

Searching for Non-Keynesian Effects of Fiscal Policy

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September 1998

Abstract

We search for the circumstances in which the response of national saving to fiscal policy contradicts conventional Keynesian predictions, using data from 18 OECD countries. The data suggest that non-Keynesian effects are associated with large and persistent fiscal impulses. Such responses can be traced to changes in taxes and transfers, more than to changes in government consumption, and are stronger for fiscal contractions than expansions. During large contractions an increase in taxes has no effect on national saving. High or rapidly growing public debt is not a good predictor of non-Keynesian effects. Finally, the composition of the fiscal impulse matters: the non-Keynesian effects of a large fiscal contraction are enhanced when this is carried out primarily by raising taxes.

Key words: fiscal policy, national saving, contractionary fiscal expansions.

JEL classification: E21, E62, H31.

Financial support for this paper has been provided by the Training and Mobility of Researchers Network Program (TMR) of the European Commission DGXII, the Italian National Research Council (CNR) and the Ministry of University and Scientific Research (MURST). Francesco Giavazzi is associated with IGER, Università Bocconi, NBER and CEPR. Tullio Jappelli and Marco Pagano are associated with CSEF, Università di Salerno, and CEPR. Giovanni Radicella provided valuable research assistance at an early stage of this project.

1. Introduction

Even though fiscal policy is a classic theme in macroeconomics, there is no consensus about the size and even the sign of its effects on private sector behavior. Renewed interest in this question was recently spurred by the surprising consequences of two episodes of fiscal retrenchment which occurred in Europe during the 1980s. In Denmark, between 1983 and 1986, a reduction in the full-employment budget of 7.2 percent of GDP was accompanied by a boom in private consumption and investment which led to a sharp acceleration of growth. In Ireland, between 1987 and 1989, a similar cut in the full-employment surplus (5.7 percent of GDP) was also accompanied by higher growth. Shortly afterwards, the Swedish fiscal expansion of the early 1990s was associated with a sharp contraction in economic activity, a symmetric case relative to the Danish and Irish experiences. These episodes contradict the Keynesian view that an increase in the government surplus is contractionary, and raise two important questions. First, was there something unique to the Danish, Irish and Swedish experiences, or did similar episodes arise in other countries as well? If so, can one identify circumstances in which fiscal policy is more likely to display such non-Keynesian effects?

There is no lack of theoretical models consistent with non-Keynesian outcomes, as we shall see in Section 2. Expansionary contractions can be explained by the effects that fiscal policy can have on the market value of wealth and on expectations about future taxes. A fiscal contraction often reduces interest rates, raising the market value of stocks, bonds and housing, thus stimulating aggregate demand. It can also drastically change the view that people have about the future of the economy, and therefore the estimate of their human capital. For instance, in a high-debt country a fiscal correction may prevent a financial crisis, thus improving confidence and increasing consumption and investment. These issues have been investigated by several empirical studies, reviewed in Section 3. They typically confirm that indeed expansionary contractions can happen.

What remains to be understood is under what conditions does a fiscal consolidation induce an expansion or, viceversa, a fiscal expansion brings about a contraction. This is the aim of our paper. Such conditions fall, in principle, in two classes. First, the circumstances under which fiscal policy is carried out. Perotti (1997), for instance, shows that the outcome of a consolidation is more likely to be expansionary when public debt is high, or has been growing

rapidly. Second, the size and composition of the fiscal impulse. Giavazzi and Pagano (1996) find that private sector behavior depends on the size and persistence of the fiscal impulse. But in principle the composition of the fiscal impulse may also matter: the private sector response may differ depending on whether the budget is cut by slashing public sector wages and reducing social security benefits, or by raising taxes and cutting public investment. The aim of this paper is to search systematically which of these factors is associated to non-Keynesian effects of fiscal policy.

Previous studies have mainly analyzed the response of private consumption and investment to taxes and government spending. We instead focus on national saving to discriminate between competing hypotheses about the effect of fiscal policy on private sector's expectations. For instance, the Keynesian view predicts that an increase in taxes raises national saving. Models with infinite horizons suggest that, given government spending, taxes have no effect on national saving. Other hypotheses suggest that the sign and size of the effect of taxes on national saving depend on the level and sustainability of government debt, the size and persistence of the fiscal impulse, and the change in composition of the budget.

As most of the studies conducted so far, our empirical analysis is based on a panel of national accounts data for the OECD countries over the last three decades (1970-1996). In section 4 we propose a simple but flexible framework to analyze the impact of fiscal policy on national saving. In our empirical specification the impact of fiscal policy on national saving can depend on: (i) the sign of the impulse (budget cut or expansion); (ii) its size and duration; (iii) the level or growth rate of public debt before the fiscal impulse; (iv) the composition of the impulse (changes in taxes and transfers relative to changes in government consumption, changes in public investment or in social security entitlements). The main results of the empirical analysis are summarized in Section 5.

