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**AN EXAMINATION OF THE
"EXPANSIONARY FISCAL CONTRACTION"
HYPOTHESIS**

by
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An Examination of
the "Expansionary Fiscal Contraction" Hypothesis.

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Abstract

It has recently been argued that severe fiscal contractions (perceived to be permanent) can, through their impact on expectations, lead to growth in consumption, investment and employment. Giavazzi and Pagano (1990), who refer to this as "the German view", claim to find supporting evidence from several small open economies. Severe contractions typically occur because adjustment has been delayed due to fear of aggravating unemployment; for this reason we examine the extent to which the processes embodied in the German view can arise in the presence of wage/price rigidities which give rise to unemployment. Our model has many New Classical features however - perfect foresight, perfect capital markets and Ricardian Equivalence - so that expectational effects can be taken fully into account. We examine the impact of temporary and permanent fiscal contractions on consumption, investment, employment and the current account. While we find that both consumption and investment can be stimulated by fiscal contractions under certain circumstances, employment is in all cases likely to fall; this leads us to believe that the German view is overoptimistic. The trade balance in our model is generally found to move in the expected direction.

January 1992

1. Introduction

It has recently been argued that severe fiscal contractions in economies burdened with large foreign debts can, through their impact on expectations, lead to growth in consumption, investment and output. Giavazzi and Pagano (1990), who refer to this as "the German view" of fiscal policy, claim to find evidence of this process in operation in several small open economies. They refer to these as episodes of "expansionary fiscal contraction".

If the hypothesis were correct, it would be heartening for the many developing economies currently undertaking structural adjustment programmes, as well as for those developed economies burdened with foreign debt problems. Giavazzi and Pagano's analysis, however, focuses primarily on the behaviour of consumption, as does the analysis of Bertola and Drazen (1991) that followed; the authors are unjustified then in suggesting that their results imply that the German view (which is concerned with aggregate demand rather than simply with the private consumption component) "has a serious claim to empirical relevance"¹. Such an implication could only be drawn from a fully-specified macro model.

Clearly an intertemporal model would be required to analyse the interactions between fiscal policy, private consumption and output in this context, since the mechanism posited operates through a reduction in the expected future tax burden; Giavazzi and Pagano (GP) argue that this effect will

be stronger the more permanent the fiscal contraction is expected to be, citing evidence that this is implicit in the German view also.

Public sector expenditure is same as private sector future sgs. Taxes.
One approach would be to draw on the results of recent equilibrium models which incorporate these intertemporal and expectational effects. While this literature does indeed suggest that fiscal contractions will have crowding-in effects on private-sector consumption and investment, however, most treatments imply that the latter is affected only by temporary fiscal contractions, in contrast to the German/GP view; see e.g. Aschauer and Greenwood (1985) and Barro (1989). This is so because a temporary contraction which raises disposable income gives rise to a dampened increase in current consumption because of consumption smoothing. Interest rates must therefore fall, and investment rise, for goods market equilibrium to be maintained. When the fiscal contraction is permanent, on the other hand, consumption rises one-for-one with the reduction in government spending, and there are no effects on interest rates or investment². If labour supply is variable, consumption and hours worked move in opposite directions (assuming both consumption and leisure are normal goods)³; infinite-horizon versions of the full market-clearing model do not therefore support the "expansionary fiscal contraction" hypothesis⁴.

This is perhaps not so surprising, since the hypothesis in fact is based on a more Keynesian view of the economy, albeit

one that embodies intertemporal effects not usually associated with this model: specifically, the large reduction in the future tax burden associated with a permanent fiscal contraction is hypothesised to generate such buoyancy in consumption and investment that aggregate demand increases, leading to an upturn in output and employment⁵.

Keynesian elements would also seem to be required if the analysis is to be of any relevance to debt-burdened countries making adjustment decisions, since it is usually the fear of aggravating unemployment that delays adjustment. The wage and price rigidities capable of transforming a debt problem into one of unemployment⁴ therefore we regard as a crucial ingredient in the model⁶.

The present paper is concerned therefore with exploring the intertemporal issues in a Keynesian context. We develop a model capable of taking the expectational effects fully into account - we assume perfect foresight and perfect capital markets, and the model exhibits the Ricardian Equivalence property. It is Keynesian however in the sense that wages and/or prices are not perfectly flexible. Furthermore, since expectations are crucial to the hypothesis being analysed, we explore the workings of the model in circumstances where the rigidities are known to prevail into the future; in other words, we incorporate what Neary and Stiglitz (1983) call "rational constraint expectations".

