy and nothing much can be said about stability.

4.4. Balanced budget multipliers in the intermediate-run

The intermediate-run equilibrium is described by the following equations.

$$(39)\quad \begin{cases} \dot{q} = 0 \\ \dot{s} = 0 \end{cases}$$

Replacing (39) into (37) and differentiating, we can study the effects of an increase in g on the intermediate-run equilibrium values of q and s and through them on y, p and r.

$$\begin{bmatrix} -sm_y y_q - f_r r_q n^* + f_{r*} p_q n^* , & x_s - sm_s - m - m_y y_s - f_r r_s n^* + f_{r*} p_s n^* \\ -p_q & -p_s \end{bmatrix} \begin{bmatrix} dq \\ ds \end{bmatrix}$$

$$(40)\quad = \begin{bmatrix} (m_y y_g + f_r r_g n^* - f_{r*} p_g n^*) dg \\ p_g dg \end{bmatrix}$$

The determinant of (40) is roughly the same as that of (38). So, assuming that the difference between inflation rates is small, the determinant is positive when the system is stable and negative otherwise. In a stable case an increase in g decreases q while the effect on s is ambiguous.

The effects of increasing g on output, inflation and real interest rate in the intermediate-run can now be expressed using equations (34) - (36). A balanced-budget increase in g increases y and p directly but decrease them through a decrease in q, while the effects through s are ambiguous. The total effect on y, given by (41),

$$(41)\ dy = y_g dg + y_s \frac{ds}{dg} dg + y_q \frac{dq}{dg} dg$$

is thus ambiguous as is also the total effect on p. The sign of the effect on r is of course also unknown, because even the short-run effects remained unclear.

Finally, we may notice that the assumption we have implicitly made in the intermediate-run analysis, that d^* is constant, means that the total real demand in the rest of the world grows at the same rate as all domestic real variables. That is, our small economy cannot have a steady growth rate that differs from that abroad. An alternative is to relate exports to the domestic capital stock (it needs be related to some income or wealth variable, otherwise the homogeneity assumption would not be fulfilled). This could be given an interpretation that our economy produces and exports a differentiated product, whose demand depends on relative prices and on domestic technology but not on world's total demand. In that case the growth rates may also differ.

5. Conclusions

Some important and interesting questions concerning theoretical intermediate- or long-run analysis in general were discussed in this paper. Imperfectly anticipated inflation has some apparent and important consequences which, I think, cannot be dodged in a more serious study. The real values of nominal quantities change, and if economic decision-units set targets to these real values, these targets cannot usually be met, and the decision-units must adjust their behaviour correspondingly. To theoretical routine exercises, like those in chapter 4, this also gives rise to severe complications. Even if perfectly anticipated, inflation implies gains and losses which must be absorbed and held in some sectors of the economy.

Some of the questions discussed in chapter 3, while almost trivial, are also important when one tries to compare the model with reality. For instance, balancing the budget somehow, rather than letting the deficit float freely, seems a sensible description of the world. Technically this means endogenizing more of the variables in the budget constraint and, as shown in chapter 4, does not necessarily complicate the analysis and in fact can make it simpler.

The implications of the respecification of the model in per-unit-of-capital form give rise to some difficulties in the interpretation of results. The requirement that in an intermediate-run equilibrium all real quantities grow at the same rate is explicitly present almost nowhere in the analysis. It is a direct consequence of the respecification and of the assumptions which made the scaling possible. The approach still resembles more that of short-run analysis of levels than that of real long-run analysis, "long-run" here in a different sense than elsewhere in this article, which focus directly on growth.

Referenc

Blinder, A.S. and Solow, R.M. : Does fiscal policy matter? Journal of Public Economics 2, 1973

Branson, W.H. : The dual roles of the government budget and the balance of payments in the movement from short-run to long-run equilibrium. The Quarterly Journal of Economics, No.3, 1976

Fischer, S. : Comments on Tobin and Buiter, in Stein (ed.): Monetarism, North-Holland, 1976

Tobin, J. : A general equilibrium approach to monetary theory. Journal of Money, Credit and Banking, 1, 1969

Tobin, J. and Buiter, W. : Long-run effects of fiscal and monetary policy on aggregate demand, in Stein (ed.): Monetarism, North-Holland, 1976

Turnovsky, S.J. : Macroeconomic analysis and stabilization policy. Cambridge University Press, 1977