ANNALES D'ÉCONOMIE ET DE STATISTIQUE. – N° 3 — 1986

The Significance of Customer Markets for the Effects of Budgetary Policy in Open Economies

Edmund S. PHELPS *

ABSTRACT. – A new model of the small open economy is constructed in which home producers operate in an international "customer market". Increased public expenditure on home output causes the home real interest rate to rise, boosting the velocity of money. It may also cause home firms to shave their mark-ups, thus boosting the real supply of money. Hence employment is up, at first. But the boom is followed by a slump.

Politique budgétaire en économie ouverte lorsque les marchés de biens sont fidélisés

RÉSUMÉ. – L'article présente un modèle dans lequel les producteurs nationaux opèrent à l'intérieur d'un «marché fidélisé» («Customer Market») international. Un accroissement des dépenses publiques en produit national génère une hausse du taux d'intérêt national, activant la vitesse de circulation de la monnaie. Cela peut également inciter les firmes nationales à rogner leurs mark-up, relançant par là l'offre de monnaie réelle. Au total l'emploi s'accroît à court terme. Mais le boom est suivi d'une dépression.

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* E. S. PHELPS: Columbia University, Department of Economics, New York, NY 10027, Etats-Unis. Prepared for the conference, "Deficit Public", OFCE, Paris, June 12-13, 1984. I am also grateful to audiences at the University of Munich, the University of Rome, the Bank of Italy and the Institute for International Economic Studies. Two students, P. CATTE and R. LAMDANY, helped me to sort out my thoughts at an early stage. Unpublished work by E. CARDOSO [1983] was also helpful.

1 Introduction

What are the employment and interest effects of Keynesian budgetary stimulus? The econometrics of fiscal effects is so difficult, apparently, that expert opinion is distributed over a vast range. Closed-economy theory has shown the possibility of an initially expansionary effect on employment, and the (independent) possibility of mounting contractionary effect due to the consequent slowing of the capital stock. Of course, these effects can be large only to the extent that interest rates or money wage rates do not entirely absorb the effects of the fiscal shock. But this theory cannot be carried over to open economies.

For those economists who are Keynesian or anti-Keynesian enough to suspect that budgetary policy does have employment and interest effects, in the orthodox or unorthodox directions, the existing open-economy macro models are dissatisfying. In the now *standard* model of an open economy in a world of capital mobility, increased government spending by a *small* country has no power to raise the real rate of interest (neither in goods produced nor goods consumed) and thus, via that Keynesian "IS" channel, to raise output and employment; and a large-scale increase of government spending in a *large* country cannot raise the real interest rate *if* the rest of the world offsets the decreased world saving by increased world saving through reduced government spending[1]. To defend these characterizations (and to make some small points of qualification) we have added as an end piece to this paper a review in some detail of present-day fiscal analyses in open and closed economies.

With this critique of existing theory as background let us proceed now to the "final goods and services" of the paper: the construction of a novel model for the analysis of budgetary disturbances in the typical open economy, and an informal examination of the model's implications regarding the effects through time of a prolonged bulge in the level of public spending. The key feature of the model is the informational friction present in the world product market (or markets) in which the country's firms are competing for market share—an "internationalization" of the notion of frictional competition first studied by PHELPS and WINTER [1970]. The possible effects of disturbances on firms' price mark-up permit output effects not present in standard models, and the characteristic that early effects on wages must ultimately be erased (as the long run takes hold) leads to a two-or-more phase cyclical response to a sustained fiscal disturbance.

1. The commentary by BLANCHARD and SUMMERS [1984] uses this standard model when in rejecting the "deficit" hypothesis for the recent rise in "world real interest rates" it explains that the US fiscal expansion has been "offset" by contradiction in Europe and Japan.

2 The Model

The setting is a small open economy. Every firm in this economy is in atomistic competition with the many other firms in the world market for its product. The informational frictions are the sort depicted in the PHELPS-WINTER model [1970]. For simplicity I suppose that just one product is produced. Each firm's product, while perhaps not identical in respect to location etc., is a perfect substitute for every other firm's product. Nevertheless a customer of one of these Phelps-Winter firms cannot costlessly find another supplier in timely fashion. So every firm has some transient monopoly power; but not permanent monopoly power, for a firm that maintained indefinitely a certain price differential over the "going" world-market price would lose all its customers asymptotically. Because the country is small and local inhabitants are as cosmopolitan as others, domestic customers are few enough to be neglected in the calculations of a firm.

It may be useful to have in mind the image of an international economy populated by resort hotels or tourist restaurants, each one competing for its share of apparently homogeneous customers in the world tourism market.

The seven structural equations of our aggregative model are set forth below in Table 1. The notation and the interpretation of these equations will be given in the course of the following discussion.