The model is used to examine the impact of temporary and permanent fiscal contractions on consumption, investment, employment and the current account. While both consumption and investment can be stimulated by fiscal contractions under certain circumstances, employment, we find, is invariably adversely affected.

2. The Model

The model we construct is based on that of Cuddington and Vinals (1986a,b) extended in two minor and in two major ways. The minor ways concern the exchange rate and our modelling of "classical" unemployment; we consider a fixed exchange rate regime, not primarily to differentiate our product from theirs but rather because the hypothesis we examine was explored initially for two EMS countries, Denmark and Ireland. Secondly, in our cost-constrained regime we allow all goods prices to be perfectly flexible, because we think this more adequately captures the way economists perceive the "cost-constrained employment" case⁷. Our more substantive departures from their prototype are that we take investment fully into account, so our results on the current account are more general than those in the earlier literature, and that we assume, as Neary and Stiglitz (1983) do, that constraints inhibiting full employment may apply in the future as well as the present.

Goods Markets

Ours is a two-period two-sector framework. The time periods are subscripted 1 and 2; the sectors are tradeables, t , and

non-tradeables, n . The price of tradeables is determined on world markets by the law of one price ^{PPP}. Under a fixed exchange rate their price is therefore exogenous, and is here set equal to unity. $P_T = 1$. There are no demand-constraints on the tradeable sector. The relative price of non-tradeables, p_n , is determined on domestic markets; this sector can be either demand- or cost-constrained (or in full equilibrium).

The form of the utility function we adopt is dictated by the very simple demand functions to which it gives rise. Consumers are assumed to maximise the log-linear utility function ✓

$$U = [\alpha \ln C_{n1} + (1-\alpha) \ln C_{t1}] + R[\alpha \ln C_{n2} + (1-\alpha) \ln C_{t2}]$$

The time preference rate is set ^{$\frac{r}{1+r}$} equal to the fixed foreign interest rate, which enters the analysis through the assumption of international capital mobility. The interest factor R is one over one plus this foreign interest rate.

Consumers, who are endowed with perfect foresight, maximise utility subject to the intertemporal budget constraint:

$$p_{n1}C_{n1} + C_{t1} + R[p_{n2}C_{n2} + C_{t2}] = p_{n1}Y_{n1} + Y_{t1} + R[p_{n2}Y_{n2} + Y_{t2}] - I - T = A_0$$

I is (net and gross) investment in the economy; we ignore depreciation. Investment undertaken in one period comes on stream in the next, so there is no investment in period two. T is the discounted sum of government tax revenues (it can easily be verified that Ricardian Equivalence holds), and A_0 is a measure of lifetime disposable income⁹.

How much we demand of goods that are not traded. $P^*Q =$ Total spend of $\frac{1}{2}$ d.

The form of the utility function allows us write the private sector demand functions in the following way:

(1)
$$P_{n1}C_{n1} = P_{n2}C_{n2} = [\alpha/(1+R)] A_0$$

$$\text{and } C_{t1} = C_{t2} = [(1-\alpha)/(1+R)] A_0$$

Assuming investment goods to be tradeables, the equilibrium conditions for the non-traded sector are:

$$P_{n1}Y_{n1} = [\alpha/(1+R)] A_0 + P_{n1}G_{n1}$$

$$\text{and } P_{n2}Y_{n2} = [\alpha/(1+R)] A_0 + P_{n2}G_{n2}$$

With government spending only on non-tradeables, the trade balance in each period can be written in the following form⁹:

$$BT_1 = Y_{t1} - I - [(1-\alpha)/(1+R)] A_0$$

$$\text{and } BT_2 = Y_{t2} - [(1-\alpha)/(1+R)] A_0$$

The intertemporal budget constraint for the economy implies that the discounted value of the trade balances in the two periods must sum to zero:

$$BT_1 + R.BT_2 = 0$$

The model can be solved easily by using this equation to write A_0 in terms of tradeables only:

(2)
$$A_0 = [1/(1-\alpha)] [Y_{t1} + RY_{t2} - I]$$
 $A_0(1-\alpha) = Y_{t1} + RY_{t2} - I$

Substituting this expression into the equilibrium conditions for the non-traded goods sector and the equation determining the first-period current account then yields the following equations with which we work for the remainder of the paper:

(3)
$$P_{n1}Y_{n1} = [\alpha/(1+R)(1-\alpha)] [Y_{t1} + RY_{t2} - I(P_{n2})]$$

$$+ P_{n1}G_{n1}$$

(4)
$$P_{n2}Y_{n2} = [\alpha/(1+R)(1-\alpha)] [Y_{t1} + RY_{t2} - I(P_{n2})]$$

$$+ P_{n2}G_{n2}$$

and

$$(5) \text{ BT1} = Y_{t1} - I(P_{n2})$$

$$- [1/(1+R)] [Y_{t1} + RY_{t2} - I(P_{n2})]$$

Factor Markets

Factor markets operate differently depending on whether there is complete price and wage flexibility, or whether there are rigidities present. As the tradeable sector is unconstrained, we will deal first with non-tradeables.

