FISCAL POLICY IN GOOD TIMES AND BAD*

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In the 1980s several countries with large government debt or deficit implemented substantial, and in some cases drastic, deficit cuts. Contrary to widespread expectations, in many cases private consumption boomed rather than contracted. This paper shows that in times of "fiscal stress" shocks to government revenues and, especially, expenditure have very different effects on private consumption than in "normal" times.

I. INTRODUCTION

In the 1980s several countries embarked on substantial, and sometimes drastic, fiscal consolidations after years of accumulating government debt. The response of the economy to these contractionary fiscal policies often surprised economists and policy-makers alike: in several cases, the economy boomed rather than fell into the deep recession that many had predicted.

In a seminal contribution Giavazzi and Pagano [1990] studied the two largest fiscal consolidations of the 1980s. Denmark in 1983–1986 and Ireland in 1987–1989. During these episodes the cyclically adjusted deficit fell by a startling 9.5 percent and 7.2 percent of GDP relative to the preconsolidation year, respectively, and yet private consumption increased by 17.7 percent and 14.5 percent cumulatively. Alesina and Perotti [1996] identify seven episodes of prolonged and substantial consolidations: the two episodes above, plus Belgium 1984–1987, Canada 1986–1988, Italy 1989–1992, Portugal 1984–1986, and Sweden 1983–1989. In each of these episodes the primary deficit in the two years after the adjustment was smaller than the average before the adjustment by at least 5 percent of GDP, except in Canada, where the difference is 4.4 percent of GDP. Yet, in all these cases the rate of growth of private consumption was positive in every single year,

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and it always exceeded the preadjustment average rate of growth, with the exception of the Italian episode.[1] It is by now common to refer to these types of episodes as "expansionary fiscal consolidations."

Of course, life is not always this easy. Most of the time, we would expect fiscal consolidations to have a cost, which is exactly why they are so difficult to bring about. One common aspect of the consolidations cited above is that they all occurred at exceptionally high levels of the debt/GDP ratio (as in Belgium, Italy, and Ireland) or immediately following exceptionally high rates of accumulation of debt (in the other countries). While this fact per se is hardly surprising, it does suggest the interesting possibility that in times of fiscal stress the economy's response to fiscal shocks changes qualitatively.

The purpose of this paper is precisely to investigate on a yearly panel of nineteen OECD countries whether the effects of fiscal policy depend on the initial conditions. As a guide to the empirical investigation, I first lay out a simple model where government expenditure shocks have a positive, "Keynesian" correlation with private consumption in normal times, and a negative, "non-Keynesian" correlation in bad times. Symmetrically, tax shocks have a negative, Keynesian correlation in normal times and a positive, non-Keynesian correlation in bad times. It is important to emphasize that what is needed to rationalize the type of episodes described above is a model in which the correlation between private consumption and shocks to government expenditure and revenues *changes,* depending on the initial conditions. For instance, in a standard neoclassical model a cut in government consumption would always have expansionary effects on private consumption: when government consumption falls, private wealth increases, and so does private consumption. However, such a model would not in itself display a *switch* in the effects of fiscal policy, and neither would a purely Keynesian model.

At least two existing models, Blanchard [1990] and Sutherland [1997], formalize the non-Keynesian effects of tax increases at high levels of debt. The model presented here is based on similar logic, but it is still useful because it develops a coherent framework where the non-Keynesian effects of *both* tax *and*

1. These numbers are all the more remarkable because the episodes are identified on the basis of the behavior of the cyclically adjusted deficit, and therefore they are unlikely to be an artifact of cyclical variations in consumption and growth.

expenditure shocks can be analyzed. Bertola and Drazen [1993] model the effects of government consumption as a function of its own initial level. As discussed in Section VIII, the logic and the implications they derive are very different from those of the present contribution. The present model also avoids the large discontinuities in the behavior of policy-makers and in the public's expectations that are typically assumed in the existing models of expansionary fiscal consolidations.

The empirical part of the present paper provides considerable support for the notion that initial conditions—like the initial level of debt—are an important determinant of the effects of fiscal shocks. In particular, I find strong evidence that expenditure shocks have Keynesian effects at low levels of debt or deficit, and non-Keynesian effects in the opposite circumstances. The evidence on a similar switch in the effects of tax shocks is less strong.

These results belong to a rapidly growing body of research on the composition and effects of fiscal consolidations. In addition to the paper by Giavazzi and Pagano [1990] mentioned above, Alesina and Perotti [1995, 1997a] and Alesina and Ardagna [1998] show that different types of consolidations have very different degrees of persistence and of correlations with macroeconomic variables. Coeur et al. [1996], De Menil [1996], Heylen [1997], McDermott and Wescott [1996], and OECD [1996] also perform thorough empirical analyses of the properties and effects of fiscal consolidations, largely confirming but also qualifying along various dimensions the results of Alesina and Perotti [1995, 1997a].

The closest antecedent of this paper is Giavazzi and Pagano [1996]. These authors also study the response of private consumption to fiscal policy on a yearly panel of OECD countries. Their main focus is on the relationship between consumption and the size and persistence of fiscal policy changes, rather than on the role of initial conditions. They also use a different econometric methodology, which is difficult to map into the theoretical framework used here.

The plan of the paper is as follows. The next section sets up the model, and Section III develops its solution. Section IV studies the effects of expenditure-based and tax-based consolidations in this model. Section V discusses estimation issues, while Section VI discusses the data and some preliminary empirical issues. Section VII presents the empirical results. Section VIII concludes by discussing the related literature and some remaining open issues.

II. THE MODEL

The model has four key ingredients, each of them fairly standard in macroeconomic models: first, distortionary taxation; second, a policy-maker who effectively discounts the future more than the private sector, so that the economy is initially away from a position of perfect tax-smoothing; third, the coexistence of credit-constrained individuals and individuals with free access to credit markets; fourth, government expenditure has a positive effect on output, for instance, because of the presence of nominal or real rigidities. This and the next section will make clear the role of each of these features.

Whenever at least some individuals have access to credit markets, fiscal policy shocks generate wealth effects from anticipated future responses of fiscal policy, via the intertemporal government budget constraint. To incorporate these effects, I consider a simple model where consumers live for three periods (denoted by 0, 1, and 2, respectively), and I study the change in consumption between period 1 and 0 as a function of the fiscal policy shocks in period 1. The future response of fiscal policy to the current shock is then summarized by the behavior of fiscal policy in period 2, the last period of the model. This setup contains all the essential features of the analysis.

Individuals have quadratic utility,[2] and their only decision concerns the choice between consumption and savings. The population is divided into two types of individuals: a mass $1 - \mu$ have unrestricted access to credit markets at the market interest rate, while the remaining fraction μ are credit constrained. Thus, the pervasiveness of credit constraints in the economy is indexed by μ.

From standard consumption smoothing arguments, and assuming for simplicity that both the rate of time preference and the interest rate are 0, the change in consumption of unconstrained

2. Without this assumption, it would be impossible to obtain a closed-form solution for the consumer's problem, since the first-order conditions would involve higher moments of consumption than the first. In the specific case of the model, the problem would be compounded by the fact that, as shown below, the budget constraint of the consumer is nonlinear in taxes, which are stochastic. However, as Blanchard [1990] and Sutherland [1997] have noted, precautionary savings would *reinforce* the main conclusion of the model. When a fiscal consolidation occurs, uncertainty on how the government's intertemporal budget constraint will be satisfied falls. If this uncertainty is larger at larger levels of debt (as it seems natural to assume), a consolidation has larger positive effects on consumption the larger the initial level of debt.

individuals between periods 1 and 0 is simply half the innovation in the PDV of their disposable income:

$$\Delta C_1^u = [(1-\mu)/2][(Y_1 - Y_{1/0}) + (Y_{2/1} - Y_{2/0})] + \epsilon_1, \tag{1}$$

where the superscript u refers to "unconstrained" individuals, Y_i represents disposable income in i, and $X_{i/j}$ denotes the expectation of X in period i, formed in period j. The disturbance ϵ_1 represents, for instance, transitional consumption and in general shocks to preferences in period 1. Its properties will be important when discussing the estimation of the model, but for the purposes of the present section it is useful to think of the simple case of an i.i.d. shock.

Following Hayashi [1982], Campbell and Mankiw [1989, 1990], and others, credit constraints have a very simple but convenient form: constrained individuals cannot borrow or lend. Therefore, they consume all their disposable income in each period. Hence, for such individuals the change in consumption between periods 1 and 0 is identically equal to the change in disposable income:

$$\Delta C_1^c = \mu \Delta Y_1, \tag{2}$$

where the superscript c refers to "constrained" individuals.

To solve for the change in aggregate consumption, one only needs to specify a process for disposable income. A sufficiently general form is

$$Y_t = \overline{Y} + Z_t\alpha + \beta G_t - T_t - \lambda T_t^2 + \zeta_t^Y, \qquad \beta > 0; \lambda > 0, \tag{3}$$

where Z_t is a row vector of variables and α a column vector of associated coefficients, T_t is total taxes on individuals, G_t is government expenditure,[3] and ζ_t^Y is a stochastic disturbance. The specific form of the vector Z_t will be important only when discussing the econometric methodology. Hence, to simplify the notation, from now on, I will assume that Z_t is a scalar following the process $Z_t = \overline{Z} + Z_{t-1}\rho + \epsilon_t^Z$, and I will concentrate on the role of the fiscal policy variables.

From expression (3) taxes have two types of effects on

3. In the empirical section I will consider the various components of government expenditure—the wage and the nonwage components of current spending on goods and services, the capital component of spending on goods and services, and transfers—separately. Until then, I will use the generic term "government expenditure" when referring to the variable G_t.

disposable income. The first is obvious: an increase in taxation causes a one-to-one fall in the after-tax disposable income. According to this effect, only the PDV of taxation, not its timing, would matter to unconstrained individuals if taxation were nondistortionary. The second effect of taxation is the distortions it causes on pretax income; in this model with inelastic labor supply and no investment, this effect is captured in a very simple way by the quadratic term $-\lambda T_t^2$.[4]

If the initial expected path of taxation is upward sloping (i.e., $T_{1/0} < T_{2/0}$), a consolidation in period 1 that increases current taxes at a given PDV of taxation causes T_1 to get closer to $T_{2/1}$. As a consequence, the PDV of tax distortions falls, and the wealth of unconstrained individuals increases. Hence, an upward-sloping expected path for taxation is a necessary condition for a rise in taxes to be associated with an increase in consumption: this is the basic intuition of Blanchard [1990] and Sutherland [1997]. In those models, the expectation of high future taxation is conditional on the government debt to GDP ratio reaching the maximum "acceptable" level of debt $\bar{b}$. Thus, the reasons for the absence of tax-smoothing are very different from the present model. As a consequence, the present model does not require the large discontinuity in the behavior of policy-makers at $\bar{b}$, nor in the expectations of the private sector.

