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Expansionary Fiscal Contractions? Evidence from Panel Data

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Abstract

We examine the ability of the Expansionary Fiscal Contraction (EFC) hypothesis to explain the performance of of OECD economies during times of crisis. We find some limited evidence in its favour: if public consumption is reduced in response to a fiscal crisis (as defined by a high level of debt), private consumption does seem to increase. However the size of the effect is smaller than that typically found in similar studies. Furthermore, the increase in private consumption is not usually sufficient to offset the direct effect of a reduction in the public consumption on output– fiscal contractions are not literally expansionary.

JEL Classification: E21, E62

Keywords: Consumption; Saving; Fiscal Policy.

1 Introduction

The effect of large fiscal adjustments has become one of the most important themes in recent macroeconomic debates worldwide. In Europe, the Maastricht treaty envisages explicit targets for public debt and deficits. In the US, there is much discussion of the large (implicit) national debt represented by the obligations of the social security system to future retirees.

Orthodox Keynesian economics would suggest that any reduction in the budget deficit should lead to a decline in economic activity. However, several different theories have been advanced to explain how fiscal contractions may in fact be expansionary. The first, which Giavazzi and Pagano (1990) call the "German view" of fiscal policy, suggests that reductions in government spending can be expansionary due to their effects on private sector expectations concerning taxation. If forward-looking consumers and investors anticipate long-run tax reductions because of cuts in expenditure, then they may increase expenditure now and so offset the demand-side effects of the fiscal contraction. Blanchard (1990) and Bertola and Drazen (1993) proposed an extension to the basic EFC hypothesis: if tax increases unexpectedly stabilize debt now and thus avoid a later, more painful, stabilization involving larger increases, then the change in expectations could prove expansionary. Both models imply that such an outcome is most likely to be seen when economies

are "close to the edge" with high debt-GDP ratios.

Alesina and Perotti (1995, 1997) propose a further refinement of the EFC hypothesis. In a study of a wide range of fiscal adjustment experiences, they find that the adjustment programs most likely to succeed in stabilizing debt levels are those which cut expenditure as opposed to those which focus on raising taxes. They indicate that expenditure reduction programs succeed not because they reduce deficits by more but rather because they lead to higher growth.

The principal econometric evidence that has been put forward in support of these theories has taken the form of consumption (or savings) function analyses. Giavazzi and Pagano (1990) suggest that the Irish and Danish stabilization were associated with large positive residuals from estimated consumption and investment functions. Giavazzi and Pagano (1996) and Giavazzi et. al. (2000) perform multi-country analyses of consumption/savings to show that, if fiscal actions are large and persistent, then fiscal policy will have non-Keynesian effects on consumption. Perotti (1999) also argues that a consolidation is more likely to be expansionary if the public debt is high or growing rapidly.

Most the theories of EFC concentrate on explaining why consumption might increase in response to a fiscal contraction. It is important to note that this need not imply that *output* rises in response to the fiscal contrac-

tion. So for example, following a cut in government consumption, private consumption may rise due to some EFC mechanism. But it is quite possible, indeed likely, that this consumption effect is not large enough to offset the direct effect of the cut in government consumption so that output still falls.

In this paper we make two points. Firstly, usual panel data techniques such as fixed effects may not be appropriate tools with which to examine the EFC hypothesis. Pesaran and Smith. (1995) show that the fixed effects estimator will indeed be inconsistent when applied to dynamic panel data models in the presence of heterogeneity in slope coefficients and serially correlated regressors. Both characteristics are likely to be present in cross country models of savings or consumption. Pesaran et. al. (1996) suggest an alternative estimator which is consistent in such circumstances. When we apply this estimator to estimate the OECD consumption function we find that the size of the EFC effects are smaller than those found previously.

Our second point is more straight-forward. No matter how the EFC effect is measured the direct effect of a reduced deficit on consumption, even if positive, is typically not enough to offset the direct effect of the deficit reduction on GDP. Thus fiscal contractions are not literally expansionary.