Consider a firm choosing labour inputs in each period, L_{n1} and L_{n2} , and a level of investment $I_n = K_{n2} - K_{n1}$, so as to maximise π_n , the discounted stream of net revenues:

$$\pi_n = P_{n1}Y_{n1} - I_n - b[I_n^2/2K_{n1}] - w_1L_{n1} + R[P_{n2}Y_{n2} - w_2L_{n2}]$$

where $Y_{n1} = F_n(K_{n1}, L_{n1})$ is the firm's constant returns to scale production function, and $bI_n^2/2K_{n1}$ is a capital-adjustment cost term, representing internal marginal adjustment costs which are an increasing function of the firm's investment relative to its capital stock, as is common in the theory of the firm¹⁰.

This yields the following labour-demand and investment functions:

$$(6) \quad F_{Ln1} = w_1/P_{n1}$$

$$(7) \quad F_{Ln2} = w_2/P_{n2}$$

and

$$(8) \quad I_n = K_{n1} [RP_{n2}F_{Kn2} - 1] / b$$

The process above is appropriate as long as the firm can sell as much as it desires to produce at prevailing prices. If goods prices are sticky, however, and demand is less than this amount, the firm must take the demand constraint into consideration in determining its factor demands. Letting N_1 and N_2 be the values of these exogenous levels of aggregate demand in the two periods, the firm now optimises over the Lagrangean:

$$\pi_n + \mu_1[N_1 - Y_{n1}] + R\mu_2[N_{n2} - Y_{n2}]$$

to yield

$$(6') \quad F_{Ln1} = w_1 / (p_{n1} - \mu_1)$$

$$(7') \quad F_{Ln2} = w_2 / (p_{n2} - \mu_2)$$

and

$$(8') \quad I_n = K_{n1} [R p_{n2} F_{Kn2} (1 - \mu_2) - 1] / b$$

Imposition of a demand constraint in any period is seen to reduce labour-demand and raise the capital-labour ratio in that period, and a second-period demand constraint also reduces first-period investment¹¹. Since an increase in aggregate demand relaxes the constraints and reduces the values of the Lagrange multipliers, μ_1 and μ_2 , it is clear that aggregate demand drives factor demands under these (Keynesian) conditions.

The tradeable sector, as already mentioned, is assumed not to experience demand-constraints. Its factor demands are therefore determined throughout by:

$$(9) \quad F_{Lt1} = w_1$$

$$(10) \quad F_{Lt2} = w_2$$

and

$$(11) \quad I_t = K_{t1}[RF_{Kt2} - 1]/b$$

Next we need to specify a wage determination process. In some situations we will be concerned with real wage rigidity, i.e., with the following linearly homogenous function:

$$(12) \quad w_1 = \Phi(p_{n1}, 1)$$

If the rigidity also prevails in period 2 then

$$(13) \quad w_2 = \Phi(p_{n2}, 1)$$

Alternatively, if all wages and prices are perfectly flexible, the wage adjusts to clear the labour market and full employment prevails, in which case:

$$(14) \quad L_{t2}(w_2) + L_{n2}(w_2/p_{n2}) = L$$

where the supply of labour, on the right hand side, is assumed fixed.

Finally, note that in the presence of adjustment costs aggregate investment is defined as

$$I = I_n + b(I_n^2/2K_{n1}) + I_t + b(I_t^2/2K_{t1})$$

3. The Demand-Constrained Case

Employment and non-tradeable production will be demand-constrained in period 1, as represented by equations (6')-(8'), if the nominal wage and the price level p_{n1} are stuck at too high a level, so that workers cannot find as much work as they desire and non-tradeable firms cannot sell as much output as they desire at these disequilibrium prices. We hold w_1 and

p_{n1} fixed when this case is being analysed. Similarly, if the economy is demand-constrained in period 2, w_2 and p_{n2} are held fixed at their first-period levels.