TABLE 1

(1)	GG	$N=\eta\left(\frac{P}{EP^*}\right)x+\gamma$	EE
(2)	LM	$M=PL(N, i)$	LL
(3)	PP	$P=P(Q, EP^*, W)$	LL
(4)	AR1	$i=i^*+\frac{\dot{E}}{E}$	
(5)	AR2	$i=\eta\frac{P-W}{Q}+\frac{\dot{Q}}{Q}$	
(6)	DW	$\frac{\dot{W}}{W}=\Phi(N-\bar{N})$	
(7)	Dx	$\frac{\dot{x}}{x}=-\delta\left(\frac{P}{EP^*}-1\right)$	

First, the demand side. A customer's demand is a function η of the supplying firm's price in terms of foreign exchange deflated by the foreign price level: $\eta\left(\frac{P/E}{P^*}\right)$, $\eta'<0$, where P is the firm's price, E is the price of

foreign exchange, hereafter the "exchange rate" and P* the foreign price level. EP* may be called the adjusted exchange rate. This demand multiplied by the number of customers, x, gives the firm's current demand. With all the country's firms alike and therefore behaving identically, and with the government purchasing or producing γ per firm, $\eta(\,.\,)x+\gamma$ gives total demand per firm.

For purposes of comparison we give our money demand function the (not unjustified) form used in the MUNDELL-FLEMING model [1972, 1973] and we also adopt their hypothesis of perfect capital mobility.

On the supply side, we suppose that a firm to produce one unit of output needs one unit of labor; this constant-costs case is studied in passing by PHELPS and WINTER [1970] and in a general-equilibrium framework by CALVO and PHELPS [1983]. But the price (in local currency) charged by each firm, P, is not generally equal to the money wage rate, W. Presuming existence and uniqueness of an optimal pricing policy for each firm and of the associated equilibrium path of the economy, we proceed to invoke a *price function.* It depicts the firm's price as a linear-homogeneous function of the shadow-price of customers, Q, the adjusted exchange rate EP*, and the wage rate W, all in (local) money terms. For the price level, then, we write P(Q, EP*, W); and for the price level in wage units, P/W, or more conveniently $\tilde{P}$, we write $P(\tilde{q}, \tilde{e}, 1)$ where $\tilde{q}$ denotes Q/W and $\tilde{e}$ denotes EP*/W. In these terms, a firm's real profit in the cash-flow sense is (P−W)/P per unit of output, which we usually approximate as $\tilde{P}-1\equiv\mu$. Since this "profit" is not competed away, provided the world capital market presents a positive real rate of interest (in terms of the good when obtained from foreign firms), each firm has a positive market value, namely Q per customer in terms of money, and $q\equiv Q/P$ in terms of product from local firms. [2] It is implicit here that at each moment a firm can hire freely at some given nominal wage.

With regard to wage behavior we want a conventional treatment in order to facilitate tracing the effects of the customer market feature. On the other hand, research into wage dynamics has so proliferated models that no ruling model any longer exists. However, some version of a non synchronous wage-wage model, *without* intra-term indexation to the general price or wage level and *with* a "contractual" constraint forbidding initiatives in wage cutting absent adverse evidence to show cause, is probably the model of choice, at least to describe American (and some other) wage behavior. Hence we adopt a statistical Phillips curve that says wages rise (fall) if and only if employment is greater (less) than some natural level. The proportionate rate of wage change is given by $\Phi(N-\bar{N})$, $\Phi'(\,.\,)>0$, $\Phi(0)=0$, where N is the number employed and $\bar{N}$ the natural level.

This paper is confined to the case of a fixed money supply and flexible exchange rate.

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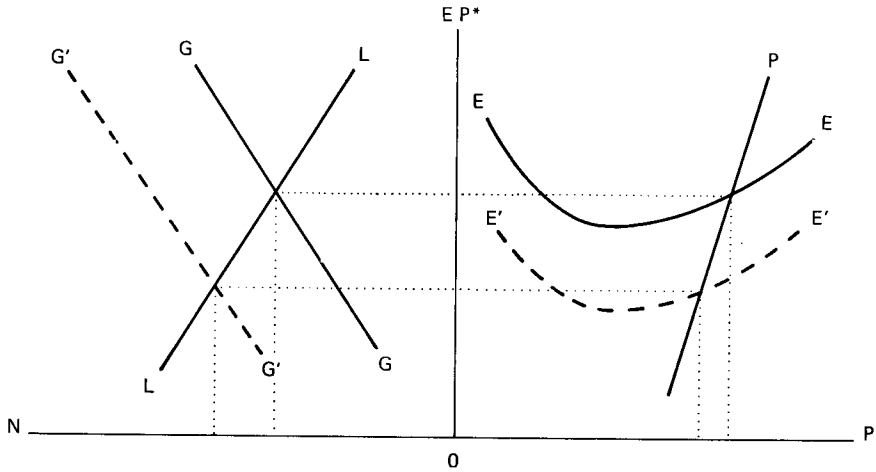
2. The pricing function is a semi-reduced form that is not entirely invariant to changes in the structure of the economy.

FIGURE 1



To aid understanding we indicate here the requisite comparative-statics analysis using static expectations represented in Figure 1. Fiscal stimulus via increased γ succeeds in raising employment by inducing reduced mark-ups and thus higher real cash balances through the exchange rate.