2 Fiscal Policy and Consumption

Before proceeding, we briefly review what the various theories predict will be the effect of fiscal policy on consumption.[1] Broadly speaking the effects of net taxes (NT) and government consumption (G) on Consumption (C) will depend on the planning horizon of households and their expectations. In a fully specified model of infinitely lived agents (or dynastic households with bequests) fiscal policy will have no effect on national savings. Any change in the government's surplus will simply crowd out the consumption of private agents who know that increases in the surplus today facilitate decreases in the surplus at some point in the future.[2] This is the well known case of Ricardian Equivalence.

In finite horizon models (e.g. Over-Lapping Generation models without bequests) an increase in taxation will reduce the life time income of the current generation leading to a reduction in private savings and consumption. In the special case of the simplest Keynesian model, changes in the government surplus will have no effect on private consumption once we control for disposable income.

There is a third set of models (for convenience referred to as Expecta-

[1] For a comprehensive review of impact of fiscal policy on savings in different models, see Giavazzi et. al. (2000).

[2] This is true to a first approximation, fiscal policy can still have an effect if taxes are distortionary or if public consumption is complementary to private consumption.

tions Models) which predict that fiscal policy can have perverse (perhaps non-linear) effects on national savings. It is these models that provide the theoretical rationale for EFC hypothesis. For example if the current fiscal deficit is unsustainable, savings (consumption) may be very high (low) in anticipation of a looming financial crisis which would lead to a decline in real living standards. In this scenario any decrease in the deficit to an extent sufficient to assure private agents that a crisis has been averted, may cause them to reduce savings and increase consumption. Thus the effect of fiscal policy on consumption could reverse sign in times of financial crisis. The exact definition of financial crisis varies from model to model. For example, Blanchard (1990) thinks of a crisis occurring when Debt-GDP reaches a critical level. Alesina and Perotti (1997) think of a crisis being signaled by large changes in the deficit. Bertola and Drazen (1993) think of government expenditure following a stochastic process with discrete changes occurring when it reaches certain "trigger points". Thus if we find evidence that sign of the effect of fiscal policy does reverse, then we will have evidence of the existence of this mechanism for EFC.

However it is important to note that the presence of a EFC effect for consumption (or savings) does not necessarily imply that a fiscal contraction will lead to an expansion of output i.e. that fiscal contractions are literally expansionary. In order for a fiscal consolidation to increase output the effect on

consumption (savings) must not only be positive (negative), but sufficiently large so as to dominate the direct effect of the contraction on GDP. To be clear, let θ be the direct effect of government consumption (G) on private consumption (C) in (1) and let γ be the direct effect of net taxes (NT), once disposable income is controlled for.

$$C = \alpha + \beta(Y - NT) + \gamma NT + \theta G \tag{1}$$

In a traditional Keynesian model we would expect $\theta = \gamma = 0$ i.e. once we control for disposable income, fiscal policy has no effect on private consumption. In most empirical models where evidence of EFC is found, the estimates of θ fall in the range $-1 < \theta < 0$ generating the well known perverse effect of G on C. However in order to have a fiscal contraction that actually leads to an expansion in output we must have $\theta < -1$.[3] It is worth noting that none of the non-Keynesian effects of G on C identified by Giavazzi et. al. (2000) are large enough to generate a negative output multiplier. In fact the term "Expansionary Fiscal Contraction" seems to have come to refer to the effect on consumption rather than the net effect on output.

[3] If $Y = C + I + G$ then $dY = \frac{1+\theta}{1-\beta} dG + \frac{\gamma-\beta}{1-\beta} dNT$

3 Econometric Evidence

In this sections we estimate consumption functions for 18 OECD countries using data from *OECD Economic Outlook* CD ROM. Our specification nests the three sets of models discussed above and is similar to that employed elsewhere in the literature.[4] Table 1 reports the exact series used and the transformations of the data. The country specific samples used are as in Giavazzi et. al. (2000) but with end date extended to 1999.[5] Note that the variables are not in logs in order to facilitate direct calculation of the multiplier. Instead all the variables are scaled by potential GDP.[6]

We estimate a dynamic version of (1) with interactions added to capture the possibility of non-linear effects. This specification nests the traditional Keynesian view that consumption is purely a function of disposable income. We follow the recent literature and allow for possibly nonlinear effects of fiscal policy by interacting the fiscal variables with various other variables that capture the potential for non-linear effects during times of crisis.