A temporary fiscal contraction (targeted on non-tradeables, as in all our experiments) in this case reduces employment and output still further, through its impact on aggregate demand. Private-sector consumption is unchanged, however, because the effect on discounted wealth of the fall in production just offsets that of the fall in discounted taxation¹².

Investment is unaffected because the temporary policy has no effect on period 2 ("the future")¹³. With neither saving nor investment affected, it is clear that there is no impact on the trade balance either.

Representing a temporary change by dG_{n1} we find :

$$\begin{aligned} dY_{n1}/dG_{n1} &= 1 \\ (15) \quad dY_{n2}/dG_{n1} &= 0 \\ dBT1/dG_{n1} &= 0 \end{aligned}$$

We may note in passing that a comparison of these results and others in the paper with those of Cuddington and Vinals (1986a) who analyse a flexible exchange rate regime validates the Mundell-Fleming conclusion that fiscal policy is more potent under fixed exchange rates.

Now consider the case of a permanent fiscal contraction:

$dG_{n1}=dG_{n2}=dG_p$. Giavazzi and Pagano argued that this was a crucial element in the alleged successes of the fiscal contractions they studied. The present model provides no support for this however. If the rigidities generating current unemployment are expected to prevail into the future, then a permanent contraction through its demand-effects obviously reduces both current and future output.

If there were no investment effects, private-sector consumption and the current account would again be unchanged. In the present case, however, investment is affected - adversely. While there is no impact on investment in tradeables (since output and employment in that sector depend only on the unchanged relative price), investment and second-period production in the non-tradeable sector decline.

The decline in investment leaves more to be spent on all consumption goods [the fall in taxes and in spending on investment dominating the impact of reduced pre-tax income; see equation (2)] - fiscal contraction has an expansionary effect on consumption in this case. It is clear from equation (5), however, that the impact of the reduced investment dominates the movement in the trade balance, generating the conventional result that a fiscal contraction improves the current account:

$$dBT1/dG_p < 0$$

It can be noted, furthermore, that since consumption rises in



the present case the aggregate demand effects of a permanent change in fiscal policy are more moderate than those of a temporary change¹⁴, i.e.

$$0 < dY_{n1}/dG_p = dY_{n2}/dG_p < 1$$

In terms of the impact on output, employment, investment and consumption, to conclude, it is only on the latter that the fiscal contraction has an expansionary effect.

The question that must now be asked is how the analysis is affected if the private sector expects that the rigidities generating current unemployment are likely to dissipate in the future, allowing full employment to emerge.

The effects of temporary policies are the same as before, since they have no impact on the second period (which thus has no feedback effects on period one). This is not so for permanent policies however. The possibility that they generate a perverse current account effect now arises, since total investment can move in either direction (a change in second-period relative prices drives investment in the two sectors in opposite directions). The effect on total investment is found from equations (7), (8), (10), (11) and (14), from which we find dI/dp_{n2} to be positively related to the difference between the (absolute values of the) elasticities of labour demand in the tradeable and non-tradeable sectors:

$$(16) \quad \text{Sign } dI/dp_{n2} = \text{Sign } [\varepsilon(L_{t1}; 1/w_1) - \varepsilon(L_{n1}; p_{n1}/w_1)]$$

+

There is a presumption in general that this difference is negative, because services comprise a large proportion of non-tradeables. If this is so then in the full employment case $dI/dp_{n2} < 0$; (a high elasticity of labour demand in non-tradeables means that a change in p_{n2} has a strong effect on wages, which is the mechanism by which the traded sector is squeezed.)

A permanent fiscal contraction in this case would raise total investment as well as consumption. It would nevertheless be contractionary in its effects on current output and employment, and should be observed to have a perverse effect on the current-account deficit.

4. The Cost-Constrained Case

We now move on to the case where the unemployment problem is due to excessive costs rather than to aggregate demand-deficiency. In this section goods prices are perfectly flexible but real wages are rigid at too high a level for full employment to prevail; government policies affect employment in this case by changing the relative price of tradeables and non-tradeables, thus inducing an expansion of one sector at the expense of the other.

Fiscal contractions, whether temporary or permanent, reduce the relative price of non-tradeables in the current period; this sector then contracts while the tradeable sector, faced with lower wage costs, expands. The effect on aggregate

employment therefore depends on various characteristics of the two sectors. Total employment in period one moves in the same direction as p_{n1} or in the opposite direction depending on whether the following condition is met or violated:

(17)

$$\left[\varepsilon(L_{n1}; p_{n1}/w_1) / \varepsilon(L_{t1}; 1/w_1) \right] \left[\varepsilon(p_{t1}w_1; p_{t1}) / \varepsilon(w_1; p_{n1}) \right] \left[L_{n1}/L_{t1} \right] > 1$$

The functions on the left-hand side are the elasticities of sectoral labour demands and of wage demands. Total employment is therefore more likely to fall in response to a reduced demand for non-tradeables, the greater is the elasticity of labour demand and the initial level of employment in that sector, and the lower the influence of non-tradeable goods prices on the nominal wage, the latter obviously being related to the share of these goods in private consumption. This is a standard condition in the literature¹⁵, and is usually considered to hold.