In this model there are two natural and very compelling reasons for an upward sloping expected path of taxation. First, even if taxes were set by a benevolent dictator with the same horizon as the whole economy, a tax-smoothing policy would not maximize the expected lifetime utility of constrained individuals: if pretax disposable income is increasing over time, their expected lifetime utility would be maximized if taxes also were growing over time, so as to smooth disposable income and therefore consumption. Second, an upward sloping expected path for taxation is the natural outcome of virtually any realistic positive description of tax policy in this model. In particular, this would be the outcome if the tax rate were set in each period by a policy-

4. It is usually assumed that distortions are a function of the square of the tax *rate*, rather than of total tax revenues as here. This would make the model intractable analytically, because it would require computing the variance of a term like T_t/Y_t, where both the numerator and the denominator are stochastic, and moreover, the denominator is a function of the numerator. The formalization adopted here simplifies the exposition without sacrificing anything substantive. Note also that this is the specification adopted, for instance, by Sargent [1987].

maker with a shorter effective horizon than the private sector, for instance because a policy-maker with different preferences will be in charge next period with positive probability, as in Tabellini and Alesina [1990].[5] In fact, it is easy to show that in the present model one would obtain $T_{1/0} = pT_{2/0}$, where p is the probability of political survival of the current policy-maker. From now on, this is the assumption I will make on the relationship between the expected taxes in the two periods.[6]

Still in expression (3), government expenditure has a positive impact on the disposable income of the private sector. While this is obvious in the case of transfers, in the case of spending on goods and services it would be true in any model where aggregate demand has an effect on output. Here I simply assume this effect without modeling it explicitly.

Government expenditure is exogenous,[7] and obeys the simple process,

$$G_t = \overline{G} + \theta_0 G_{t-1} + \epsilon_t^G. \tag{4}$$

Given the expected path of expenditure, the expected path of taxation must obey the intertemporal budget constraint, which from the perspective of time t states

$$\sum_{i=t+1}^{2} T_{i/t} = \sum_{i=t+1}^{2} G_{i/t} + B_t; \qquad t = 0,1; \qquad B_2 = 0, \tag{5}$$

where B_t is the stock of government debt at the end of period t, which is known in period t.[8] The right-hand side of (5) can be interpreted as the PDV of the financing needs of the government. For brevity, I will indicate it with L_t. Expressions (4) and (5) provide the link between current shocks and future changes in fiscal policy.

5. In that paper the current policy-maker knows that with positive probability he will be succeeded by a different policy-maker, with very different preferences over the composition of expenditure. The current policy-maker then sets a low level of taxation and thus bequeaths the next policy-maker a large deficit. This forces the next policy-maker to use the tax revenues he raises to repay the deficit, rather than spending them on the type of expenditure the current policy-maker dislikes.

6. For simplicity, I will also assume that p is constant.

7. Expenditure could be easily endogenized. For the purposes of the present investigation, however, an exogenous government expenditure will suffice.

8. Note that, in order to simplify the notation, I assume that the spending variables appearing in (4) and in (5) are the same. This need not be so in the empirical part: while G_t in (4) is total government spending, in (5) it is the particular type of government expenditure being investigated.

III. Solution

This section solves for the change in aggregate consumption in period 1, ΔC_1, as a function of the tax and expenditure shocks, ϵ_1^G and ϵ_1^T.[9] Consider first the change in consumption of unconstrained individuals, ΔC_1^u. From (3), and using a first-order Taylor expansion of T_1^2 around $T_{1/0}$ to linearize the term $(T_1^2 - E_{1/0}(T_1^2))$, $Y_1 - Y_{1/0}$ in expression (1) can be written as (ignoring constraints)

$$Y_1 - Y_{1/0} = \alpha\epsilon_1^Z + \beta\epsilon_1^G - (1 + 2\lambda T_{1/0})\epsilon_1^T + \zeta_1^Y. \tag{6}$$

Similarly, the term $Y_{2/1} - Y_{2/0}$ in (1) can be expressed as

$$Y_{2/1} - Y_{2/0} = \alpha\rho\epsilon_1^Z + \beta(G_{2/1} - G_{2/0}) - (T_{2/1} - T_{2/0}) - \lambda[E_{2/1}(T_2^2) - E_{2/0}(T_2^2)]. \tag{7}$$

Using the law of motion for G_t (equation (4)), the intertemporal government budget constraint (expression (5)), and after linearizing T_2^2 around $T_{2/0}$, one finally obtains

$$\Delta G_1^u = \gamma_1^u\epsilon_1^G + \gamma_2^u\epsilon_1^T + \eta_1^u, \tag{8}$$

where

$$\begin{aligned} \gamma_1^u &= (1 - \mu)\frac{1 + \theta_0}{2}[\beta - (1 + 2\gamma T_{2/0})] \\ \gamma_2^u &= (1 - \mu)\lambda[T_{2/0} - T_{1/0}] > 0 \\ \eta_1^u &= (1 - \mu)\frac{1}{2}[\alpha(1 + \rho)\epsilon_1^Z + \zeta_1^Y] + (1 - \mu)\epsilon_1. \end{aligned} \tag{9}$$

Thus, γ_1^u and γ_2^u capture the effects of expenditure and tax shocks on the consumption of unconstrained individuals. Their interpretation is straightforward. Starting with γ_1^u, a unitary expenditure shock in period 1 causes the expected PDV of government consumption to increase by $(1 + \theta_0)$. This increases the expected PDV of income by $\beta(1 + \theta_0)$. However, the expected PDV of taxation also increases by $(1 + \theta_0)$ by the intertemporal government budget constraint, causing a total of approximately $(1 + \theta_0)2\lambda T_{2/0}$ extra tax distortions. Half of the total net effect of the shock on the expected PDV of income is consumed.

The expression for γ_2^u is equally intuitive. Holding constant

9. The notation ϵ_t^X denotes the innovation in the variable X on the basis of the information at time $t - 1$: $\epsilon_t^X = X_t - E(X_t/\Omega_{t-1})$.

government expenditure, an increase in taxation in period 1 must be exactly offset by an equal fall in taxation in period 2. The expected PDV of taxation does not change, but distortions in period 1 increase by approximately $2\lambda T_{1/0}$, while in period 2 they fall by approximately $2\lambda T_{2/0}$. The overall change in the expected PDV of income is therefore $2\lambda(T_{2/0} - T_{1/0})$, half of which is consumed in period 1. All other shocks are collapsed into the error term η_1^u.

Turning to constrained individuals, from (2) the change in their consumption is equal to the change in their disposable income. The latter can be expressed as the sum of the unexpected and of the expected (as of time 0) changes, and using (3) this gives

$$\Delta C_1^c = \gamma_1^c \epsilon_1^G + \gamma_2^c \epsilon_1^T + \eta_1^c + \mu(Y_{10} - Y_0), \tag{10}$$

where the first three terms on the right-hand side represent the unexpected change, the last term is the expected change, and

$$\gamma_1^c = \mu\beta > 0; \qquad \gamma_2^c = -\mu(1 + 2\lambda T_{1/0}) < 0; \qquad \gamma\eta_1^c = \mu(\alpha\epsilon_1^Z + \zeta_1^Y). \tag{11}$$

For constrained individuals there is no wealth effect from future anticipated changes in fiscal policy. Hence, holding constant current taxation, the effect of an expenditure shock, γ_1^c, is just its positive current effect, β, multiplied by the share of constrained individuals, μ. This effect is unambiguously positive, and also independent of the initial conditions. Holding constant current expenditure, the effect of a tax shock, γ_2^c, is just its contemporaneous effect on disposable income, including the extra distortions it causes: once linearized, this effect is equal to $-(1 + 2\lambda T_{1/0})$, multiplied by the share of constrained individuals, μ. Hence, it is unambiguously negative. Combining (8) and (10), one obtains an explicit expression for the change in aggregate consumption as a function of fiscal policy shocks:

$$\Delta C_1 = \gamma_1 \epsilon_1^G + \gamma_2 \epsilon_1^T + \mu(Y_{1/0} - Y_0) + \eta_1, \tag{12}$$

where

$$\gamma_1 = \gamma_1^u + \gamma_1^c, \qquad \gamma_2 = \gamma_2^u + \gamma_2^c, \qquad \eta_1 = \eta_1^u + \eta_1^c. \tag{13}$$

Thus, γ_1 and γ_2 capture the effects of expenditure and tax shocks on the consumption of both unconstrained and constrained individuals. Expression (12) is the basis for the analysis of the effects of expenditure- and tax-based consolidations.

IV. The Effects of Expenditure and Revenue Shocks

The basic strategy is to investigate the signs of the two coefficients γ_1 and γ_2 in equation (13) as functions of the parameters of the model. In particular, I will focus on L_0, the PDV of the financing needs of the government from the perspective of time 0, p, the probability the current policy-maker will be in power next period, and μ, capturing the pervasiveness of credit constraints in the economy. The first two parameters determine the values of $T_{2/0}$, $T_{1/0}$, and $T_{2/0} - T_{1/0}$, which in turn determine the values of the initial distortions appearing in (9) and (11). Recall that $T_{2/0} - T_{1/0} = (1 - p)T_{2/0}$ and, from the government budget constraint, $T_{2/0} = L_0/(1 + p)$. Hence, for a given p, $T_{2/0}$, $T_{1/0}$, and $T_{2/0} - T_{1/0}$ are all positive functions of L_0; and for a given L_0, $T_{2/0}$ and $T_{2/0} - T_{1/0}$ are negative functions of p.

The notion of fiscal stress is then captured by a high value of L_0 (i.e., high PDV of expected future expenditure or high initial debt) and by a low value of p (i.e., high expected taxation in the future). For brevity, I will refer to situations where L_0 is large or p is small as "bad times," and to opposite situations as "good times."

Also for brevity, I will refer to the case of $\gamma_1 > 0$ as the Keynesian effects of government expenditure, and conversely to $\gamma_1 < 0$ as the non-Keynesian effects. Similarly, I will refer to the cases of $\gamma_2 < 0$ and $\gamma_2 > 0$ as the Keynesian and non-Keynesian effects of taxation, respectively. The expansionary effects of fiscal consolidations occur when $\gamma_1 < 0$ and/or $\gamma_2 > 0$.

A. An Expenditure Shock

Consider first the effects of a shock to government expenditure, summarized by γ_1.[10] By straightforward differentiation of the expression for γ_1 in (13), and assuming the sufficient condition $\theta_0 \leq 1$,[11] it is easy to show the following.

10. Note that the results of the analysis would be qualitatively identical if an expenditure-based consolidation were defined as a permanent fall in the parameter $\overline{G}$ or θ_0 in the process driving G_t, equation (4). Also, the degree of persistence of government consumption shocks, captured by θ_0, affects the size of the effects of a given shock, but obviously does not change the qualitative conclusions of the analysis.

11. This condition is needed only to prove part (i) of Result 1, and it is much more stringent than one needs.

RESULT 1.

(i) γ_1 is a positive function of μ;
(ii) γ_1 is a negative function of L_0;
(iii) γ_1 is a positive function of p.

The intuition is straightforward. Starting with part (i), the effect of an expenditure shock on aggregate consumption, γ_1, is the weighted sum of its effects on the consumption of constrained and unconstrained individuals. From (11) the effect on the consumption of a constrained individual is just the positive disposable income effect β. From (9) the effect on the consumption of an unconstrained individual $[(1 + \theta_0)/2](\beta - (1 + 2\lambda T_{2/0}))$, is negative if $\beta < 1$ or positive if $\beta > 1$ and $T_{2/0}$ is small, but in any case it is certainly smaller than the effect on a constrained individual. The reason is that, in addition to the positive effect β on the disposable income over the two periods, it also reflects a negative wealth effect from the expected future increase in T_2 (recall that T_1 is being held constant in this exercise). Hence, overall, γ_1 is an increasing function of the weight of constrained individuals. The intuition for part (ii) is also straightforward. Because of the convexity of tax distortions, the expected increase in T_2 following the increase in expenditure causes a bigger fall in the wealth and consumption of unconstrained individuals the larger the initial distortions, i.e., the higher the expected future tax rate $T_{2/0}$. In turn, $T_{2/0}$ is a positive function of L_0. Similarly, part (iii) follows immediately from the fact that $T_{2/0}$ is a negative function of p. Figure I summarizes Result 1 and introduces Corollary 1.