The usual approach to estimation in this context is to pool the data

[4]See Giavazzi and Pagano (1996), Giavazzi et. al. (2000) and Perrotti (1999) for examples.

[5]We had to drop the United Kingdom due to the absence of data on the government surplus before 1987. This is curious as such data appears to have been available in previous versions of Economic Outlook such as that used by Giavazzi et. al. (2000).

[6]Potential GDP is defined as GDP passed through a Holdrick-Prescott Filter. Giavazzi et. al. (2000) used the OECD's potential ouput series, which is virtually indistinguishable from ours but available for a shorter period.

across countries and apply a fixed effects estimator. However this approach may be inappropriate because of institutional differences across countries not captured by fixed effects. There is no reason to expect that the effect of fiscal policy on savings should be the same or even similar in different countries. Pesaran and Smith (1995) formalize this intuition to show that the fixed effects estimator will be inconsistent in dynamic panels with serially correlated regressors and heterogeneous slope coefficients. The problem arises because, when the regressors are serially correlated, incorrectly imposing homogenous slope coefficients induces serial correlation in the residuals which in turn leads to inconsistent estimates of dynamic models for the usual reason. This inconsistency would disappear if one of the following held: i) there was no lagged dependent variable (so that serial correlation in residuals matters only for efficiency not for consistency); ii) there was no serial correlation in the regressors; iii) the slope coefficients are the same for all countries. It seems unlikely that either of the first two conditions hold in the present application. The third condition is more plausible and is implicitly assumed by most of the rest of the literature. However, we believe that it is probably unreasonable to assume that the dynamic adjustment of consumption or savings is the same across countries. Therefore we use the Mean Group estimator, the estimator proposed by Pesaran and Smith (1995) and shown by them to be consistent

but less efficient than the fixed effects estimator.[7]

Table 2 shows the results.[8] The first column reports the results of the fixed effect estimation of the basic regression without any interaction effects. The second column reports the mean group estimates of the same regression.[9] A quick glance at the coefficients suggests that the two procedures seem to produce statistically different estimates. Most obviously the autoregressive component of consumption is much lower in the MG case. This will imply that the dynamic effects of fiscal policy will be very different than suggested by the fixed effects estimator. A formal Hausman type test of the null that both estimates are the same leads to rejection at all usual significance levels.[10] Thus we conclude that the fixed effects estimator is inconsistent.

Concentrating on the consistent mean group estimator in column two, we notice that the estimated effects of fiscal policy appear to be non-Keynesian. We look first at the effect of changes in net taxes. The impact effect of

[7]Peseran et. al. (1996) provide formulae for the asymptotic distribution of the mean group estimator and conduct monte carlo simlulations of it against the more usual fixed effects estimator.

[8]Q-tests indicate that Consumption is an AR(2) and all other series can be modeled as AR(1) so two lags of consumption and a single lag of other variables should be sufficient to capture the dynamics of the system

[9]We also estimated the savings function instrumenting using lagged values of the variables and a measure of the cyclically adjusted fiscal surplus calculated by the OECD. The resulting point estimates were similar to those presented in table 2. Furthermore as in Giavazzi and Pagano (1996) the estimates are not very robust to alternative sets of instruments. Therefore we do not report the results of the IV estimation.

[10]Peseran et al. (1996) show that if $H_0 : \beta_{MG} - \beta_{FE} = 0$
the test statistic $h = (\beta_{MG} - \beta_{FE})'(V_{MG} - V_{FE})^{-1}(\beta_{MG} - \beta_{FE})$ is distributed as $\varkappa^2$ with $k+1$ degrees of freedom. In this case $h = 41.53$ with $k = 8$ generating a $p-value < 0.005$.

an increase in taxation is to cause an increase in consumption, controlling for changes in disposable income. This behaviour is consistent with agents taking a forward looking perspective – tax increases today facilitate future reductions. It is thus broadly consistent with the EFC hypothesis even though we have made no distinction between normal times and periods of crisis. Note also that the long run effect of taxation on consumption, $(0.44 - 0.11 - (0.39 - 0.15))/(1 - 0.67 + 0.11) = 0.20$, is positive and significant.[11]

Next we turn to the effect of government consumption. The impact effect of an increase in government consumption on private consumption is also positive. This is not consistent with the EFC hypothesis. It can be reconciled with more general forward looking behaviour, if we allow that private and public consumption are complementary goods. In the long run effect of government consumption on private consumption $(0.56 - 0.59)/(1 - 0.67 + 0.11) = -0.07$, is small and negative. However the effect is not significantly different from zero (p-value of 0.3) which is what we would expect from a traditional Keynesian or finite horizon model.