If we adopt this assumption then, fiscal contraction reduces employment in the cost-constrained economy as well as in the demand-constrained one. A permanent contraction again has weaker effects on current unemployment than a temporary one (because it has weaker effects on p_{n1} due to its greater crowding-in of consumption), but the effects are nonetheless negative.

We can solve for the effects of fiscal changes on p_{n1} and p_{n2} from equations (3) and (4), noting that in the present case Y_{n1}

and Y_{t1} are functions, on the supply side, only of p_{n1} , while Y_{t2} , Y_{n2} and I are functions only of p_{n2} . Since these equations determine the qualitative impact of shocks on prices regardless of whether or not full employment is expected to prevail in period 2, the only variables qualitatively affected by period-two conditions are employment itself and investment.

The price-effects are:

$$dp_{n1}/dG_{n1} = \Theta\Omega^{-1} > 0$$

$$dp_{n2}/dG_{n1} = \Theta_{p_{n1}}[\alpha/(1+R)(1-\alpha)]dY_{t1}/dp_{n1} < 0$$

where Ω and Θ are both positive. (Their values are given in the Appendix).

$$dp_{n1}/dG_p = \Theta_{p_{n1}}[(Y_{n2}-G_{n2}) + p_{n2}(dY_{n2}/dp_{n2})]$$

$$\text{implying: } 0 < dp_{n1}/dG_p < dp_{n1}/dG_{n1}$$

$$dp_{n2}/dG_p = \Theta_{p_{n2}}[(Y_{n1}-G_{n1}) + p_{n1}(dY_{n1}/dp_{n1})] > 0$$

Even a temporary contraction in this cost-constrained case has effects on the second-period equilibrium, because its (positive) impact on consumer spending is spread across periods. (Recall that a temporary contraction in the demand-constrained case had no impact on consumer spending.) The relative price of non-tradeables in the second-period is increased, and this in turn affects investment and, when variable, employment.

We will return to these effects in a moment, but for now can note that the temporary contraction raises private-sector

wealth and therefore spending. No matter what the effect on aggregate investment, however, the increased level of production of tradeables in the first period dominates on the current account, leading to the standard result of a trade surplus.

If full employment prevails in the second period (because the labour market becomes more flexible over time) then the only employment effects are those that arise in the first period and, as we have seen, these are likely to be negative. Furthermore, we have argued that in this case there is likely to be a negative relationship between aggregate investment and P_{n2} , so the temporary contraction also reduces total investment.

The situation is somewhat different if the labour market rigidity prevails into the future, since the first and second period employment effects now move in opposite directions. The first one is larger in size however, since the temporary contraction's impact on first period prices is larger than its effect on the second period, and the employment effect in each period is driven solely by relative prices in that period. The impact of the contraction on total investment may be reversed, however, under a long-run labour-market rigidity. To see this, note from (7), (8), (10), (11) and (13) that the sign of dI/dp_{n2} in the present case is determined by

$$[\varepsilon(p_{t2}w_2; p_{t2})/\varepsilon(w_2; p_{n2})][L_{n1}/L_{t1}][p_{t1}/p_{n1}] - 1$$

The intuition here is as follows. For a temporary fiscal

contraction p_{n2} rises; the smaller the effect this has on wages the less the crowding-out of investment in tradeables and the greater the crowding-in of investment in non-tradeables.

Comparing this to conditions (16) and (17) we see that it is in the spirit of our earlier assumptions to imagine that this condition will be satisfied. If so, then a change in p_{n2} has qualitatively opposite effects on total investment depending on whether the economy is expected to reach full employment or to remain cost constrained within the time horizon under consideration.

What of the effects of a permanent fiscal contraction in the cost-constrained economy? Consumption now rises more strongly than was the case for the temporary contraction. Employment is again likely to fall in the first period, and also in the second if the wage rigidities persist. Comparing this to the temporary contraction case we saw that that raised future employment while worsening the current situation. It appears then that in the cost-constrained economy permanent fiscal contractions produce more unemployment (netted across periods) than temporary ones, the opposite of the Giavazzi-Pagano hypothesis.