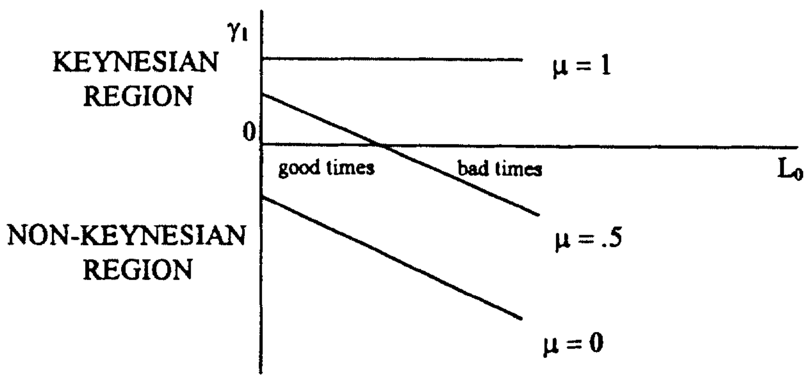

FIGURE I

COROLLARY 1.

(i) γ_1 is positive at low levels of L_0 and negative at high levels.[12]

(ii) γ_1 is positive at high levels of p and negative at low levels of p.

That is, a government expenditure shock has Keynesian effects when L_0 is low or p is high, and non-Keynesian effects in the opposite case.

Part (i) of Corollary 1 follows immediately from Result 1. If L_0 is small, the wealth effect on unconstrained individuals γ_1^u, which is a direct function of L_0, is either positive or negative but small in absolute value. Hence, the positive Keynesian effect γ_1^c, which is independent of L_0, dominates the aggregate effect. If L_0 is large, the effect of an expenditure shock on unconstrained individuals is certainly negative and becomes larger in absolute value as L_0 increases, until eventually it dominates the aggregate effect. A similar reasoning proves part (ii) of Corollary 1, recalling that $T_{2/0}$ is a negative function of p.

B. A Revenue Shock

Now consider the effects of a positive realization of the tax shock ϵ_1^T. This shock causes taxes to go up in period 1 and down in period 2, relative to their expectations in period 0, but it does not affect the PDV of expenditure and taxation. By differentiation of the expression for γ_2 in (13), one obtains the following.

RESULT 2.

(i) γ_2 is a negative function of μ;

(ii) γ_2 is a positive function of L_0 for $\mu < \bar{\mu}$, and a negative function of L_0 for $\mu > \bar{\mu}$, where $\bar{\mu} = (1 - p)/(1 + p)$;

(iii) γ_2 is a negative function of p.

Part (i) of Result 1 simply reflects the fact that γ_2^u is positive and γ_2^c is negative. Part (ii) is more complicated than the corresponding part of Result 1. The key difference is that, unlike in the case of a spending shock, for a revenue shock the effects of the initial conditions are the opposite on unconstrained and constrained individuals: γ_2^u is positive and increases with L_0 (see

12. Note that, if $\beta < 1$, Corollary 1 would also require the condition that μ not be too close to 0. When $\beta < 1$, the effect on unconstrained individuals is negative even at $L_0 = 0$, and if μ is small, this effect would always dominate for all values of L_0.

expression (9)); γ_2^c is negative and increases, in absolute value, with L_0. Thus, at high levels of μ, the effect of the initial debt L_0 on constrained individuals dominates, and the converse at low levels of μ. The intuition for part (iii) is straightforward: the higher p, the closer is the initial expected path of taxation to perfect smoothing, hence the smaller the increase in the wealth of unconstrained individuals from a positive tax shock in period 1. Figure II summarizes these findings and introduces Corollary 2.

COROLLARY 2.

(i) For $0 < \mu < \bar{\mu}$, γ_2 is negative at low levels of L_0 and positive at high levels.

(ii) For L_0 and λ sufficiently large, γ_2 is negative for high values of p and positive for low values.

That is, under the stated conditions a tax shock has Keynesian effects at low levels of L_0 or high values of p, and non-Keynesian effects at high values of L_0 or low values of p.

Part (i) follows from the fact that, when $\mu < \bar{\mu}$, γ_2 is a positive function of L_0. When L_0 is small, the positive wealth effect on unconstrained individuals from an increase in taxation is small because the initial distortions are relatively small; hence, γ_2 is negative because the negative effect on unconstrained individuals dominates. When L_0 is large, the positive wealth effect on unconstrained individuals dominates, and γ_2 is positive. When $\mu > \bar{\mu}$, revenue shocks always have a Keynesian effect because the behavior of constrained individuals always dominates. To prove part (ii), note that γ_2 is a negative function of p and it is always

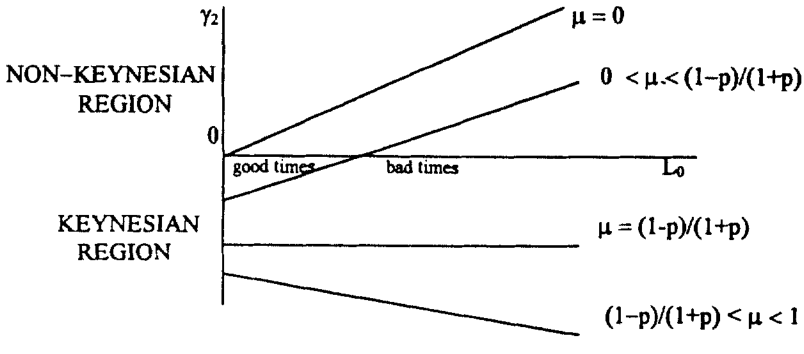

FIGURE II

negative at high values of p. When instead p is small, $T_{2/0} - T_{1/0}$ is large. Hence, the positive wealth effect on unconstrained individuals from an increase in T_1 dominates if L_0 is large enough, i.e., if the initial difference $T_{2/0} - T_{1/0}$ is large enough, and if λ is large enough, i.e., if tax distortions are relevant. In all these cases, the term "large enough" is relative to μ: the larger μ, the larger L_0 and λ must be for γ_2 to be positive at large values of p.

It is immediately apparent that Corollary 2 is more "fragile" than Corollary 1, in that the switch from Keynesian to non-Keynesian effects of taxation requires more stringent conditions. The empirical results will be consistent with this observation.

Corollaries 1 and 2 are the key results of the paper, which I will test in the following sections.

V. Specification and Estimation Methodology

I test the predictions of the model on a yearly panel of nineteen OECD countries, described in subsection VI.A. The empirical analysis requires two preliminary steps. First, the fiscal policy innovations ϵ_t^G and ϵ_t^T and the forecastable change in disposable income $\Delta Y_{t/t-1}$ must be estimated, an issue that I discuss in subsection VI.B; in this section I will simply assume that these estimates are available. Second, a key aspect of the model is that the effects of fiscal innovations depend on the initial conditions. I make this dependence explicit by interacting the coefficients of the fiscal innovations with the regime dummy variable D_t, taking the value 0 when the country-year t belongs to the good times regime and the value 1 when it belongs to the bad times regime. The construction of this variable is discussed in subsection VI.C.

After these steps, an estimable form of equation (12) becomes[13]

$$\Delta C_t = \gamma_1 \hat{\epsilon}_t^G + \tilde{\gamma}_1 D_t \hat{\epsilon}_t^G + \gamma_2 \hat{\epsilon}_t^T + \tilde{\gamma}_2 D_t \hat{\epsilon}_t^T + \mu \widehat{\Delta Y}_{t/t-1} + \omega_t, \tag{14}$$

where $\Delta Y_{t/t-1}$ stands for the anticipated (from the perspective of

13. Equation (14) displays the key differences with the methodology of Giavazzi and Pagano [1996]. These authors estimate an error-correction model of consumption, rather than a Euler equation as here; more importantly, they use the first difference in government consumption and taxation as regressors, and then instrument them using variables lagged once and longer. This is equivalent to using the *anticipated* changes in taxation and expenditure, rather than the *unanticipated* changes as here. However, anticipated changes in expenditure and taxation should have no effect on the change in consumption once the change in disposable income is also included in the regression.

$t-1$) change in Y between t and $t-1$, i.e., $\Delta Y_{t/t-1} = Y_{t/t-1} - Y_{t-1}$; a circumflex denotes an estimate; γ_1 represents the effects of government expenditure in good times, and $\tilde{\gamma}_1$ the *difference* in the effects of government expenditure between bad and good times. A similar interpretation applies to the coefficients of the tax shocks, γ_2 and $\tilde{\gamma}_2$. By Corollaries 1 and 2, under the null hypothesis $\gamma_1 > 0$, $\tilde{\gamma}_1 < 0$, $\gamma_2 < 0$, and $\tilde{\gamma}_2 > 0$.

Also, in (14) $\omega_t = \eta_t + \gamma_1(\epsilon_t^G - \hat{\epsilon}_t^G) + \tilde{\gamma}_1 D_t(\epsilon_t^G - \epsilon_t^G) + \gamma_2(\epsilon_t^T - \hat{\epsilon}_t^T) + \tilde{\gamma}_2 D_t(\epsilon_t^T - \hat{\epsilon}_t^T) + \mu(\Delta Y_{t/t-1} - \widehat{\Delta Y}_{t/t-1})$, and the terms $(\epsilon_t^G - \hat{\epsilon}_t^G)$ and $(\epsilon_t^T - \hat{\epsilon}_t^T)$ are orthogonal to $\hat{\epsilon}_t^G$ and $\hat{\epsilon}_t^T$. By construction, $\widehat{\Delta Y}_{t/t-1}$ is orthogonal to ω_t because it is a function of information dated $t-1$ and earlier.[14]

Consistent estimation of the coefficients of (14) also requires that $\hat{\epsilon}_t^G$ and $\hat{\epsilon}_t^T$ be uncorrelated with ω_t, or, equivalently, that ϵ_t^G and ϵ_t^T be uncorrelated with η_t. There are two main reasons why fiscal policy can respond to contemporaneous changes in the economic environment: automatic mechanisms and the response of policy-makers to developments in the economy within the year. The cyclical adjustment of fiscal policy, which I discuss in subsection VI.C below, has the purpose of eliminating the first source of endogeneity of fiscal policy. Hence, from now on $\hat{\epsilon}_t^G$ and $\hat{\epsilon}_t^T$ should be interpreted as the cyclically adjusted fiscal shocks. The identifying assumption of the model then rests on the notion that the policy-makers are unlikely to respond much to the economic environment within a year. This is probably a safe assumption regarding government spending on goods and services, particularly its wage component. Changes in government employment must be legislated and implemented, and both processes take time; discretionary changes in government wages are usually the results of long negotiations with unions, which typically take place at intervals of one or more years.[15]

14. If ω_t has a MA(1) component (for instance, because ϵ_t is interpreted as a taste shock or because of time aggregation), it will be necessary to forecast ΔY_t using information dated $t-2$ and earlier. This does not pose any conceptual problem: the forecastable component of the change in Y_t is uncorrelated with the error term under the null hypothesis.