The other regressions in table 2 allow us to test the hypothesis that the relationship between consumption and the fiscal policy variables is different

[11] A Wald test of the restiction that the coefficients on the net taxes variable sum to zero produces a χ^2 statistic of 15.41 giving p-value of less than 0.005.

in times of crisis. In the third column we examine the possibility that the effect of fiscal variables is different during periods of large adjustment, where the definition of a large adjustment is taken from Giavazzi et. al. (2000).[12]

We find little evidence to support the EFC hypothesis. The first thing to note is that the coefficients on the interacting terms are individually insignificant. The point estimates show that impact effect of an increase in net taxes becomes slightly negative in times of crisis. But if the EFC were valid we would expect to see consumption reacting positively to increases in net taxes during times of crisis. The impact effect of government consumption is similar. During crises, the impact effect is even more positive than in normal times, exactly the opposite of what we would expect if EFC were true.

The long run effect of government consumption on private consumption in normal times is not significantly deferent from zero (p-value of 0.2). The long run effect outside of normal times is the same as the coefficients on the interaction terms sum to zero. The long run effect of net taxes on private consumption is significant (p-value of 0.02) and positive $(0.45 - 0.18 - (0.4 - 0.14))/(1 - 0.66 + 0.03) = 0.02$. The long run effect of taxes outside of normal times is precisely the same. This is what we would expect, as crises are a short run phenomenon, almost by definition. Note that we might not pick

[12] A large adjustment in one where the full employment budget surplus (as a percentage of potential output) changes by at least 1.5 percentage points over a two year period.

up this effect if we had not included lagged values of the fiscal variables.

In summary we find little evidence for EFC from the regression estimated in column 3 of Table 2. The effect of fiscal variables on private consumption is not qualitatively different when those variables experiences abnormally large changes. The estimated effects are broadly in line with standard Keynesian theory.

The fourth column of table 2 examines the possibility that the effect of the fiscal policy varies with the level of debt. We might expect that at low level of debt the orthodox finite horizon model may apply. But when debt reach crisis levels, the expectations model dominates, agents cast a wary eye on the future and respond to anything that may stabilize the situation with a reduction in (precautionary) savings. In order to examine this possibility, we interact the ratio of debt to potential GDP with the two fiscal policy variables. In this case we do find some limited evidence in favour of the EFC hypothesis.

The interaction terms on government consumption are significant whereas those on net taxes are not. Broadly speaking, once we control for disposable income, net taxes have no effect on consumption and this does not change with the level of debt. In contrast, the effect of changes in government consumption is significant and does vary with the level of debt. In order to clarify the effect of fiscal policy consider two scenarios: A low debt scenario

(where debt is 25 percent of potential GDP) and high debt scenario (where debt is 85 percent of potential GDP).[13]

In the low debt scenario the net effect of an increase in government consumption is to increase private consumption by $(3 - 0.25 * 4.94) = 1.77$. Whereas, in the high debt environment the effect of an increase in government consumption is to *reduce* private consumption by $(3 - 0.85 * 4.94) = -1.20$. This is what we would expect from a forward looking model and lends credence to the EFC hypothesis. When debt is high, a further increase in government consumption aggravates the fiscal crisis, inducing private agents to increase their precautionary savings and decrease their consumption.

The estimates indicate that the effect of government consumption on private consumption is negative for debt-potential GDP ratios in excess of 0.6. Note also that with a debt-potential GDP ratio in excess of 0.81 the impact effect of government consumption on private consumption would be sufficiently negative to lead to a decline in *output* i.e. fiscal contractions would be literally expansionary $(3 - 0.81 * 4.94 = -1)$. This condition is rare, however, occurring in only 12 percent of the sample and only for five countries (Ireland, Italy, Belgium, Japan, Canada, Greece).