The smaller expansion in the output of tradeables (as compared to the temporary contraction case above) alongside an even larger increase in consumption and the ambiguous effects on investment make the present trade-balance effect ambiguous. On

the basis of the elasticities conditions discussed earlier, investment seems likely to rise in response to a permanent fiscal contraction if full employment prevails in the second period - making a trade deficit in period one the likely outcome, while a decline in investment and a trade surplus are more likely if the wage rigidities are persistent.

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5. Summary and Conclusions

This paper has examined, on a theoretical level, the possibility that permanent fiscal contractions through their intertemporal effects can raise consumption, investment and employment. We considered cases in which economies were either demand- or cost-constrained in the first period, while in the second period these constraints could either remain or dissipate; this yields four combinations in all.

We summarise the effects of temporary (T) and permanent (P) fiscal contractions in these four cases in Table 1. (DC refers to demand-constrained, CC to cost-constrained, and FE represents full employment). A negative sign indicates a fall, a zero indicates no change, inequalities refer to the absolute values of the multipliers, and a sign followed by a question mark indicates an ambiguous result but one which can be signed under the various assumptions made in the text.

Period 1:	DC		DC		CC		CC	
	T	P	T	P	T	P	T	P
Y_{n1}	- >	-	- >	-	- >	-	- >	-
Y_{t1}	0	0	0	0	+ >	+	+ >	+
C	0	+	0	+	+ <	+	+ <	+
I	0	-	0	+?	+?	-?	-?	+?
L_1	- >	-	- >	-	-?>	-?	-?>	-?
BT1	0	+	0	-?	+	+?	+	-?
Y_{n2}	0	-	0	-	+	-	+	-
Y_{t2}	0	0	0	+	-	+	-	+
L_2	0	-	0	0	+?>	-?	0	0

Period 2: DC FE CC FE

Table 1: The Effects of Temporary and Permanent Fiscal Contractions Under Various Conditions

The general picture that emerges from Table 1 is that fiscal contractions (under the strong consumption-smoothing possibilities allowed here) typically raise private sector consumption.

Effects on investment and the trade balance depend strongly on the circumstances under which the contractions take place. We identify three cases under which both consumption and investment are likely to be stimulated: these investment effects can be understood as follows. Permanent fiscal contractions put downward pressure on the relative price of non-tradeables in period 2; if this sector's elasticity of labour-demand is high, it can be expected to release a large amount of labour, and, in the absence of wage or price rigidities, this implies a strong boost to tradeable-sector profitability and growth, raising the total investment rate in the economy. The other circumstance in which total investment is likely to rise is when the economy is cost constrained in

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both periods, and a temporary fiscal contraction occurs. Since this raises consumption, it puts upward pressure on the price of non-tradeables in the second period and stimulates investment in that sector. If the price movement does not have a strong effect on wage demands then the effect on the traded sector is small, and aggregate investment again increases. In all other cases however, investment effects are likely to be zero or negative.

Effects on consumption and investment notwithstanding, fiscal contractions in all cases are likely to reduce employment; this is one of the most robust results of the paper. Furthermore, when the rigidities generating unemployment are persistent, permanent contractions have more adverse effects on employment (netted across periods) than temporary ones, in contrast to the hypothesis being examined. These results suggest, unfortunately, that there is no easy solution to the trade-offs traditionally thought to confront policymakers in debt-burdened economies. The German view appears overoptimistic¹⁶.

In our model it transpires that the New Classical elements - intertemporal optimisation, perfect capital markets and Ricardian Equivalence - drive consumption, so that it does indeed rise in response to fiscal contraction. The Keynesian elements of the model however determine the response of employment, which therefore operates in the conventional direction.

Finally, we see that the impact on the trade balance is also usually in the expected direction - fiscal contractions raise the trade surplus. The possibility of perverse effects arises only in a subset of the cases in which the possibility of an increase in investment cannot be ruled out.

APPENDIX

Results are evaluated for $p_{n1}=p_{n2}$ at the initial equilibrium.