15. An important issue is the effects of a price shock on the real amount of government consumption. If government consumption is legislated in nominal terms, a price shock will be reflected one to one in a fall in real government consumption. On the other hand, if government consumption is indexed with a lag less than a year, price shocks will have little effect on the real value of government consumption. Government wages are in general indexed, and nonwage government consumption—like government procurement—also typically includes indexing clauses. Thus, the truth probably lies between the two extreme cases of full and no indexation; where exactly the truth lies, however, depends on the specific country in a way that is difficult to quantify.

In principle, discretionary changes in taxation are easier and faster to decide and implement. Hence, the assumption of no or weak feedback from GDP is less tenable than in the case of government consumption. To take care of this problem, one would need quarterly data, as in Blanchard and Perotti [1999]; but the type of data used in the present empirical analysis is not available at a quarterly frequency except for a few of the countries in the sample, However, note that the focus of the analysis is on the *difference* in the coefficients of tax surprises in good and bad times. Even if the estimated surprises are not truly exogenous, this is likely to bias *both* coefficients upward, but it is not clear why it should seriously bias their difference.

Instead of forecasting the change in disposable income using lagged information only, as in equation (14), one could also use the (cyclically adjusted) $\hat{\epsilon}_t^G$ and $\hat{\epsilon}_t^T$ as instruments. As argued above, these are valid instruments for ΔY_t if the model is to be identified. Let $\widehat{\Delta Y}_{t/t}$ be the change in disposable income estimated using past information *and* the contemporaneous estimated innovations in G_t and T_t. From (3), $\widehat{\Delta Y}_{t/t} = \widehat{\Delta Y}_{t/t-1} + \beta\hat{\epsilon}_t^G - (1 + 2\lambda T_{1/0})\hat{\epsilon}_t^T$.[16] The term $\mu\widehat{\Delta Y}_{t/t}$ now incorporates the effects of fiscal shocks on the disposable income of constrained individuals. Hence, the coefficients of the fiscal shocks now reflect only the wealth effects on unconstrained individuals. In fact, using (11), $\mu\beta = \gamma_1^c$, and $-\mu(1 + 2\lambda T_{1/0}) = \gamma_2^c$, and by simple manipulation of (14), this approach is equivalent to estimating

$$(15) \qquad \Delta C_t = \gamma_1^u\hat{\epsilon}_t^G + \tilde{\gamma}_1^u D_t\hat{\epsilon}_t^G + \gamma_2^u\hat{\epsilon}_t^T + \tilde{\gamma}_2^u D_t\hat{\epsilon}_t^T + \mu\widehat{\Delta Y}_{t/t} + \tilde{\omega}_t.$$

Comparing the coefficients of (15) with those of (14), and using (9) and (13), under the null hypothesis $\gamma_1^u < \gamma_1$, $\tilde{\gamma}_1^u = \tilde{\gamma}_1 < 0$, $\gamma_2^u > 0 > \gamma_2$, and $\tilde{\gamma}_2^u > \tilde{\gamma}_2 > 0$.

These relationships are intuitive. γ_1^u is certainly smaller than γ_1 because it also incorporates a negative wealth effect from future increases in taxation. From (13), $\tilde{\gamma}_1 = \tilde{\gamma}_1^u + \tilde{\gamma}_1^c$; but from (11) the effect of government expenditure on constrained individuals does not depend on the regime. Hence, $\tilde{\gamma}_1^c = 0$, and $\tilde{\gamma}_1 = \tilde{\gamma}_1^u$ because both reflect only the difference in the wealth effect on unconstrained individuals. γ_2^u is positive, because the wealth of unconstrained individuals increases when T_1 increases and T_2 decreases, holding constant their sum. Finally, $\tilde{\gamma}_2^u > \tilde{\gamma}_2$ because $\tilde{\gamma}_2 = \tilde{\gamma}_2^u + \tilde{\gamma}_2^c$ and $\tilde{\gamma}_2^c <$

16. For simplicity, this expression replaces the estimated coefficients with their actual values. Asymptotically, this makes no difference.

0. Thus, this alternative approach allows one to test specifically the source of the non-Keynesian effects of fiscal policy, namely wealth effects on unconstrained individuals.

I estimate equation (15) using an IV GMM estimator that allows for serial correlation of order 1 and heteroskedasticity of general form, essentially using the panel equivalent of the Newey-West variance-covariance matrix (see Appendix 1).[17] To construct this matrix, one needs the residuals from a preliminary regression of ΔC_t on the right-hand-side variables of equation (15), but with $\widehat{\Delta Y}_{t/t}$ replaced by ΔY_t. Note that this procedure automatically provides an efficient estimator and asymptotically correct standard errors; i.e., it automatically takes care of the "generated regressor problem" arising from the fact that $\hat{\epsilon}_t^G$ and $\hat{\epsilon}_t^T$ are obtained from forecasting regressions (see Pagan [1984] and Murphy and Topel [1985]).[18]

Before actually carrying out the estimation of (14) or (15), it is necessary to scale the variables appropriately. In a typical Euler equation involving consumption and disposable income only, the choice of the scaling factor would make little difference because the private consumption to income ratio is very similar across countries and over time. Hence, expressing all variables in log differences, as it is often done, would be appropriate. By contrast, there are large differences in the government expenditure-to-GDP and tax-to-GDP ratios, both over time and across countries. One

17. This is the same type of estimator used by Attanasio and Browning [1995] and Attanasio and Weber [1995]. I also estimated all the standard errors with a variance-covariance matrix that allows for contemporaneous correlation across countries. This variance-covariance matrix is constructed by adding a new component to the previous matrix. The new component must be weighed by a number between 0 and 1 to ensure that the resulting matrix is positive definite. The heteroskedasticity component also has to be weighed by a number between 0 and 1, but for this we have analytical results on the kernel that guides this choice. For instance, Newey and West [1987] show that $\theta = 1$ is the lowest value in the kernel $A(k,L) = (L + 1 - k)^{\theta}/(L + 1)$ (where k is the lag in the residual) that ensures positive definiteness. In the case of the contemporaneous correlation component, there is no such guidance. In fact, positive definiteness is typically ensured in my regressions if the weight of the heteroskedasticity component is of the order of .01, which means that it makes virtually no difference whether the variance-covariance matrix allows for contemporaneous correlation across countries. For this reason, the standard errors I report are based on a covariance matrix that only allows for serial correlation and heteroskedasticity. However, all regressions include a set of year dummies, which should largely take care of the contemporaneous correlation.

18. The estimation of equation (14) involves a two-step procedure: first, the fiscal shocks $\hat{\epsilon}_t^G$ and $\hat{\epsilon}_t^T$ and the predicted values of disposable income $\hat{Y}_{t/t-1}$ are generated, then ΔC_t is regressed on them. Asymptotic efficiency and consistency of the standard errors follow from the fact that $\hat{Y}_{t/t-1}$ is orthogonal to $\hat{\epsilon}_t^G$ and $\hat{\epsilon}_t^T$ (see Pagan [1984]).

would not expect a given percentage change in government consumption to cause the same percentage change in private consumption when government consumption is 10 percent of GDP as when it is 30 percent of GDP. Hence, the appropriate scaling factor in this case is the lagged value of disposable income, rather than the lagged own value as in the log-difference specification. Thus, from now on the notation ΔX_t will indicate the change in the real[19] per capita value of the variable X_t, divided by lagged real per capita disposable income Y_{t-1}: $\Delta X_t = [(X_t/N_tP_t) - (X_{t-1}/N_{t-1}P_{t-1})]/(Y_{t-1}/N_{t-1}P_{t-1})$.

VI. The Data and Preliminary Empirical Issues

A. The Data

The sample consists of a panel of nineteen OECD countries, from as far back as 1965 to 1994.[20] The data and their sources are described in detail in the Data Appendix. The budget variables used in this paper come from the *Economic Outlook* and *Revenue Statistics of Member Countries,* both published by the OECD. The well-known advantage of these data sets is that they use a uniform definition of all variables across countries and refer to the general government. Clearly, from the point of view of the private sector what matters is taxation and expenditure of the general government. The debt data come from the OECD *Economic Outlook* and, for the first years of the sample in a few countries, from the national sources described in the Data Appendix.[21]

19. All variables are deflated using the disposable income deflator. Conceptually, this is the right deflator to use, since what enters the definition of wealth of the private sector is the present discounted value of government consumption and taxes, expressed in terms of the deflator for disposable income. Not surprisingly, the behavior of the disposable income deflator is highly correlated with the consumption deflator.

20. The countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, the United Kingdom, and the United States. I exclude Switzerland from the sample because of the lack of data on cyclically adjusted taxes. The actual length of the sample depends on the country and on the tax variable used. Also, the first three years of the sample are lost to forecast the shocks.

21. For a few year at the beginning of the sample in a few countries (Austria 1965–1970, France 1965–1977, Norway 1965–1970, and Portugal 1965–1970), data on general government debt are not available. For these country-years I multiply the value of the central government debt by the ratio of general to central government debt in 1971 (1978 for France).

B. The Forecasting Equations

The fiscal policy innovations $\hat{\epsilon}_t^G$ and $\hat{\epsilon}_t^T$ are estimated according to the following procedure. For each country, I specify three parsimonious near-VARs with government expenditure, taxes, and GDP as the endogenous variable. The first system has the form,

$$
\begin{aligned}
\Delta G_t &= \alpha_{1,0} + \alpha_{1,1}\Delta G_{t-1} + \alpha_{1,2}\Delta TT_{t-1} + \alpha_{1,3}\Delta Q_{t-1} + \epsilon_t^G \\
\Delta T_t &= \alpha_{2,0} + \alpha_{2,1}\Delta G_{t-1} + \alpha_{2,2}\Delta T_{t-1} + \alpha_{2,3}\Delta Q_{t-1} + \epsilon_t^T \\
\Delta Q_t &= \alpha_{3,0} + \alpha_{3,1}\Delta G_{t-1} + \alpha_{3,2}\Delta TT_{t-1} + \alpha_{3,3}\Delta Q_{t-1} \\
&\quad + \alpha_{3,4}\Delta Q_{t-2} + \epsilon_t^{TQ},
\end{aligned} \tag{16}
$$

where G_t is government expenditure, T_t is the tax variable which is being forecasted (income and social security taxes paid by employees, or the same plus indirect taxes), TT_t is total tax revenues, and Q_t is GDP. All variables are expressed in real per capita terms, and all first differences are normalized by the lagged value of real, per capita disposable income. The second specification of the forecasting systems adds ΔG_{t-2} to the list of regressors of the government consumption equation, and ΔT_{t-2} to the list of regressors of the tax equation. The third specification of the system adds ΔQ_{t-2} to both regressions. In the benchmark regressions that I present below, for each country and for each variable I choose the specification with the highest R^2. In each regression the constant is allowed to change in 1975.[22]

I cyclically adjust the tax shocks using the simple methodology proposed by Blanchard [1993]. Using GDP-elasticities of taxes provided by the OECD[23] ϕ_t, for each country I compute the cyclically adjusted tax innovation as $\hat{\epsilon}_t^T - \phi_t\hat{\epsilon}_t^Q T_t$, where $\hat{\epsilon}_t^T$ and $\hat{\epsilon}_t^Q$

22. The system (16) implies a departure from the logic of the theoretical model, in that it does not impose the intertemporal government budget constraint in the estimation of the consumption equation. Doing so is a notoriously difficult and largely arbitrary operation, and I prefer not to impose a dubious restriction on my estimation procedure. Note also that, contrary to the theoretical model, it is impossible to make sure that the expected PDV of expenditure is being held constant when a shock to taxation occurs, even if the contemporaneous shock to expenditure is being held constant. Thus, in practice the coefficient of the tax shock also includes any wealth effect from future changes in expenditure associated with the current shock to taxation. This is not necessarily a serious problem, however, since the main goal of this paper is to estimate the difference in the effects of fiscal shocks between bad and good times.