The dynamics of the response to fiscal stimulus is the subject of the rest of the paper. The formal model describes the rational-expectations, or perfect-foresight, behavior of the economy since it specifies perfect foresight in the arbitrage conditions on the motion of Q and EP* in relation to W. First, the proportionate rate of change of Q, $\dot{Q}/Q$, which is here equal to the expected rate of change, must equal the excess of the nominal interest rate, i, over the rate of profit, $\frac{P-W}{P}\cdot\frac{P}{Q}\eta$, or approximately $\mu\eta/q$, where P/Q can be written $\tilde{P}/\tilde{q}$. To obtain i we may invert the LM equation, writing $L(Y, M/P)$ for i, where Y is measured by N and where M denotes the fixed money supply. Letting $\tilde{m}$ denote M/W and using $\dot{\tilde{q}}/\tilde{q}=\dot{Q}/Q-\dot{W}/W$, we have

$$(1)\quad \dot{\tilde{q}}=\tilde{q}\left\{L\left[\eta\left(\frac{\tilde{P}}{\tilde{e}}\right)x+\gamma,\ \frac{\tilde{m}}{\tilde{P}}\right]-(\tilde{P}-1)\,\eta\left(\frac{\tilde{P}}{\tilde{e}}\right)\frac{\tilde{P}}{\tilde{q}}-\Phi\left[\eta\left(\frac{\tilde{P}}{\tilde{e}}\right)x+\gamma-\bar{N}\right]\right\}$$

The second arbitrage condition is that the rate of depreciation (rate of appreciation of foreign exchange), $\dot{E}/E$, equal the excess of the home interest rate, i, over the foreign rate, $\bar{i}^*$, which is here a constant equal to the "world" real rate, $\bar{r}^*$, plus the world inflation rate, $\dot{P}^*/P^*$; hence $d/dt\,(EP^*)/(EP^*)$ equals $i-\bar{r}^*$, and

$$(2)\qquad \dot{\tilde{e}}=\tilde{e}\left\{L\left[\eta\left(\frac{\tilde{P}}{\tilde{e}}\right)x+\gamma,\ \frac{\tilde{m}}{\tilde{P}}\right]-\bar{r}^*-\Phi\left[\eta\left(\frac{\tilde{P}}{\tilde{e}}\right)x+\gamma-\bar{N}\right]\right\}$$

The rate of growth of the money supply in wage units gives

$$\dot{\tilde{m}} = \tilde{m} - \left\{\Phi\left[\eta\left(\frac{\tilde{P}}{\tilde{e}}\right)x + \gamma - \bar{N}\right]\right\} \tag{3}$$

since the money supply is taken to be fixed. The above three equations constitute the "short-run" subsystem studied in the next section.

The full model adds the customer flow equation. The proportionate loss of customers is proportional to the competitive gap, $\frac{P}{EP^*} - 1$.

$$\dot{x} = x\left\{-\delta\left(\frac{\tilde{P}}{\tilde{e}} - 1\right)\right\}, \qquad \delta > 0 \tag{4}$$

3 Preliminary Exercices

This section will discuss as a kind of warm up two extreme cases that can be imagined, both of which are really excluded by the logic or rationale of the model as constructed above. There is, first, the case of so-called "perfect flexibility" of money wage rates and, second, the case of a constant mark up of price over marginal and unit cost. Here and throughout the paper the thought experiment is a fiscal shock in the form of a permanent or (more plausibly) a prolonged increase of γ. It is always supposed that the economy is initially at rest when the disturbance occurs.

3.1. A Perfectly Flexible Wage

In this case $N = \bar{N}$ always. Hence $e \equiv EP^*/P$ is linked to x and γ by the relation $\bar{N} = \eta(e^{-1}).x + \gamma$. Therefore the model of the present case can be reduced to a differential equation in a real price, say $q = Q/P$, another differential equation in a money price, say P or equivalently P/M, and the one in x, which involves e but as was noted e is a function only of x, given γ. We need not pause over the details of these equations.

It is immediately clear, both from the simplified model here and the full model of section 1, that the money price level, P, and all the real prices – e, q and w – are the same across steady states, each such state corresponding to some γ. Obviously, $\bar{e} = 1$, otherwise $\dot{x} \neq 0$, and $r^* = L(\bar{N}, M/\bar{P})$, otherwise $\dot{P} \neq 0$. So these steady-state values are independent of γ (both directly and indirectly through its effect on $\bar{x}$). Using these results and inverting the mark-up equation to determine w as a function of e and q, we can then solve for $\bar{q}$ and hence $\bar{w}$; both can be seen to be invariant to γ. From the

invariance of $\bar{e}$ and hence $\bar{\eta}$ it follows that $\bar{x}$, which is determined by the relation $\bar{N}=\bar{\eta}\,\bar{x}+\bar{\gamma}$, is a decreasing function of γ. Looking back at these results we realize their obviousness: if there were no frictions in the product market, x would jump to the new steady-state level following the increase of γ and there would be no effects upon relative and money prices.