Model 1: Demand-constrained in both periods

In this case both p_{n1} and p_{n2} are fixed, and Y_{n1} and Y_{n2} are demand determined.

$$\begin{aligned} dY_{n1}/dG_{n1} &= 1 & dY_{n2}/dG_{n1} &= 0 \\ dA_0/dG_{n1} &= 0 & dBT1/dG_{n1} &= 0 \end{aligned}$$

$$0 < dY_{n1}/dG_p = dY_{n2}/dG_p = p_{n1}p_{n2}/D < 1$$

$$dA_0/dG_p = -D^{-1}[(1/(1-\alpha))][dI_n/dY_{n2}][1+(bI_n/2K_{n1})]p_{n1}p_{n2} < 0$$

$$dBT1/dG_p = -[R/(1+R)](dI_n/dG_p)[1+(bI_n/2K_{n1})] < 0$$

$$\text{where } D = p_{n1}[p_{n2} + \{\alpha/(1+R)(1-\alpha)\}\{dI_n/dY_{n2}\}\{1+(bI_n/2K_{n1})\}] > 0$$

Model 2: Demand-constrained in the first period; full employment in the second

In this case p_{n1} is fixed, p_{n2} is flexible, Y_{n1} is demand-determined, and Y_{n2} , Y_{t2} , I_n , and I_t are functions only of p_{n2} .

$$dY_{n1}/dG_{n1} = 1 \quad dY_{n2}/dG_{n1} = 0 = dp_{n2}/dG_{n1}$$

$$dA_0/dG_{n1} = 0 \quad dBT1/dG_{n1} = 0$$

$$0 < dY_{n1}/dG_p = \Omega p_{n1}[(Y_{n2}-G_{n2}) + p_{n2}(dY_{n2}/dp_{n2})] < 1$$

$$dp_{n2}/dG_p = \Omega p_{n1}p_{n2} > 0$$

$$\text{where } \Omega^{-1} = p_{n1}[(Y_{n2}-G_{n2}) + p_{n2}(dY_{n2}/dp_{n2})]$$

$$- \{ (R\alpha) / (1+R)(1-\alpha) \} F_{Lt2} dL_{t2}/dp_{n2}$$

$$+ \{ (\alpha) / (1+R)(1-\alpha) \} \{ dI_n/dp_{n2} \} \{ 1+(bI_n/2K_{n1}) \} > 0$$

$$dA_0/dG_p = p_{n1}p_{n2}[(1/(1-\alpha)) [RF_{Lt2}(dL_{t2}/dG_p) - (dI_n/dG_p)\{1+(bI_n/2K_{n1})\}]] < 0$$

$$dBT1/dG_p = - dI/dG_p - [(1/(1+R)) [RF_{Lt2}(dL_{t2}/dG_p) - (dI_n/dG_p)\{1+(bI_n/2K_{n1})\}]]$$

A sufficient condition for this to be positive is given in the text.

$$\begin{aligned} dI/dp_{n2} &= [Rw_1L_{n1}L_{t1}][\{\varepsilon(L_{t1};w_1)/p_{n1}\}\{1+(bI_n/2K_{n1})\}] \\ &- \{\varepsilon(L_{n1};w_1/p_{n1})/p_{t1}\}\{1+(bI_t/2K_{t1})\} / \\ &\{p_{n1}L_{n1}\varepsilon(L_{n1};w_1/p_{n1}) + L_{t1}\varepsilon(L_{t1};w_1)\} b p_{n1} \end{aligned}$$

The condition for this to be negative is given in the text.

Model 3. Cost-constrained Case

$$dA_0/dG_{n1} = (1/1-\alpha)\Theta(dY_{t1}/dp_{n1})P_{n1}\{(Y_{n2}-G_{n2}) + P_{n2}(dY_{n2}/dp_{n2})\}$$

$$< 0$$

$$dBT1/dG_{n1} =$$

$$\begin{aligned} & [(R)/(1+R)] [\Theta(dY_{t1}/dp_{n1})P_{n1}\{(Y_{n2}-G_{n2}) + P_{n2}(dY_{n2}/dp_{n2}) - \\ & \quad [(R\alpha)/(1+R)(1-\alpha)] [dY_{t2}/dp_{n2}] \} - \\ & \quad (dY_{t2}/dp_{n2})(dp_{n2}/dG_{n1})] \end{aligned}$$

$$< 0$$

$$\text{where } \Theta^{-1} = \{(Y_{n1}-G_{n1}) + P_{n1}(dY_{n1}/dp_{n1})\} (\Omega^{-1}/P_{n1})$$

$$- \{(\alpha)/(1+R)(1-\alpha)\} (dY_{t1}/dp_{n1}) \{(Y_{n2}-G_{n2}) + P_{n2}(dY_{n2}/dp_{n2})\} > 0$$

$$dp_{n1}/dG_{n1} > 0; dp_{n2}/dG_{n1} < 0$$

With full employment in the second period dI/dp_{n2} is as given in model 2 above. Alternatively, with a real wage rigidity prevailing into the second period, we have:

$$\begin{aligned} dI/dp_{n2} = & [RW_1] [\{\varepsilon(w_2; p_{t2})L_{n1}/p_{n1}\} \{1+(bI_n/2K_{n1})\} \\ & - \{\varepsilon(w_2; p_{n2})L_{t1}/p_{t1}\} \{1+(bI_t/2K_{t1})\}] / bp_{n1} \end{aligned}$$