2. Competing Theories

In this section we outline the main competing hypotheses on the response of national saving to fiscal impulses. The models generally state their predictions with reference to private consumption. We shall map them into hypotheses about the response of national saving, to

facilitate the interpretation of the regressions presented in section 4, where national saving is the dependent variable. Recall, from presented accounting definitions, that national saving is the difference between national income and the sum of private and public consumption:

$$S = S_G + S_P = (T - G) + (Y - T - C) = Y - (C + G), \quad (1)$$

where S denotes national saving, S_G government saving (or surplus), S_P private saving, Y national income, T taxes net of transfers and G government purchases of goods and services. The predictions of the main hypothesis are summarized in Table 1.

2.1. Net Taxes

In the familiar Keynesian model, an increase in taxes - for given public spending - increases the government surplus while depressing private consumption and saving. But the increase in the government surplus exceeds the fall in private saving (for every dollar of additional taxes the private sector reduces its saving by a fraction of a dollar), so that on balance higher taxes translates into higher national saving.

Even in the Keynesian model, however, wealth effects can overturn this prediction. If the increase in the government surplus reduces the interest rate - either via a traditional crowding-in mechanism, or by reducing the default premium on the public debt - the induced appreciation of stocks, bonds and housing can trigger a consumption boom and thus a reduction in national saving.

In full employment models with intertemporally optimizing households, the effect of a tax increase on national saving depends on the planning horizon, on the distortionary effect of taxes and on the perception of future fiscal policies. The benchmark case is that of a temporary increase in lump-sum taxes, where the additional revenue raised is used to retire public debt and reduce the taxes levied on future generations, holding government consumption constant. If households have a finite planning horizon, as in overlapping generations models with non-altruistic consumers, net lifetime income falls for the current generation. Households then reduce their consumption and saving accordingly. The reduction in saving, however, falls short of the tax increase, as households spread the reduction in consumption over their lifetime. The

implied increase in government surplus thus exceeds the fall in private saving, leading to a positive correlation between taxes and national saving, as in the Keynesian model.

If instead households plan over an infinite horizon, one obtains the well-known neutrality result, often labeled as complete tax discounting or “Ricardian irrelevance proposition”. A temporary tax increase does not affect private consumption, because the reduction in disposable income reduces private saving one for one. National saving is unaffected: the fall of private saving precisely matches the increase in government surplus.

If taxes are distortionary, this neutrality result no longer obtains, even in infinite horizon models. A tax increase today, matched by lower taxes tomorrow, changes the deadweight cost of taxes at different dates and thereby affects the present value of pre-tax lifetime income. Under some circumstances, this can lead to non-Keynesian results, as illustrated by Blanchard (1990). He assumes that the deadweight cost of taxation is highly non-linear. It is zero until the tax rate reaches a critical level; positive and high above that threshold. If public debt and spending are high compared to current tax revenue, an increase in current taxes reduces the chances that the government will have to raise the tax rate above the critical level in the future. This increases the expected value of households’ future disposable income and thus private consumption. Since in Blanchard’s model Y and G are given, the increase in current taxes reduces national saving (see equation 1 above). This exemplifies a more general point. If the deadweight cost of taxes is an increasing function of the tax rate, an increase in current taxes may translate into lower saving. This effect is more likely to arise if current taxes are low relative to the permanent taxes required by the public debt outstanding and the level of public spending.¹ The prediction is that the impact of taxes on national saving is considerably attenuated (and can even switch from negative to positive) depending on the debt-income ratio and the public consumption-income ratio.

This line of reasoning can be extended to deal with other non-linear effects of fiscal policy. For instance, assume that the current fiscal policy stance is unsustainable. Unless it is corrected it will lead to repudiation of public debt, disrupting the financial sector and the real economy. Raising taxes lowers the probability of default. The implied increase in future income

¹If the government is raising relatively little tax revenues today given its debt level and its spending path, it is implicitly leaving most of the tax burden for the future, inefficiently imposing a very large deadweight cost on future production. In this situation, shifting part of this tax burden to the current

raises current private consumption and reduces national saving. In this example the non-Keynesian response of the private sector hinges on the confidence that people place on the switch to “sound finance”. If the credibility of the regime shift is enhanced by the magnitude of the fiscal turnaround (as suggested by Feldstein, 1982) sufficiently large changes in current taxes could trigger non-Keynesian effects.

Sutherland (1997) provides another model where expectations can trigger non-Keynesian policy outcomes. Suppose that consumers have finite planning horizons, so that increases in taxes normally depress consumption and raise national saving. But consumers expect that, once the public debt-income ratio exceeds a given threshold, a major stabilization will occur. If the debt-income ratio is close to the threshold, an increase in current taxes delays the time when the threshold is reached, and postpones the “day of reckoning”, making the readjustment more likely to fall on the shoulders of future generations. Paradoxically, the tax increase raises the expected lifetime disposable income and the consumption of the current generation. The effect of taxes on national saving is again attenuated.

2.2. Government Consumption

There is greater theoretical consensus about the effects of an increase in government consumption than for an increase in taxes: all standard models predict a negative or zero impact on national saving. In the Keynesian model a fiscal expansion reduces investment and national saving. The negative effect can be attenuated, or even reversed, by wealth effects. If greater spending pushes interest rates up, the market value of wealth falls, inducing households to save more.