Given the initial stock of customers, x_0, and the uniqueness of $\bar{x}$, it follows that x will be continuously decreasing with time as it approaches the new and lower steady-state value. It follows from the aforementioned equation linking e to x and γ that the jump of γ causes a downward jump of e on impact. (The home currency appreciates, that is.) As x decreases, approaching $\bar{x}$ asymptotically, e recovers, returning to 1 asymptotically. This subsequent recovery, which is an appreciation of the *foreign* currency, implies that the real rate of interest is elevated (though vanishingly so) during the approach to the new steady state. This finding together with the differential equation in P, which says that the inflation rate is the excess of the nominal interest rate over the real interest rate, and the differential equation in x (which is independent of P and q), imply that the price level jumps up on impact; then, with shrinkage of x, the price level recedes toward its invariant steady-state level, $\bar{P}$. Since this (vanishing) elevation of the price level must cause an elevation (also vanishing) of the nominal interest rate, E must be increasing during the adjustment process; but this is only possible through an initial downward jump of E at the moment γ is increased. Hence the jump and the recovery of e are both achieved through jumps and subsequent recoveries in the opposite directions of E and P. The motion of q can be separately analyzed in the (q, x) plane, free of nominal variables, just as the motion of P was analyzed in the (P, x) plane without the intrusion of q. The sole role of q is to determine, along with e, the equilibrium real wage, w.

The main lesson to be drawn from our brief study of this extreme case is that the fiscal "stimulus" drives up the real interest rate and thus the price level. So, on *this* account, the "stimulus" must be considered expansionary—its effect on employment being choked off by an instantaneous upward jump of money wage rates. (For if P has jumped up despite a jump down of E, which by itself lowers P according to the mark-up function, it must be, *given* Q, that the average money wage, W, jumps up; and such a jump reflects an upward shift in the nominal demand-price schedule for labor.) However, a full analysis would have to face the possibility—one that cannot be ruled out with the equations here—that the upward jump of the price level is no greater than what is caused by a downward jump of Q, which overcomes the effect of the fall of E, so that no inference of a higher W can be drawn; money wage rates may actually be reduced.

3.2. A Constant Mark Up

In this case (3), which describes the sluggish movement of the average money wage, is restored. And since N is not a constant in this case, (2) returns. The original four equations describe the system with the exception that the mark up is a constant: $P/W=\tilde{P}=\beta>1$. Hence the price level is sticky, like the wage.

Here also the steady-state prices are all invariant to γ, and $\bar{x}$ is decreased by the increase of γ. So all the impact effects on prices are followed by recoveries to the normal level. But with *two* state variables, W and x, the recovery of a price need not be monotonic; overshooting in the recovery is possible.

The equations (2) and (4) determine the path of x and $\tilde{e}$, given the path of W but independently of Q thanks to the fixity of $\tilde{P}$; e is likewise determined since $\tilde{e}=\beta e$. Assume provisionally that employment is not expanded by the increase of γ so that W remains undisturbed. Then the phase diagram in the (x, e) plane shows that when the shock occurs, driving $\bar{x}$ below x_0, e drops below 1 and then recovers monotonically while x monotonically declines to $\bar{x}$. (This assumes uniqueness of the e path, which requires that the sensitivity of the interest rate to employment exceed that of the inflation rate.) The prospective recovery, *i.e.* the appreciation, of the foreign currencies elevates the real interest rate and, given the inflation rate, the nominal interest rate as well, which implies a *rise* of employment; the latter feeds back on the inflation rate, so the nominal interest rate rises more, and so forth; but on our assumptions, the expansion of employment is convergent. Thus the assumption that employment and the wage are undisturbed is contradicted; employment is expanded at first, so wages will be rising. But in time the mounting money wage level chokes off this expansion, which leaves wages elevated above their normal level. So there must be at least one more phase of falling wages and employment slump.

4 The Effects of the Fiscal Stimulus in the Full Model

Let us now study the effects in the full model, both over the near-term and far-term future, of a permanent or long-lasting fiscal stimulus, as represented by an increase of γ. We may interpret the fiscal stimulus to be a permanent or long-term *balanced-budget* increase of government spending financed by taxes without supply-side effects. Alternatively we may regard the stimulus as a temporary *deficit-financed* increase of government spending that lasts long enough for both employment and wages to settle into a quasi-steady state – before the end of the deficits draw so near as to begin pulling wages and employment markedly away; clearly this second interpretation requires us to assume that the accumulation of public dept is a sufficiently weak force (because the real interest rate is low, for example) that its impact effects will be appreciable only in the far future – too far ahead to have important anticipatory effects upon near-term and medium-term variables.

For an informal analysis of the response of the system to such a fiscal stimulus we view the aftermath in a succession of phases, simplifying occasionally to expedite the main points.

In the first phase, employment, after being at first disturbed from its natural level by the stimulus, gradually recovers to its natural level. Here

it is supposed somewhat artificially that the stock of customers has made only a negligible adjustment to the fiscal shock by the time this phase is over. Moreover we suppose, merely to keep the analysis uncluttered, that static expectations prevail regarding the exchange rate; the perfect-foresight case is adressed in a footnote. In the second phase, the stock of customers gradually adjusts to the fiscal disturbance. This adjustment to the original shock produces an "after-shock" effect upon aggregate demand that tends (while it lasts) to keep employment from its natural level. The analysis will show that any boom in the first phase must be followed by a slump, and a slump in the first phase by a boom.