The condition for this to be positive is given in the text.

$$\begin{aligned} dA_0/dG_p = & [(1/(1-\alpha))\Theta[(dY_{t1}/dp_{n1})P_{n1}\{(Y_{n2}-G_{n2}) + P_{n2}(dY_{n2}/dp_{n2})\} \\ & + \{(RF_{Lt2}dL_{t2}/dp_{n2}) - (dI_n/dp_{n2}) \{1+(bI_n/2K_{n1})\}\} \\ & \quad P_{n2}\{Y_{n1}-G_{n1} + P_{n1}(dY_{n1}/dp_{n1})\}] \end{aligned}$$

$$< 0$$

$$(- dA_0/dG_p > - dA_0/dG_{n1})$$

$$dBT1/dG_p =$$

$$\begin{aligned} & [(R)/(1+R)] [\Theta(dY_{t1}/dp_{n1})P_{n1}\{(Y_{n2}-G_{n2}) + P_{n2}(dY_{n2}/dp_{n2})\} \\ & \quad - \Theta(dY_{t2}/dp_{n2})P_{n2}\{(Y_{n1}-G_{n1}) + P_{n1}(dY_{n1}/dp_{n1})\} \\ & \quad - (dp_{n2}/dG_p)(dI/dp_{n2})] \end{aligned}$$

Factors influencing the sign of this term are discussed in the text.

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1. Blanchard (1990) and Drazen (1990) also extrapolate from Giavazzi and Pagano's analysis to suggest that fiscal contraction in these cases raised investment, aggregate demand and output.
2. The more open the economy, the greater the extent to which these interest rate and investment effects are replaced by movements in the trade balance.
3. If interest rates are determined abroad the impact of this reduced labour supply on the marginal product of capital means that investment must fall in response to a fiscal contraction, again in contrast to the "expansionary fiscal contraction" hypothesis; see Barry (1992).
4. Dropping the infinite horizon, however, as in Blanchard's (1985) overlapping-generations model, produces results consistent with some of the hypothesised expansionary effects, as does Barry's (1987) OLG model of a cost-constrained economy.
5. For more on the German view see Fels and Froehlich (1986) and Hellwig and Neumann (1987).
6. In the two cases analysed by Giavazzi and Pagano (1990) - Denmark and Ireland - the unemployment problem was already severe when the fiscal retrenchment occurred. The Danish fiscal adjustment took place in 1982 when its unemployment rate stood at 11%, compared to an OECD average of 8%. Irish unemployment was 17.6%, compared to an OECD average of 7.5%, when its fiscal adjustment took place in 1987. (Source: OECD

Labour Force Statistics, 1969-89).

7. In the cost-constrained case analysed by Cuddington and Vinals (1986b) consumers are rationed on goods markets.
8. The reader might wonder why our "debt-burdened economy" has no initial foreign debt! The answer is that the assumption of an initial debt of b_0 at the world interest rate r^* would simply add a constant term $-(1+r^*)b_0$ to the intertemporal budget constraint, to the first period current account, and to our final expression for A_0 ; this constant term would not of course affect the workings of the model. This strengthens our argument that the modelling of such economies should take the associated unemployment problems into account explicitly.
9. The first period trade balance and the current account are synonymous in our model since initial debt is zero.
10. This formulation is equivalent to Tobin's q theory of investment; see e.g. Hayashi (1982)
11. A first-period constraint has no effect on investment unless it affects second-period conditions.
12. This is a standard result in these types of models; see e.g. the discussion in Moore (1989). It generates the balanced budget multiplier of unity seen in the text.
13. If full employment is expected to prevail in the second period p_{n2} must be flexible. From the non-traded market equilibrium condition however it is clear that this is affected only by G_{n2} . If the second period were instead expected to be demand constrained, the first period shock would still have no effect since discounted after-tax wealth is unchanged.
14. The reduced demand for investment goods, since they are tradeable, does not affect current employment or output.
15. See Barry (1987) and the references cited there.
16. For an interpretation of Ireland's economic recovery alternative to the "German view" espoused by Giavazzi and Pagano see Barry (1991).