23. Note that these elasticities are not obtained from regressions, but from simulations based on the structure of the tax system of each country and on its distribution of earnings; hence, the cyclical component of the change in taxation is not a generated regressor.

are estimated from (16).[24] The OECD has recently recomputed the income elasticities of taxes for fifteen OECD countries[25] at about four years intervals, starting in 1978. For earlier periods I assume the 1978 value of tax elasticities. This procedure is probably safe, since tax elasticities show minimal variation over time in each country, and moreover, the period of substantial tax reforms starts after 1978.

C. Bad and Good Times

The regime dummy variable D_t is not directly observable, and must be proxied. Corollaries 1 and 2 have highlighted the two main fiscal policy determinants of the regime: L_{t-1}, and p, the probability of reelection. This section illustrates the construction of the empirical counterparts to these determinants.

I compute L_{t-1} as the sum of the "cyclically adjusted" government debt B_{t-1} and the PDV of future government expenditure, computed recursively from the estimate of a system like (16).[26] I then divide the cyclically adjusted L_{t-1} by trend GDP in $t-1$, Q^T_{t-1}, to obtain the variable l_{t-1}. This procedure has the purpose of eliminating the potential correlation with the disturbances ω_t and $\tilde{\omega}_t$ in equations (14) and (15), since at least one component of these disturbances, ϵ_t in equation (1), is likely to have an MA(1) structure.

According to the first definition of bad times, a given country-year t belongs to the bad time regime if l_{t-1} is greater than a certain cutoff value x. This generates the first bad times dummy variable, $D1_t$. In the benchmark case, x is the ninetieth percentile

24. The term T_t—the share of revenues to previous year's disposable income—appears in the expression because $\hat{\epsilon}^T_t$ is defined as the innovation in revenues as shares of previous year's disposable income. The original definition in Blanchard [1993] used unemployment, rather than real GDP, to cyclically adjust taxes. Nonregression-based elasticities of taxation to unemployment are not available. The elasticity ϕ_t I use is actually a weighted average of the elasticity of each component of tax revenue that appears in each specific definition of T_t.

25. These are all the countries in the sample, except Austria, Greece, Ireland, and Portugal. For these countries I use older elasticities.

26. Debt is cyclically adjusted by subtracting the cyclical change in taxation relative to the previous year, as measured by the lagged percentage change in GDP times the average GDP elasticity of taxes. Future expected tax revenues and expenditure are evaluated at trend GDP, and the change in taxes to start the recursion in (16) is cyclically adjusted. I compute the PDV of future expenditure as the discounted sum—at a discount rate of .05 per year—of the first five years of future expenditure. At the ratios prevailing for expenditure to GDP, computing the PDV over a long horizon would make the value of government debt almost irrelevant for the value of L_{t-1}. In addition, the forecasts of government expenditure are subject to large standard errors far into the future. However, when I compute the PDV of total government expenditure over a ten-year horizon instead, I obtain very similar results.

of the distribution of l_t, generating a total of 48 observations of bad time years. In Section VII, I also display results based on progressively looser definitions, where x is the eightieth and seventieth percentile. I denote these different versions of the bad time dummy variable $D1_t$ by $D1_t(.90)$, $D1_t(.80)$, $D1_t$ (.70).

The second determinant of the bad time regime, p, is essentially unobservable in this panel. However, note that this variable captures the extent of the departure from perfect tax-smoothing; a lower p means a lower $T_{1/0}$, and therefore, given expenditure, a larger deficit. Hence, in the second definition, the bad time dummy variable is simply a function of the deficit. Specifically, a given country-year t belongs to the bad time regime if the cyclically adjusted deficit, as a share of trend GDP, exceeds a certain value x in the two previous years $t - 1$ and $t - 2$.[27] This generates the second definition of the bad times dummy variable, $D2_t$. In the benchmark case, the value of x is set at .04, generating 53 observations on bad time years. In Section VII, I also experiment with values of x of .03 and .02, corresponding to 80 and 122 observations on bad time years, respectively. These different versions of the bad time dummy variable $D2_t$ are denoted by $D2_t(.04)$, $D2_t(.03)$, and $D2_t(.02)$.

Table I lists all the country-years that belong to the bad time regime according $D1_t(.90)$, $D1_t(.80)$, $D2_t(.04)$, and $D2_t(.03)$. The table highlights an important difference between the two definitions. In column (1) the benchmark version of the first definition, $D1_t(.90)$, captures long periods of time in a few high-expenditure countries; five countries are represented, and three of these represent 83 percent of the total observations of bad times. The distribution of bad time country-years becomes more balanced under $D1_t(.80)$ (column (2)). Even in its benchmark version $D2_t(.04)$ (column (3)), the second definition of bad times generates a fairly balanced distribution of bad time episodes across countries and over time: now fourteen countries experience at least one year of bad times, with nine of them experiencing at least three years. Under $D2_t(.80)$, all countries except Australia have at least one year of bad time, and only five countries have two years or less.

Note that, strictly speaking, the two bad time dummy variables interact with each other (see expressions (9) and (11)). Allowing for all these interactive effects would lead to a large

27. I measure the deficit as the first difference in government debt.

TABLE I
BAD TIMES

	(1) $D1_t(.90)$	(2) $D1_t(.80)$	(3) $D2_t(.04)$	(4) $D2_t(.03)$
Australia				
Austria		1993	1978	1977–1978
Belgium	1979–1993	1974, 1976–1993	1980–1985, 1989	1980–1989
Canada			1985–1987	1985–1987
Denmark	1984–1986,	1981–1994	1981–1985	1978–1985
	1988–1994	1981–1994	1981–1985	1978–1985
Finland		1993–1994	1994	1994
France		1994		1994
Germany				1977
Greece			1986	1985–1986
			1990–1993	1989–1993
Ireland		1986, 1988, 1992–1994	1985	1980, 1983–1985, 1988
Italy	1992–1994	1986–1994	1973, 1985–1989, 1993	1973, 1984–1990, 1993–1994
Japan			1978–1982	1969–1970, 1978–1984
Netherlands	1988, 1990–1993	1980–1994	1985–1986	1985–1986, 1990
Norway		1979–1981, 1987–1994	1978–1980, 1987	1978–1980, 1987, 1994
Portugal		1993	1982, 1989	1982, 1989
Spain			1984–1986	1984–1986, 1991
Sweden	1980–1994	1978–1994	1980–1985, 1994	1980–1985, 1994
United Kingdom				1994
United States				1985–1987
Observations	48	96	53	80

Column (1): bad time dummy variable is $D1_t(.90)$, defined by $l_{t-1} > x$, where x is ninetieth percentile; Column (2): bad time dummy variable is $D1_t$*.80), defined by $l_{t-1} > x$, where x is eightieth percentile; Column (3): bad time dummy variable is $D2_t(.04)$, defined by $b_{t-1} - b_{t-2} > x$ and $b_{t-2} - b_{t-3} > x$, with $x = .04$; Column (4): bad time dummy variable is $D2_t(.03)$, defined by $b_{t-1} - b_{t-2} > x$ and $b_{t-2} - b_{t-3} > x$, with $x = .03$.

number of cross terms in the same regression, including triple interactions of the type $D1_t * D2_t * \hat{\epsilon}_t^G$. Therefore, I present regressions based on $D1_t$ and $D2_t$ separately. This also has the advantage of highlighting the role of each determinant of bad times more clearly. Note also that the interaction between the two types of determinants is much more important for the non-Keynesian effects of taxes than of expenditure. In the latter case, even if $p = 1$, expenditure shocks can easily have non-Keynesian effects; but tax shocks cannot have non-Keynesian effects at or around $p = 1$.

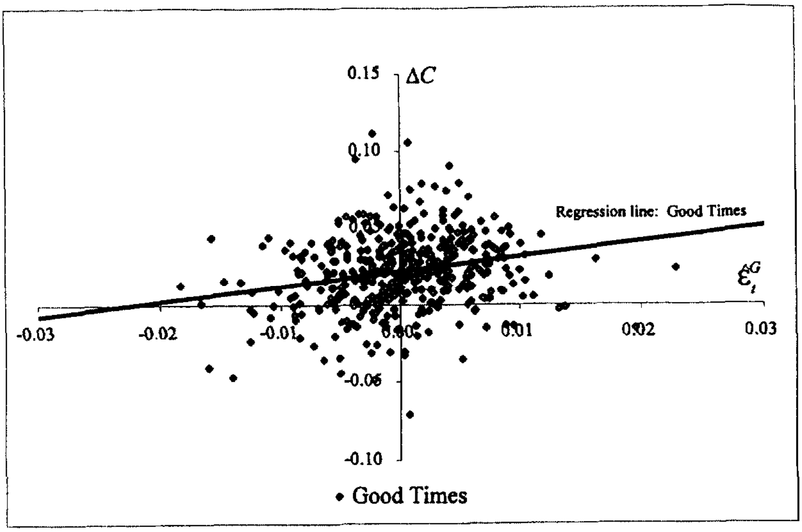

FIGURE IIIa

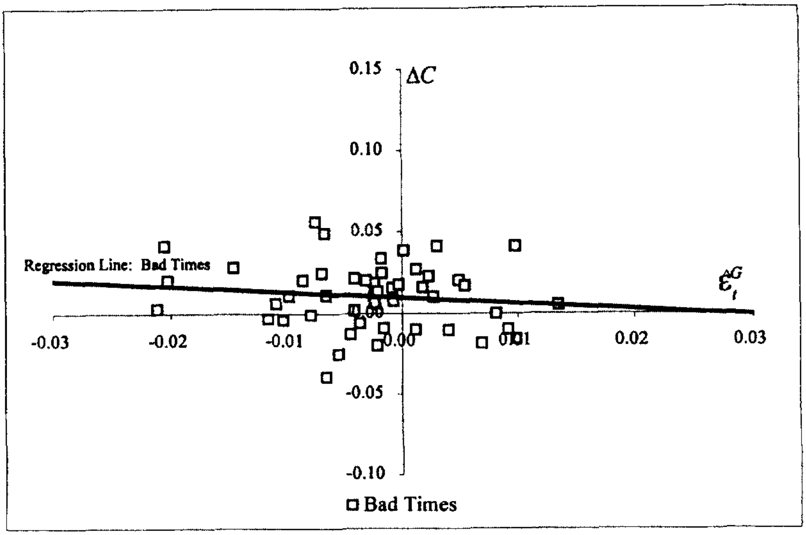

FIGURE IIIb

Figures III and IV display scatterplots of the changes in private consumption and in government consumption in good and bad times, under $D1_t(.90)$ (Figure III) and $D2_t(.04)$ (Figure IV). The interpolated lines represent the slopes of the simple regres-