The first phase. Consider the following trial solution for the first phase of the model when γ is increased: P is undisturbed and E jumps to lower level such that the higher export price in foreign currencies, P/E, decreases $x\eta(P/E)$ by just the amount of the increase in γ. Such an outcome is exactly the solution to the static Mundell-Fleming model on the usual specifications. However, it is not generally the solution to our dynamic customer-market model, not even with static expectations regarding E and P.

The actual solution to the first phase of the model depends on the system effects upon the price level of the increased γ through the pricing function. An apparent possibility is the following: The aforementioned decrease of E causes the price level, P(Q, E, W) to decrease too, as firms cut their mark-up in order to moderate the increase in their prices expressed in foreign exchange. This reduction of the domestic price level, and thus nominal cash flow at each level of employment, has a real-cash-balance effect (representable by a rightward shift of the Hicksian LM curve) that boosts output and employment. On the previous specification that P is less than unit elastic with respect to E, the rise of P/E found in the trial solution is not altogether erased; so there is some crowding out.

In this scenario the increased employment level causes the average money wage to be rising over the first phase. The cumulative rise of the average wage acts, via the price level and real balances, to rein in the level of employment. The first phase is over once the wage level has reached a level high enough to extinguish the aforementioned real-balance effect while the exchange rate clears the market for the country's exports, so that employment is restored to the natural level. If we postulate static expectations regarding both E and P, then these variables would at this point attain

3. As some results below will make clear, all nominal variables ultimately return to their original levels. Under the perfect foresight version of this scenario, therefore, E will be expected to be rising from its depressed value. Hence, at the end of the first phase, the nominal interest rate will be elevated above its original and ultimate value, r^*, and as a consequence P (and hence also the market-clearing E when N is at $\bar{N}$) is higher at the end of the first phase than under the static-expectations version described above.

Note also that with perfect foresight the trial solution is also incorrect for overlooking that the expected recovery of E, hence an anticipated elevation in the nominal rate of return to foreign investments, raises the opportunity cost of holding money and thus produces an excess supply of money tending to raise output and employment – a different channel from the one described in the text above. Another effect noted by Burgstaller and others is the possible reduction in the demand by consumers for precautionary cash balances due to the reduced price of foreign consumables.

their values in the trial solution; P would reattain its pre-shock level and E would be reduced as required for full crowding out, though W would lie at an elevated level. [3]

However, we are not able to rule out a contrasting outcome, should the right constellation of parameter values appear in the heavens. In this scenario as in the previous one, the initial fall of E has the side effect of reducing Q, the shadow worth of an additional customer. But in the present scenario the effect is strong enough relative to the fall of E itself to cause P(Q, E, W) to *increase*, and the consequent negative real-balance effect is to drive employment below its natural level into a slump. The reason that there is a fall of Q and even a fall of Q/E is that the appreciation of the currency has driven up the firms' costs in terms of foreign exchange, W/E, which must make it less worthwhile to have added customers (with their unchanged foreign-exchange denominated demand curves). We are unable, with only the analytical capital of the present paper and its predecessors, to exclude the possibility that Q/E decreases by so much as to make P/E increase by an amount requiring an increase of P on top of the decrease of E. Over the first phase of this contrasting scenario, then, the average money wage will be falling until, at the end of this phase, the negative real-balance effect is offset by the lower wages. Under static expectations, P and E then are at their trial-solution values, with W this time at a depressed level.

The second phase. Since P/E is elevated at the start of the second phase, the firms find themselves less competitive than originally and must be losing customers to foreign competitors. It can be seen that the decline of the stock of customers, x per firm, necessarily results in a depreciation of the local currency (*i. e.*, a rise of E from its depressed level). That *may* lead to a slump of employment (from the level $\bar{N}$) into the sub-normal, or sub-natural, zone. The mechanism is this: given P, the "market-clearing" E must increase at each output-employment level as x declines, for each remaining customer must be induced to buy the output previously bought by those who have left, and this *increase* of E, *taken alone*, induces an *increase* of the price that firms set (in local currency) which gives rise to an increased demand for money, thus a *negative* real-balance effect upon net foreign investment tending to reduce exports and hence employment.

However this rise of E (from a depressed level) has the side effect of raising Q (from its likewise depressed level) since it improves the firms' wage competitiveness as measured by W/E, and a rise of Q, taken alone, induces firms to *lower* the mark-up over marginal and unit cost. As we cannot exclude the possibility that this indirect effect of increased E outweighs the aforementioned direct effect, there is the possibility that P(Q, E, W) is *decreased*, the real-balance effect of which is to increase employment.