[13]The ratio of debt to potential GDP in Ireland was 25 percent in 1979 and 85 per cent in 1987. The later date can be regarded as the start of the EFC episode identified by Giavazzi and Pagano (1990).

4 Conclusions

We examined the Expansionary Fiscal Contraction Hypothesis using a panel of OECD data. We find that the estimated effect of fiscal variables is sensitive to the estimation method used. It appears that the fixed effects estimator that has become standard in this literature is inconsistent. We use the consistent "Mean Group" estimator as recommended by Pesaran at. al. (1996). We find some evidence in favour of EFC occurring during times of financial crisis as indicated by high debt levels. Thus our results support the refinement of the EFC hypothesis first put forward by Blanchard (1990) and re-examined by Giavazzi et. al. (2000). In contrast to some other recent studies, we find little evidence to support the more general hypothesis that EFC occur as a result of abnormally large changes in fiscal policy. In short, what appears to matter is the level of the countries debt not the size of the adjustment. Finally we note that the size of the EFC effect is relatively small, and only in the most extreme cases will it be large enough to overcome the direct contractionary effects a fiscal retrenchment and lead to an increase in activity i.e. fiscal contraction may have non-Keynesian effects but will not, literally, be expansionary.

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Table 1: Data

Variable	Definition	Code & Construction
	Real Private Consumption	CPV
	Real Government Consumption	CGV
	Government Expenditure (value)	YPG
	Government Surplus (value)	SAVG
	Real GDP	GDPV
	National Debt (nominal)	GGFL
	GDP Deflator	PGDP
$Y*$	Potential GDP	HP Filtered GDPV
C	Private Consumption share	CPV/Y^*
G	Real Gov. Cons. share	CGV/Y^*
$NetY$	Disposable Income	$GDPV/Y^* - NT$
NT	Net taxes	$(SAVG/PGDP + CGV)/Y^*$
$Debt$	Ratio of Debt to Pot. GDP	$GGFL/(PGDP * Y^*)$

1. All data from OECD Economic Outlook.

Table 2: OECD Consumption Function

	(1)	(2)	(3)	(4)
Private Cons$_{t-1}$	1.01	0.67	0.66	0.41
	(0.04	(0.11	(0.06	(0.07
Private Cons$_{t-2}$	-0.12	-0.11	-0.03	-0.08
	(0.03	(0.06	(0.05	(0.05
NetY$_t$	0.37	0.39	0.4	0.37
	(0.02)	(0.05)	(0.04)	(0.08)
NetY$_{t-1}$	-0.29	-0.15	-0.14	-0.01
	(0.03	(0.05)	(0.04)	(0.06)
Net taxes$_t$	0.37	0.44	0.45	0.19
	(0.03)	(0.07)	(0.1)	(0.19)
Net taxes$_{t-1}$	-0.29	-0.11	-0.18	-0.18
	(0.03)	(0.07)	(0.07)	(0.18)
Gov Cons$_t$	0.43	0.56	0.12	3.0
	(0.12)	(0.11)	(0.21)	(0.62)
Gov Cons$_{t-1}$	-0.44	-0.59	-0.14	-2.46
	(0.11)	(0.12)	(0.23)	(0.54)
Crisis*Net taxes$_t$	-	-	-0.07	0.33
			(0.09)	(0.29)
Crisis*Net taxes$_{t-1}$	-	-	0.07	0.47
			(0.08)	(0.32)
Crisis*Gov Cons$_t$	-	-	0.37	-4.94
			(0.34)	(1.12)
Crisis*Gov Cons$_{t-1}$	-	-	-0.37	4.23
			(0.34)	(0.99)
Adj. R^2	0.98	0.98	0.99	0.99
Crisis Definition	-	-	large change in surplus	high debt
Estimation Method	FE	MG	MG	MG

1. Standard errors in parentheses
2. Taxes are net of transfers
3. Sample is annual data from 1970 to 1999