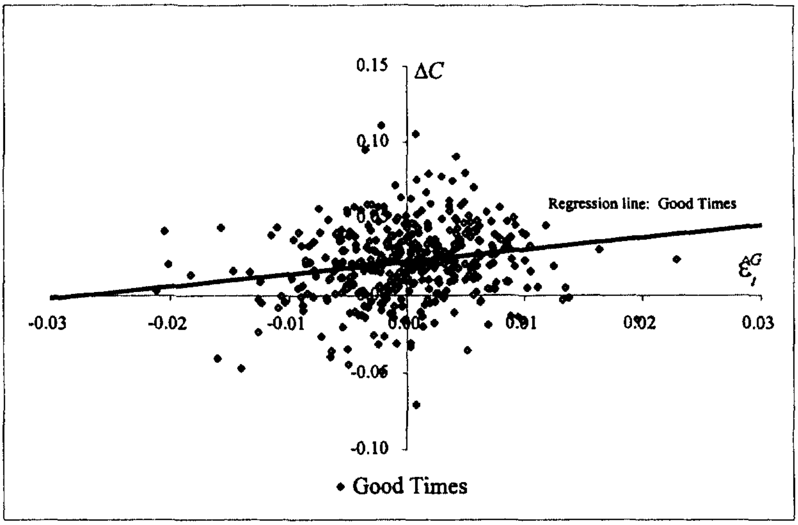

FIGURE IVa

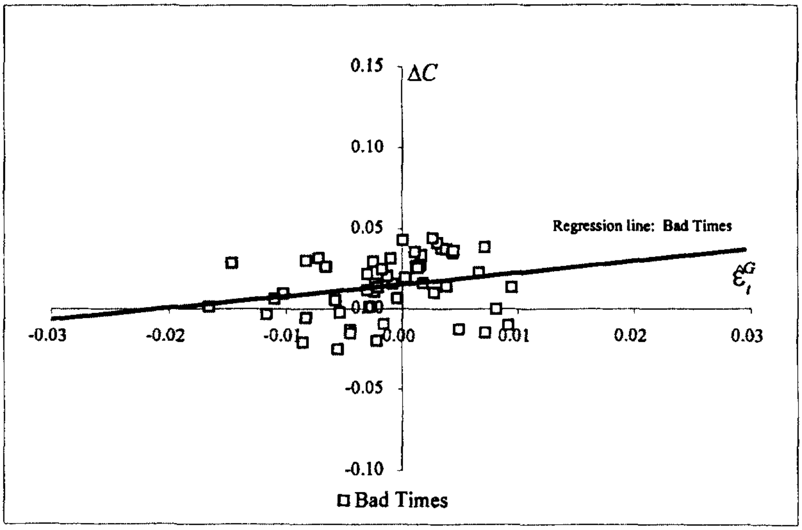

FIGURE IVb

sion of the change in private consumption on the change in government consumption in each sample. Under $D1_t(.90)$ (Figure III), there is a considerable difference in the simple correlation between the two variables in good and bad times: in the former, it is positive, in the latter it is negative. As shown in the next section, this difference will become even larger when one looks at partial correlations. Under $D_2(.04)$ (Figure IV), the simple correlation is positive under both regimes, although slightly larger in good times. Only when one looks at partial correlations in the next section, will a significant difference between bad and good times appear.

VII. Estimates

A. Basic Results

Table II presents the first estimates of equations (14) (first two columns) and (15) (last two columns). Thus, the coefficients being estimated are the γ_i's and $\tilde{\gamma}_i$'s of equation (14) in columns (1) and (2), and the γ_j^u's and $\tilde{\gamma}_j^u$'s of equation (15) in columns (3) and (4).

TABLE II
First Estimates

Var.	Coeff.	(1)	(2)	Coeff.	(3)	(4)
$\hat{\epsilon}_G^t$	γ_1	1.10	0.93	γ_1^u	0.01	−0.06
		(5.82)	(4.58)		(0.05)	(0.34)
$D_t * \hat{\epsilon}_t^G$	$\tilde{\gamma}_1$	−1.61	−1.37	$\tilde{\gamma}_1^u$	−1.05	−1.14
		(5.15)	(2.61)		(3.00)	(2.06)
$\hat{\epsilon}_t^T$	γ_2	−0.32	−0.23	γ_2^u	0.13	0.17
		(3.08)	(2.37)		(1.09)	(1.58)
$D_t * \hat{\epsilon}_t^T$	$\tilde{\gamma}_2$	.48	0.07	$\tilde{\gamma}_2^u$	0.40	0.22
		(2.32)	(0.24)		(1.62)	(0.67)
$\widehat{\Delta Y}_{t/t-1}$	μ	0.65	0.66			
		(6.31)	(6.42)			
$\widehat{\Delta Y}_{t/t}$				μ	0.74	0.75
					(8.53)	(8.22)
Sample		All	All		All	All
Nobs.		484	484		484	484
R^2 of first stage		0.37	0.37		.48	.47
Defn. of bad times		$D1_t(.90)$	$D2_t(.04)$		$D1_t(.90)$	$D2_t(.04)$
No. of bad times		48	53		48	53

Dependent variable change in real, per capita private consumption, scaled by previous year real per capita disposable income. All regressions include a full set of year and country dummies and the dummy variable D_t. Government expenditure is defined as current spending on goods and services (government consumption). Columns (1) and (2) display estimates of equation (14); i.e., $\widehat{\Delta Y}_{t/t-1}$ is estimated using only past information. Columns (3) and (4) display estimates of equation (15); i.e., $\widehat{\Delta Y}_{t/t}$ is estimated also using the current fiscal shocks. In columns (1) and (3) bad time dummy variable is $D1_t(.90)$; in columns (2) and (4) bad time dummy variable is $D2_t(.04)$. For the definition of $D1_t(.90)$ and $D2_t(.04)$ and a list of the country-years in each, see Table I.

The difference between columns (1) and (2) is that the bad time dummy variable is $D1_t(.90)$ in column (1), and $D2_t(.04)$ in column (2), and similarly for columns (3) and (4). Taxes are defined as the sum of direct taxes on households and social security taxes paid by employees.[28] Initially, the government expenditure variable is current spending on goods and services, or government consumption. All regressions also include a full set of year and country dummies and the bad time dummy variable.

Recall that under the null hypothesis, in columns (1) and (2) $\gamma_1 > 0$, $\tilde{\gamma}_1 < 0$, $\gamma_2 < 0$, and $\tilde{\gamma}_2 > 0$. The estimates are remarkably consistent with this hypothesis.[29] Starting with column (1), in good times government consumption innovations have a large positive effect on private consumption: the estimated coefficient γ_1 is 1.10, significant at the 1 percent significance level. But in bad times, this positive effect all but vanishes: the estimated value of $\tilde{\gamma}_1$ is -1.61, also significant at the 1 percent level. Thus, in bad times the effects of government consumption innovations on private consumption is *negative* and equal to $-.51$, with a p-value for a test of the difference from 0 of .05.

The pattern of the coefficient estimates for the tax variable is also consistent with the model. The estimate of γ_2 is negative and significant at the 1 percent level, and the estimate of $\tilde{\gamma}_2$ is positive, much larger than the absolute value of γ_2, and significant at the 2 percent level. The estimated coefficient of the change in disposable income, .65, is close to the value one would obtain by averaging estimates from Euler equations on various countries, as obtained for instance by Campbell and Mankiw [1991] or Jappelli and Pagano [1989].

In column (2), based on $D2_t(.04)$, the pattern of estimates is very similar to column (1), with the only difference that now the estimate of $\tilde{\gamma}_2$ is very small and not statistically significant.

Columns (3) and (4) present estimates of the $\tilde{\gamma}_i$'s in equation (15). As discussed in Section V, now all coefficients of fiscal shocks capture only the wealth effect on unconstrained individuals, since the disposable income effect on constrained individuals is already incorporated in the disposable income term. As a consequence,

28. For Italy the breakdown between social security taxes paid by employers and by employees is not available until 1974. To avoid losing the first nine years of the sample, for Italy the benchmark definition of taxes includes all social security taxes. Alternative definitions that include social security taxes paid by employers lead to very similar results.

29. The variables used to predict ΔY_t are ΔC_{t-2}, ΔY_{t-2}, ΔT_{t-1}, ΔG_{t-1}, ΔT_{t-2}, and ΔG_{t-2}. ΔC_{t-2} also enters interacted with the country dummies, to capture in a compact way country-specific dynamics (see Attanasio and Browning [1995]). ΔT_{t-1} and ΔT_{t-2} are cyclically adjusted.

under the null hypothesis $\gamma_1^u < \gamma_1$, $\tilde{\gamma}_1^u = \tilde{\gamma}_1 < 0$, $\gamma_2^u > 0 > \gamma_2$, and $\tilde{\gamma}_2^u > \tilde{\gamma}_2 > 0$.

These predictions are mostly borne out in the regressions. In column (3), to be compared with column (1), the estimate of γ_1^u is practically 0, much lower than the estimate of γ_1 in column (1); the estimate γ_1^u is negative and significant, and not too far from the estimate of $\tilde{\gamma}_1$ in column (1). The effects of taxation are also uniformly higher, in an algebraic sense, in column (3) than in column (1), again reflecting the fact that now the coefficient only captures the positive wealth effect on unconstrained individuals. In fact, γ_2^u in good times is now *positive* at .13, although not significant. The only point estimate inconsistent with the null hypothesis is that of $\tilde{\gamma}_2$ in column (3), which is smaller than the estimate $\tilde{\gamma}_2$ in column (1). Similar considerations apply to column (4) as compared with column (2). However, note that in columns (3) and (4) the coefficients of the tax variables are never significantly different from 0, although the estimates of γ_1^u are significantly different from the estimates of γ_1 in columns (1) and (2).

Thus, the key message of Table II is that there is a large difference in the effects of government consumption in bad and good times. The evidence on non-Keynesian effects of taxation is slightly weaker: it supports the null hypothesis under $D1_t(.90)$, less so under $D2_t(.04)$.

B. The Role of Credit Constraints

Table III investigates the role of credit constraints in the transmission of fiscal shocks. The larger the share of unconstrained individuals, the larger the weight of the negative wealth effect of expenditure shocks and of the positive wealth effect of tax shocks in the aggregate effect. Accordingly, by Result 1 all coefficients of expenditure shocks in equations (14) and (15) are negative functions of the degree of development of credit markets; similarly, by Result 2 all coefficients of tax shocks are positive functions of the same variable.