It should now be clear how the pieces of the jig-saw puzzle fit together. The *former* possibility, in which the loss of customers leads to a decline of jobs, is to be joined to the *first* of the two scenarios in the first phase; in both cases the direct effect upon the mark-up of a change in the exchange rate is stronger than the indirect effect. We can therefore complete this first scenario as follows: the elevated wage level, which was a

residue of the first phase, as the increased government spending generated a transient boom, is "worked off" in the second phase, as the continuing exit of customers (to other countries) causes a continuing slump in the level of employment, with the result that wages are falling in this second phase.

An inspection of the four-equation system immediately indicates the important features of the steady-state to which the system must approach—in either of the completed scenarios, whichever one is the actual solution in view of the parameters. Equation (4) implies that x will settle down only when P/E has returned to its original, "competitive" level. [Equation (3) permits the calculation of the steady-state level of x]. Equation (2) then gives the steady-state price level; so we can calculate the corresponding steady-state exchange-rate level. Then we can use equation (1) to calculate the steady-state level of Q. It is apparent that in this steady state the values of Q, E and P are all equal to their pre-shock steady-state values; it follows that W must also be back at its old steady-state value. Hence the "nominal" prices must ultimately recover to their original levels.

Hence, in the first scenario, which we have just been discussing, the "fluctuation" will not be over until the wage level has fallen to exactly its original level. Possibly the wage will approach this level from above as the stock of customers approaches from above its steady state level, $\bar{x}$. In general, however, there will come a time at which the customer stock attains its steady-state level yet the money wage level is still too high for the simultaneous attainment of the natural level of employment. That is, once x is at $\bar{x}$ we do not see W et the corresponding "full-employment" level, $W(\bar{x})$. If the wage is too high, firms will still be uncompetitive, so that P/E exceeds P* and x will go on falling—a case of overshooting on the part of x—while the continuation of the slump for a while causes W to continue falling until the slump is counteracted by the reduced W and x; but at this point it is quite possible that a new phase will begin since it may be that x, although it will have begun to grow back toward $\bar{x}$, is still too small, making P/E over-competitive and thus causing x to continue rising and generating a boom. Thus, in our completed version of the first scenario (of the two scenarios that are possible), boom is followed by slump, and the slump may be followed by another boom in the familiar damped-oscillatory manner. [4]

The complete version of the second scenario is in most respects a mirror image of the first: the slump of the first phase is followed by a boom in the second, as the shrinking of the customer stock causes the currency to depreciate (*i.e.*, E to rise) which, in this second scenario, causes the price level to be reduced, which has a real-balance effect on employment. Possibly this second phase ends asymptotically as W steadily rises and x declines to their steady-state levels. A damped cycle could occur.

Our informal analysis of the dynamics of the system ends here. At several points the implications of perfect foresight were noted, but they do not dispose of the boom-bust results.

4. There is a sort of Correspondence Principle according to which it would make no sense to study the logical possibility of an explosive oscillation since the equations would cease to apply.

5 The Peculiar Features of Open-Economy Fiscal Theory. A Review

In the diverse body of closed-economy thinking there is, to begin with, the British "Treasury View" circa 1920s—that increased deficit spending simply crowds out domestic investment spending pound for pound, leaving output and employment unaltered. A formalization of this view is contained in James Tobin's dynamic aggregative model (1955), which Thomas Sargent and others revived in the 1970s: the real rate of interest equals the net marginal productivity of capital independently of budgetary stimulus, so the latter is incapable of driving the economy outward along LM, given inflation expectations at any rate. [5] Economists differ in how close they come to this view. Yet it is not the prevailing view.

The prevailing view, of course, is that taken by Keynesian doctrine—or at least by the usual formulations of Keynesian thinking. This view cites the adjustment-cost theory of the "investment demand function", $I(f_K, r)$, in which r is the expected real rate of interest and f_K the expected net marginal product of capital. Then full crowding out, if it occurred at first, would imply a non-negligible increase of r at an unchanged output level; and that effect leads to dishoarding—an upward movement along the LM curve—and hence some increase of output and employment. [6]

Several analyses in the past decade have begun to subject the fiscal tenets of Keynesian doctrine to reexamination. Two contrary lines of thought can be distinguished in the babble of discontent.

Lately there have been theoretical studies of the consequences of the present anticipation of a *future* budgetary stimulus, or what is regarded as a stimulus in Keynesian models. Among several findings one result is particularly arresting: the anticipation of the future stimulus causes present expectations of depressed stock prices or foreign-exchange prices at that future time, which acts to depress stock prices or foreign-exchange prices in the present (as investors seek to escape capital losses) and thus to depress production of capital goods—a contractionary shock to present aggregate demand, in other words—according to models by BLANCHARD [1981] and BURGSTALLER [1980, 1983].

Another contrary view of deficit spending echos the dynamic model created by the late HARROD [1939]. In that model an *increase* of the capital stock generated by private plus public saving pulls down the "required" interest rate at any given output level, as read from the LM curve (in the output-interest plane), *more* than it lowers the real interest rate that firms can afford to pay at the same output level, as read from the IS curve; as a result, output is increased though in smaller proportion than the increase of capital, and the price level and interest rate are both decreased (with the result that employment falls in the constant-shares Cobb-Douglas case). But if the monetary authorities are dedicated to stabilizing the price level or are governed by needs-of-trade thinking, the money supply will be

increased in response, output will rise to its former ratio to capital and consequently employment will be increased as well. [7] It follows that an increased level of deficit spending, which is a *decrease* of public saving, although it may lend an initial boost to employment (through the interest rate, or IS, channel) must eventually make employment *lower* than otherwise by reducing the progress of the capital stock. The discussions by FELDSTEIN [1983] and myself (PHELPS, [1983]) are among the many contemplating this Harrodian theme.

Now the swelling of current and prospective future budgetary deficits and government spending levels have created a testing ground for the effects of Keynesian fiscal stimulus (and structural tax-rate changes). In fact, the very creation of the public expenditure increases coupled with revenue cuts may owe something to the emergence of the so-called supply-side doctrine which counts on the Keynesian effects of fiscal stimulus to buoy employment while the central bank dampens inflation expectations by adopting a policy of price-level stabilization. In any case, employment suffered a major slump. But it is not clear whether that is simply evidence of the low potency of fiscal stimulus – a sign of crowding out – or of its counterproductive effects or none of the above. The questions remain unsettled.

Remarkably, the theoretical underpinnings of the contrary views are quite vulnerable to an "opening" of the economy to foreign capital movements; nor does the Keynesian view generally survive. Disregard the possibility that the government buys only imports; we shall suppose that the government's consumption requires domestic output or domestic resources. Nevertheless, if we want to maintain the traditionally aggregative character of our macroeconomic model – there is a single production process (as if there is one all-purpose product) in the world or else the country is but one small producer of its product in the world market, so that the country's real income is given by an aggregate production function $F(K, N)$ – there is still the problem of "crowding out" brought out by TOBIN [1955]: under perfect competition fiscal stimulus has no "bite" on relative prices, thus no way to drive up the rate of interest and hence raise employment through the Keynesian channel of dishoarding (by moving the economy outward along the LM curve). [8]

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5. A qualification, based on a link from increased public spending through slower capital accumulation to increased inflation, is analyzed by CALVO [1980].

6. Keynes' own 1936 view now appears to have been based on a two-sector C-I model in which the capital-good price P_I is a decreasing function (and the consumer-good price an increasing function) of government spending in the consumer-good sector.

7. Over a broad class of such money supply policy functions the final result is Harrod's warranted growth path in which capital, output, money and employment all grow at the same constant rate. Expositions and extensions of Harrod's model can be found in NELSON [1966] and ROSE [1966].

8. However, the LM curve may be shifted outward if the stimulus is increased public expenditure *and* tax-financed, while shifted inward if the stimulus is a tax cut. A further qualification developed by CALVO [1980] and first studied by KOURI [1976] in an open-economy model states that the stimulus will cumulatively crowd out the stock of capital or wealth the anticipation of which, by engendering expectations of inflation, will cause the current price level to jump up. But it could be that the adopted monetary policy (though not price-level stabilizing) is understood to aim at preventing such induced inflation and thus also its expectation.

In an open economy the problem is not solved by the disaggregative tack of supposing that there are two production functions, one for the consumer good and another for the capital good, in order to argue that increased government spending on the consumer good, would squeeze capital-goods output at given national employment, thus lowering the relative (or real) price of capital, and raising the real rate of return. Nor is it solved by the parallel argument that investment is subject to rising marginal installation cost so that if increased public spending squeezed new investment the real price, and the premium, of *installed* capital would thus be lowered. In these cases and the aggregative case the reason why budgetary stimulus is powerless is the same: it is possible for investment to be *maintained* despite the fiscal stimulus, even at a given level of national employment, simply by *importing* more capital goods or more consumer goods so that the same number of capital goods are purchased and installed at an unchanged real price.

Hence in such open-economy macro models, two-sector or one-sector, fiscal stimulus lacks the power to raise the rate of return to investment and through this Keynesian channel to raise employment. Fiscal stimulus also lacks the unorthodox effects cited earlier: since a fiscal stimulus cannot have current effects on relative prices – hence on current stock prices or exchange rates – the anticipation of a future fiscal stimulus will not have anticipatory Blanchard or Burgstaller effects in the present. In the absence of relative price effects, the world capital market will not be induced to reduce the allocation of new capital to the country when it is applying fiscal stimulus, so there will be no slowing of the capital stock to act as a Harrodian dampener on employment. [9]

Of the two disaggregative models that *do* confer effects upon fiscal stimulus – future or present, unorthodox or Keynesian – one is the model of a nontradable private good developed by SALTER [1959]. It is used to analyse the effects on exchange rates and employment of a budgetary disturbance in a paper by DORNBUSH [1975]. If the government buys more of the nontradable good, production of it is increased since private buyers cannot import it and do not generally accommodate the added government demand with an equal reduction of their own. Hence the money price of tradables must fall, which through arbitrage must lower the exchange rate (cost of foreign exchange) in equal proportion; thus, taking into account the nontradable good's price, the "dollar" price level is increased – a real appreciation of the home currency. In this model, therefore, the *anticipation* of a future fiscal stimulus would prompt an immediate appreciation of the currency. Other effects could be adduced.