A proxy for the degree of developments of credit markets has been constructed by Jappelli and Pagano [1994] in the context of a study on savings, liquidity constraints, and growth. The proxy they use is the maximum ratio of the loan to the value of the house in housing mortgages (LTV). This measure is available for each decade after 1960 for all countries in the present study, plus a few others. Hence, I assign each decade in the nineteen countries in the sample to one of two subsamples, using a cutoff value of 80 percent for the LTV ratio. This cutoff point coincides exactly with

TABLE III
THE ROLE OF CREDIT CONSTRAINTS

Var.	Coeff.	(1)	(2)	(3)	(4)
$\hat{\epsilon}_t^G$	γ_1	0.84	1.19	0.56	1.23
		(4.01)	(3.34)	(2.63)	(3.53)
$D_t * \hat{\epsilon}_t^G$	$\tilde{\gamma}$	−1.49	0.11	−1.49	−0.60
		(5.08)	(0.92)	(2.77)	(0.53)
$\hat{\epsilon}_t^T$	γ_2	−0.29	−0.50	−0.29	−0.33
		(2.50)	(2.47)	(2.65)	(1.87)
$D_t * \hat{\epsilon}_t^T$	$\tilde{\gamma}_2$	0.25	0.57	0.29	−0.11
		(0.96)	(1.86)	(1.00)	(0.20)
$\widehat{\Delta Y}_{t/t-1}$	μ	0.53	0.87	0.55	0.93
		(5.99)	(4.56)	(6.73)	(4.91)
Sample		High-LTV	Low-LTV	High-LTV	Low-LTV
Nobs.		240	241	240	241
R^2 of first stage		0.28	0.43	0.28	0.44
Defn. of bad times		$D1_t(.90)$	$D1_t(.90)$	$D2_t(.04)$	$D2_t(.04)$
No. of bad times		25	23	21	32

This table displays estimates of (14), on the sample of high- and low-LTV countries separately. High-LTV: country-decades with Loan-to-Value ratio (from Jappelli and Pagano [1994] larger than 80 percent. Low-LTV: country-decades with Loan-to-Value ratio less than 80 percent. See the Data Appendix for a list. The total number of observations of the two subsamples, 481, is less than the total number of observations of the whole sample, 484, because 3 observations in the 1960s in the United Kingdom could not be assigned a value of LTV.

the median, as it generates two groups of high-LTV and low-LTV country-decades with 240 and 241 observations, respectively. The Data Appendix lists all the observations on high- and low-LTV country-decades.

Columns (1) and (2) of Table III estimate the same specification as column (1) in Table II (i.e., based on $D1_t(.90)$), but on the sample of high- and low-LTV countries, respectively. Columns (3) and (4) do the same on the specification of column (2) of Table II (i.e., based on $D2_t(.04)$).

The results on expenditure shocks conform very well with the theory. Consistent with Result 1, in high-LTV countries both γ_1 and especially $\tilde{\gamma}_1$ are much smaller, algebraically, than in low-LTV countries, for both $D1_t$ and $D2_t$. Thus, in bad times negative government consumption shocks have large expansionary effects only in high-LTV countries; in low-LTV countries the impact of government consumption shocks on private consumption is always positive, and practically the same in bad and good times.

The results concerning the effects of a tax shock in high- and low-LTV countries are more mixed. γ_2 is smaller in low- than in high-LTV countries under $D1_t$ (columns (1) and (2)), but not under $D2_t$ (columns (3) and (4)). On the other hand, $\tilde{\gamma}_2$ is larger in high-

TABLE IV
OTHER DEFINITIONS OF GOVERNMENT EXPENDITURE

Var.	Coeff.	(1) Total exp. goods and services	(2) Total exp. goods and services	(3) Total prim. exp.	(4) Total prim. exp.
$\hat{\epsilon}_t^G$	γ_1	0.68	0.64	0.35	0.35
		(5.04)	(4.75)	(4.75)	(4.57)
$D_t * \hat{\epsilon}_t^G$	$\tilde{\gamma}_1$	−1.06	−0.87	−1.31	−0.38
		(3.66)	(2.24)	(2.28)	(2.05)
$\hat{\epsilon}_t^T$	γ_2	−0.27	−0.21	−0.34	−0.26
		(2.78)	(2.29)	(3.46)	(2.74)
$D_t * \hat{\epsilon}_t^T$	$\tilde{\gamma}_2$	0.01	0.57	0.53	0.04
		(1.98)	(0.04)	(2.42)	(0.15)
$\widehat{\Delta Y}_{t/t-1}$	μ	0.43	0.65	0.58	0.59
		(1.98)	(6.63)	(6.49)	(6.61)
Sample		All	All	All	All
Nobs.		484	484	484	484
R^2 of first stage		0.37	0.38	0.37	0.37
Defn. of bad times		$D1_t(.90)$	$D2_t(.04)$	$D1_t(.90)$	$D2_t(.04)$
No. of bad times		48	53	48	53

This table displays estimates of (14), using alternative definitions of the government expenditure variable G_t. Columns (1) and (2): government expenditure is total expenditure on goods and services. Columns (3) and (4): government expenditure is total primary expenditure.

than in low-LTV countries under $D2_t$, but not under $D1_t$. The estimates of $\tilde{\gamma}_2$, however, are rarely significant.

Notice that under both $D1_t$ and $D2_t$ the coefficient of the change in disposable income is much higher in low- than in high-LTV countries, as one would expect.

In summary, Table III confirms the impression of Table II: the empirical results are highly consistent with the theory as regards the effects of government expenditure, while the results for taxation are less strong, although one could always cite a regression which is reasonably favorable to the theory.

C. Alternative Definitions of Government Expenditure and of Bad Times

The government expenditure variable so far was defined as current government spending on goods and services. This is a legitimate definition of the variable G_t that appears in the theoretical model; but, depending on the assumptions one makes on how government expenditure affects the economy equally legitimate would be a more encompassing definition of G_t. Table IV presents estimates of the basic specifications of columns (1)

TABLE V
OTHER DEFINITIONS OF BAD TIMES

Var.	Coeff.	(1)	(2)	(3)	(4)
$\hat{\epsilon}_t^G$	γ_1	1.19	1.26	0.95	0.98
		(5.69)	(5.45)	(4.45)	(4.22)
$D_t * \hat{\epsilon}_t^G$	$\tilde{\gamma}_1$	−1.35	−1.32	−1.07	−0.90
		(4.14)	(4.18)	(2.40)	(2.22)
$\hat{\epsilon}_t^T$	γ_2	−0.31	−0.38	−0.28	−0.35
		(2.82)	(3.35)	(2.62)	(3.20)
$D_t * \hat{\epsilon}_t^T$	$\tilde{\gamma}_2$	0.34	0.57	0.32	0.47
		(1.06)	(1.87)	(1.55)	(2.41)
$\widehat{\Delta Y}_{t/t-1}$	μ	0.65	0.65	0.65	0.65
		(6.69)	(6.71)	(6.26)	(6.22)
Sample		All	All	All	All
Nobs.		484	484	484	484
R^2 of first stage		0.37	0.37	0.37	0.37
Defn. of bad times		$D1_t(.80)$	$D1_t(.70)$	$D2_t(.03)$	$D2_t(.02)$
No. of bad times		96	145	80	122

This table displays estimates of (14), using alternative versions of the bad time dummy variables $D1_t$ and $D2_t$. In column (1), $D1_t$*.80) is defined by the condition $l_{t-1} > x$, where x is the eightieth percentile of the distribution of l_{t-1}. In column (1), $D1_t(.70)$ is defined similarly, but x is the seventieth percentile of the distribution of l_{t-1}. In column (2), $D2_t(.03)$ is defined by the condition $b_{t-1} - b_{t-2} > x$ and $b_{t-2} - b_{t-3} > x$, where $x = .03$. In column (4), $D2_t(.02)$ is defined similarly, but $x = .02$.

and (2) in Table II, but using progressively larger definitions of the expenditure variable: total (including capital) expenditure on goods and services (columns (1) and (2)), and total primary government expenditure (columns (3) and (4)).[30]

For both bad time dummy variables the estimates of both γ_1 and $\tilde{\gamma}_1$ fall (in absolute value). It remains true, however, that these coefficients remain statistically significant: for all these definitions of government expenditure, there is always a structural change in the effects of government expenditure on private consumption in bad times.

Table V explores the effects of progressively loosening the definition of bad times. In columns (1) and (2) the cutoff values for $D1_t$ are the eightieth and the seventieth percentile, respectively, instead of the ninetieth percentile in column (1) of Table II. This generates 96 and 145 "bad times" country-years, respectively. In columns (3) and (4) the cutoff values for the definition of $D2_t$ are

30. Total primary government expenditure includes total expenditure on goods and services, transfers to households, and subsidies.

TABLE VI
INFLUENTIAL COUNTRIES

Var.	Coeff.	(1)	(2)	(3)	(4)
$\hat{\epsilon}_t^G$	γ_1	0.83	1.16	0.65	1.13
		(5.43)	(5.88)	(3.69)	(5.28)
excluded country		PRT	GRC	PRT	SWE
$D_t * \hat{\epsilon}_t^G$	$\tilde{\gamma}_1$	−1.00	−1.73	−1.11	−1.65
		(1.54)	(5.34)	(2.29)	(3.00)
excluded country		SWE	ITA	PRT	GRC
$\hat{\epsilon}_t^T$	γ_2	−0.28	−0.38	−0.20	−0.30
		(2.43)	(3.10)	(1.92)	(2.52)
excluded country		DNK	SWE	DNK	SWE
$D_t * \hat{\epsilon}_t^T$	$\tilde{\gamma}_2$	0.40	0.51	−0.07	0.18
		(1.55)	(2.69)	(0.22)	(0.55)
excluded country		NLD	FIN	NLD	UT
$\widehat{\Delta Y}_{t/t-1}$	μ	0.58	0.79	0.59	0.78
		(6.50)	(6.44)	(6.69)	(6.05)
excluded country		PRT	DNK	PRT	DNK
Defn. of bad times		$D1_t(.90)$	$D1_t(.90)$	$D2_t(.04)$	$D2_t(.04)$

Columns (1) and (2) display the smallest and largest (in absolute values) estimates of each coefficient of equation (14), generated by excluding one country at a time in regression (1) of Table II (i.e., based on $D1_t(.90)$). For each estimate, the corresponding t-statistic and the country that is being excluded. Columns (3) and (4) do the same, but they apply to regression (2) in Table II (i.e., based on $D2_t(.04)$.

.30 and .20 instead of .40 in column (2) of Table II. This generates 80 and 122 bad times country-years.

The estimated values of $\tilde{\gamma}_1$ decline slightly in absolute value as the definition becomes looser, but it remains significant throughout. The estimated values of $\tilde{\gamma}_2$ display a less clear pattern under $D1_t$; they rise and become more significant under $D2_t$ as the cutoff point is relaxed.

The general conclusion is that, up to the first 25–30 percent of the sample, the evidence on a drastic change in pattern of the effects of government spending is very strong, while again the conclusion must be nuanced in the case of taxes.

D. Influential Countries

The purpose of Table VI is to study whether certain countries have a disproportionate impact on these results. Column (1) displays the same benchmark regression of column (1) in Table II, but excluding one country at a time. For each coefficient this column reports the smallest estimate (in absolute value) out of the nineteen regressions one can run excluding one country at a time, and the country that is being excluded when this smallest estimate is obtained. Thus, this column can be interpreted as displaying the "least favorable" regressions from the point of view of the theory, particularly when the values of $\tilde{\gamma}_1$ and $\tilde{\gamma}_2$ are considered. By contrast, column (2) displays the largest coefficient, in absolute value, and therefore can be interpreted as showing the "best" regressions. Columns (3) and (4) do the same, but on the alternative definition of bad times, $D2_t$.