Although it has undoubted uses, this model leans too heavily on the premise of a large effect on the relative supply price(s) of the two goods. It is necessary to believe that the production possibility curve is far

9. As noted in an earlier footnote, it might also be the country's monetary policy to offset the cumulative effects of a sustained stimulus via the supply of wealth and income, thus the demand for money, with matching reductions in the supply of money to keep the price and wage level from adopting a rising trend; then there would be no "expected inflation effects" either.

from. That is hard to credit in general, where no uncommon national ressources are involved.

The other disaggregative model in which fiscal stimulus has relative price effects, and thus the possibility of *some* employment effects, is the distinctive model originated by Robert MUNDELL [1963] and Marcus FLEMING [1962). If the government buys more of the national output, which consists of a single and exportable product, the impact of the net increase of domestic absorption, or home demand, given national output, is a rise of the country's export price (in all currencies) since the country through its total export supply possesses some "monopoly power" over the world price of its national product; the resulting tendency toward increased production and upward pressure on the interest rate causes an appreciation of the currency until output, interest rate, and price level have all subsided to their original levels. The end result, then, is a real appreciation and higher "world price" for its export, with the world price of other countries' products unchanged. In this Mundell-Fleming model, therefore, present fiscal stimulus has *no* current effect on employment (though it might raise real income, depending on the price elasticity of world demand for the coutry's exports). But, as Burgstaller showed, the anticipation of a future fiscal stimulus, by engendering expectations of a better exchange rate at that time, prompts an immediate appreciation of the currency in the present which, given nominal wage stickiness, leads via worsened prices to a slump.[10] Further, throwing Burgstaller into reverse gear, wa can see that a present fiscal stimulus believed to be temporary will presumably engenders expectations of a recovery of the temporarily depreciated foreign currencies, which will moderate the home currency's appreciation and thus also moderate the crowding out of exports found when the stimulus is permanent.

This disaggregated model too is of unquestioned applicability. However it seems to place too great a weight on the monopoly power of the home country over its terms of trade to be suited for general use. It is necessary to believe that a contraction of the export supply of British cars or German beer will have an important and *permanent* effect on their world prices. In fact, even the cutback of the oil supply of a large Arab state might prove to have only a temporary effect on the price of oil, however large to begin with, as rival producers sought to capture a greater market share with substitute supplies.

10. The effects in the face of a sticky "real wage", such as might be generated by special choice of parameters in some contract models, would be interesting to examine. But such an analysis cannot be undertaken here.

APPENDIX

First, assume that when γ increases there is, via e, *some* crowding out on impact, i. e., $\frac{d}{d\gamma}\eta(e^{-1})x_0 < 0$. Hence

$$(1) \qquad \frac{d\dot{x}(0)}{d\gamma} < 0 \qquad \text{and, as a corrolary,} \qquad \frac{\partial \dot{x}}{\partial x} < 0$$

since, if x could jump down, $\dot{x}(0)$ would remain equal to zero.

Second, assume that crowding out is *incomplete*, i. e., $d\eta\, x/d\gamma > -1$ since the appreciation $(de/d\gamma < 0)$ reduces the mark up or since, being forseen to be temporary, it raises $\dot{E}/E$ and thus i. Hence

$$(2) \qquad \frac{d\dot{W}(0)}{d\gamma} > 0 \qquad \text{and, as a corrolary,} \qquad \frac{\partial \dot{W}}{\partial x} > 0$$

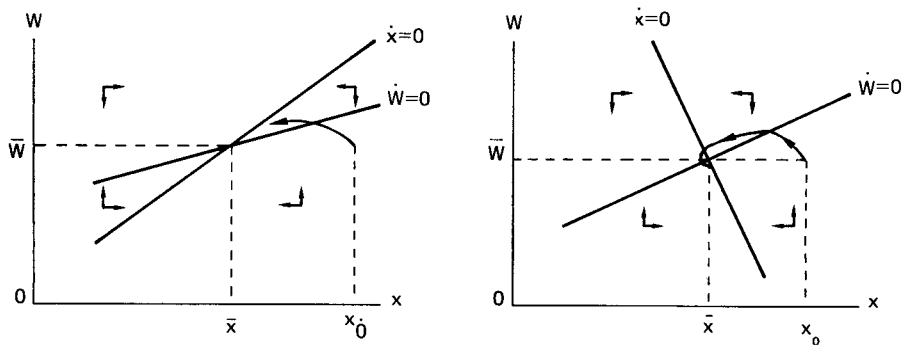
since a rise of x has impact effects via e similar to those of γ.

Finally it is clear that higher W reduces N. Hence

$$(3) \qquad \frac{\partial \dot{W}}{\partial W} < 0.$$

It follows that $(dW/dx)_{\dot{W}=0} > 0$. Then there are only two *convergent* possibilities, shown in Figure 2.

FIGURE 2



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