The first two columns deliver two key messages. The estimates of γ_1 are very robust: no matter which country is excluded, they are always highly significant. The estimates of $\tilde{\gamma}_1$ appear to be less robust: the exclusion of Sweden causes the estimated value to drop to -1.00 from 1.61, with a p-value of .12. However, in evaluating this result, one should keep in mind that Sweden represents almost 40 percent of the sample of bad times years under the benchmark definition of $D1_t$. In fact, when the bad times dummy variable is $D2_t$ (columns (3) and (4)), or when a looser definition of $D1_t$, such as $D1_t(.80)$ or $D1_t(.70)$, is assumed (not shown), the estimate of $\tilde{\gamma}_1$ does not become insignificant when Sweden is excluded.

The second key message is that the estimates of the coefficients of tax shocks in good times, γ_2, is also very robust. Under $D1_t$ it oscillates between a maximum of $-.28$ when Denmark is excluded, with a t-statistic of 2.43, and a minimum of $-.38$ when Sweden is excluded. Under $D2_t$ it oscillates between a maximum of $-.20$ when Denmark or Ireland is excluded, with t-statistics of 1.92 and 2.03, respectively, and a minimum of $-.30$ when Sweden is excluded. The estimate of $\tilde{\gamma}_2$, however, is less robust: under $D1_t$, and when the Netherlands is excluded, its t-statistic drops to 1.55; under $D2_t$ its t-statistics never reaches the value of 1. Under $D2_t$ the estimate of $\tilde{\gamma}_2$ is insignificant to start with, and remains such no matter which country is excluded.

VIII. Discussion and Conclusions

As mentioned above, as a model of the effects of taxation, the present model has a logic similar to that of Blanchard [1990] and Sutherland [1997]. There, individuals expect that when the debt/GDP ratio hits a certain level $\bar{b}$, a large and very disruptive upward jump in taxation will occur, thereby reducing the wealth of currently alive individuals. A consolidation that occurs before the debt/GDP ratio reaches $\bar{b}$ eliminates the need for this large tax increase, and therefore can have positive wealth effects. Thus, the logic of these models is similar to a "Peso problem," in that the behavior of the private sector is driven by the expectation of a rare and momentous event that might not have materialized in the sample. The common element with the present model is that, in expectation, the path of taxation is not flat. The reason, however, is different, and as a result the present model does not require a large discontinuity in the reaction function of policy-makers (at the threshold level of debt/GDP ratio $\bar{b}$), or in the expectations of individuals. A second difference is that my model does not rely on a "Peso-problem" logic.

The only model I am aware of designed explicitly to capture the effects of government expenditure in the type of episodes mentioned above is Bertola and Drazen [1993]. The framework there is wholly neoclassical, in that individuals are infinitely lived and government consumption is pure waste. Hence, normally a consolidation via a cut in government consumption increases human wealth and is associated with an increase in private consumption. But when the government consumption/GDP ratio hits a threshold value $\bar{g}$, individuals expect a large cut in government consumption, and therefore, a large increase in wealth. Thus, any reduction in government consumption before that reduces the probability of reaching $\bar{g}$ soon, and therefore it has a negative wealth effect. Hence, at high levels of government consumption the model implies *a positive* association between government consumption and private consumption, conceptually the opposite of what the present model delivers.[31] The key difference in my model is that, in addition to the standard neoclassical wealth effect, government consumption also has a positive demand effect. For the overall effect to switch sign at higher levels of government consumption (or debt, as in my model), one also needs the coexistence of constrained and unconstrained individuals.

Exactly what types of wealth effects are captured in the regressions of the present paper is not easy to assess. Fiscal policy can affect human wealth by impacting on the size of future

31. The Bertola and Drazen model is designed to fit the correlation between the government consumption/GDP ratio and the private consumption/GDP ratio observed in many episodes of consolidations, like Ireland and Denmark in the 1980s. There, as government consumption as a share of GDP fell sharply, private consumption increased substantially, as discussed in the introduction. However, it *fell* as a share of GDP, but only because investment and net exports increased even more. Because in the Bertola-Drazen neoclassical model GDP is constant, there is no difference in the signs of the movements of private consumption and of the private consumption/GDP ratio. But in reality, the difference was sharp.

disposable income, given interest rates: this is the mechanism discussed in the model developed in the paper. Alternatively, it can affect wealth by impacting on nominal and real interest rates, given the flow of future disposable income. If a consolidation reduces nominal interest rates, the value of assets denominated in nominal terms increases. Because bad times are normally associated with high levels of public debt, this is a potentially important source of asymmetry between good and bad times. Similar considerations apply to a fall in the real interest rate.

Disentangling these effects is difficult in the present context. One would need information on the market value of government debt, of the housing stock, and of the stock market. These variables exist only for a few countries in the present sample, and are often of dubious quality. A related problem which is difficult to address in the present context is that of the policies associated with fiscal consolidations. If there is a set of monetary and exchange rate policies that systematically accompany cuts in government consumption in difficult times, their effects would obviously be picked up by the fiscal policy coefficients in the regressions displayed above. However, note that for this to happen, these policies should help predict future wealth independently of their effects on current disposable income.

A second candidate for an explanation of the results of this paper is substitution effects from interest rate changes. If a fiscal policy shock causes a *temporary* fall in interest rates, consumers would try to take advantage of the temporarily low intertemporal price of consumption. This "temporariness hypothesis" figures prominently in the analysis of the consumption booms in Latin America (see, e.g., Rebelo and Vegh [1995] for a survey), but it is unlikely to be an important factor in the group of OECD countries considered here.[32]

A third candidate for an explanation of a significant coefficient of government expenditure surprises in a consumption regression is nonseparability between private and public consumption: see Aschauer [1985] and Campbell and Mankiw [1989], for evidence on U. S. data and Karras [1994] for evidence on cross-country data. While the conclusions of these contributions span the entire possible range, from complementarity to substitutability, this explanation is again unlikely to apply to the evidence

32. In addition, Reinhart and Vegh [1995] have convincingly argued that the intertemporal elasticity of substitution in consumption is too low to account for most of the observed changes in consumption even in Latin America.

presented here. In fact, it is not clear why private and government consumption should be good substitutes in difficult times, but not in normal times.

APPENDIX 1

The variance-covariance matrix is estimated as

$$\hat{V} = [(M'S)W^{-1}(M'S)']^{-1}, \tag{A.1}$$

where M is the $(\overline{T} \times \overline{K})$ matrix of observations on the independent variables in regression (15), S is the $(\overline{T} \times \overline{K}_S)$ matrix of instruments,[33] $\overline{T}$ is the total number of observations, $\overline{K}$ the number of independent variables, and $\overline{K}_S$ is the number of instruments. The matrix W is basically the sum of country-specific Newey-West variance-covariance matrices:

$$W = \frac{1}{N} \sum_{i=1}^{N} \frac{1}{T_i} \sum_{k=-1}^{1} A(k,L) \sum_{t=1}^{T_i-k} \hat{\delta}'_{t+k}\hat{\delta}_t, \tag{A.2}$$

where $\hat{\delta}_t$ is the row vector $s_t\hat{u}_t$, $\hat{u}_t$ is the residual from the preliminary regression, $A(k,L)$ is the kernel, i indicates the country, and N is the total number of countries. $\hat{u}_t$ is defined by

$$\hat{u}_t = \Delta C_t - \hat{\gamma}_1^u \hat{\epsilon}_t^G - \hat{\tilde{\gamma}}_1^u D_t \hat{\epsilon}_t^G - \hat{\gamma}_2^u \hat{\epsilon}_t^T - \hat{\tilde{\gamma}}_2^u D_t \hat{\epsilon}_t^T - \hat{\mu}\Delta Y_t. \tag{A.3}$$

Note that ΔY_t, not $\widehat{\Delta Y}_{t/t}$, appears in equation (A.3).

DATA APPENDIX

Government debt: all data refer to the general government and come from the OECD Economic Outlook data set, with the following exceptions:

Australia 1965–1994: *Federal Reserve Bank of Australia Bulletin.*

Austria 1965–1970 (Central Government): *United Nations Statistical Yearbook.*

Denmark 1965–1971: *Danmarks Nationalsbank: Monetary Review.*

France 1965–1977 (Central Government): *United Nations Statistical Yearbook.*

Ireland 1965–1973: *Central Bank of Ireland Bulletin.*

Netherlands 1965–1969: *Central Bureau of Statistics.*

33. In the first approach (equation (14)), the matrix M includes $\widehat{\Delta X}_{t/t-1}$ instead of ΔY_t, and S is equal to M.

Norway 1965–1970 (Central Government): *United Nations Statistical Yearbook.*
Portugal 1965–1970 (Central Government): *United Nations Statistical Yearbook.*
Spain 1965–1970: *Banco de Espana, Informe Anual.*
Sweden 1965–1994: *Allman Manads Statistik, Statistik Centralbgvan.*

Household disposable income: from *OECD Economic Outlook,* except:
Ireland 1965–1971: *OECD National Income Accounts.*
Netherlands 1965–1969: *OECD National Income Accounts.*

Direct taxes on households: from *OECD Economic Outlook,* except:
Ireland 1965–1969: *OECD National Income Accounts.*
Ireland 1970–1976: *OECD Revenue Statistics of Member Countries,* line nes1100, general government.
Netherlands 1965–1969: *OECD National Income Accounts.*
Norway 1965–1974: *OECD Revenue Statistics of Member Countries.*

Social security taxes paid by employees: from *OECD Revenue Statistics of Member Countries,* lines nes2100 (paid by employees) + nes2300 (paid by self-employed), general government.
Italy: Social security taxes received by general government, *OECD Economic Outlook.*

Indirect taxes: from *OECD Economic Outlook,* except:
Netherlands 1965–1969: *OECD National Income Accounts.*

Government consumption: from *OECD Economic Outlook,* except:
Ireland 1965–1969: *OECD National Income Accounts.*
Ireland 1970–1976: *OECD Revenue Statistics of Member Countries,* line nes1100, general government.
Netherlands 1965–1969: *OECD National Income Accounts.*
Norway 1965–1974: *OECD Revenue Statistics of Member Countries.*

Loan-to-Value Ratio: ratio of loan to value of house in average mortgage contract, from Jappelli and Pagano [1994].
Country-decades with Loan-to-Value ratio larger than 80 percent ("High-LTV"): Australia 1980–1994, Canada 1980–1994, Germany 1980–1994, Denmark 1970–1994, Spain 1980–1994, Finland, France, United Kingdom 1970–1994, Ireland, Norway 1980–1994, Sweden, United States.

Country-decades with Loan-to-Value ratio less than 80 percent ("Low-LTV"):
Australia 1965–1980, Austria, Belgium, Canada 1965–1980, Germany 1965–1980.
Denmark 1965–1970, Spain 1965–1980, Greece, Italy, Japan, Netherlands, Norway 1965–1980, Portugal.

In some cases, the Loan-to-Value Ratio was not available. In these cases, I assigned a decade to the High-LTV or Low-LTV group of countries assuming that the Loan-to-Value ratio does not decrease over time, which is always true for the countries for which Jappelli and Pagano report data over time. Hence, if in country X the Loan-to-Value ratio is 70 percent in 1970–1980, and it is missing in 1965–1970, I assume the Loan-to-Value ratio in 1965–1970 to be no greater than 70 percent, and hence I code 1965–1970 in country X as Low-LTV. The United Kingdom does not have data 1965–1970, and in 1970–1980 the Loan-to-Value ratio is above 80 percent. Hence, I could not code the 1965–1970 decade in the United Kingdom.

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