In an infinite horizon model with complete tax discounting and no tax distortions, government consumption “crowds out” private consumption one for one: each dollar of extra spending by the government subtracts a dollar from permanent income and thereby from consumption ($\Delta C = -\Delta G$). Since without tax distortions the path of pre-tax income Y is given, from equation (1) we see that an increase in G leaves national saving unchanged. In the

period goes in the direction of efficient “tax smoothing” and thus can have beneficial effects on consumption.

presence of distortionary taxes, the effect will be negative, unless the greater tax distortions also affect the level of investment.²

Therefore, as in the Keynesian model, the effect of higher public consumption on national saving is zero or negative. Similarly, in a model with finite horizon greater public consumption (whether funded by taxes or public debt) reduces private saving. Since the effect on public saving is also negative, an increase in public consumption reduces national saving.

As in the case of taxes, these predictions can be altered by the effects of expectations. Suppose that large increases in public spending are taken to be a signal of transition to a regime of higher permanent spending and therefore higher permanent taxes. Instead, small increases in public spending are expected to be reversed in the future. A large increase in public consumption has then a contractionary effect on private consumption and leaves national saving unchanged (in the benchmark case of complete tax discounting with no distortions). Instead, a small increase in government consumption does not affect private consumption but reduces the public surplus and national saving. This argument proposed by Feldstein (1982) and Drazen (1990), suggests a potential non-linearity in the effect of government consumption on national saving.

Non-linearities driven by expectations can go even further. Bertola and Drazen (1993) show that expectations could change the sign of the relation between government consumption and national saving. A small increase in public spending could induce a large drop in private consumption and therefore even increase national saving. Suppose a fiscal stabilization is expected to occur with some probability when public spending reaches a threshold level.³ Before the threshold is reached, an increase in government consumption reduces private consumption less than one-for-one, and therefore leads to a fall in national saving as in a Keynesian model. But if government consumption keeps increasing even after the threshold is reached, consumers will sharply revise downward their estimate of their permanent income and consumption, because the expected stabilization failed to materialize. This model therefore predicts that the sign of the correlation between government consumption and national saving depends on the level of public spending relative to income.

²This can happen, for instance, if taxes are also levied on capital income.

³The difference with the case discussed in the previous paragraph is that here the stabilization only occurs with some probability when the threshold is reached.

As summarized in Table 1, the predicted response of national saving to fiscal impulses differs greatly across models. The theories surveyed in this section, however, direct us to the variables associated with one or another of such responses. We shall use this information as a guide in our empirical search for the conditions under which a fiscal impulse can produce non-Keynesian outcomes.

3. Previous Evidence and Data Description

So far, empirical studies of unusual fiscal episodes have followed two approaches. Some studies distinguish the episodes on the basis of some ex post criterion (e.g. the success of a fiscal contraction in reducing the debt-GDP ratio) and describe the characteristics of the fiscal impulse and the associated behavior of various endogenous variables (income growth, interest rates, or the exchange rate). These studies directly ask what makes a stabilization “successful”, without addressing the intermediate question: how the private sector responds to a fiscal impulse. This is an important question, considering that the ability of a fiscal contraction to reduce the debt-GDP ratio largely depends on the response of private demand to the fiscal impulse. Other studies distinguish instead fiscal episodes on the basis of an ex ante criterion (e.g. the size or persistence of the fiscal stimulus) and then assess the effect of the government’s action on endogenous variables, such as private consumption and investment.

The latter approach was prompted by the analysis of two episodes of non-Keynesian effects of fiscal policy: the Danish stabilization of 1983-86, and the Irish stabilization of 1987-89. Giavazzi and Pagano (1990) conclude that in those episodes the size of the budgetary contraction was so large as to change expectations about future fiscal policy, and thereby people's estimates of their permanent income. Further evidence in favor of the hypothesis of a non-monotonic response of private consumption to fiscal contractions - recessionary for small contractions, expansionary for large consolidations - is provided in Giavazzi and Pagano (1996), using a panel of OECD countries and analyzing the turnaround of Swedish fiscal policy in the early 1990s. This paper shows that the non-monotonicity also applies to fiscal expansions. Large increases in the full-employment primary deficit dampen private consumption, while moderate ones produce the traditional Keynesian outcome. All these

studies rely on the size and persistence of the change in surplus as the ex ante criterion determining the effects of fiscal policy on private consumption.⁴

A different approach is taken by Alesina and Perotti (1996, 1997), Alesina and Ardagna (1998) and the IMF (1996), who study fiscal contractions classifying the various episodes according to their ex post performance. Alesina and Perotti (1996) define as “successful” those contractions which three years out produce a reduction of the debt-GDP ratio of at least 5 percentage points. According to their evidence, fiscal consolidations are more likely to stabilize the debt-GDP ratio when the improvement in the budget is obtained by cutting public wages and pension benefits. This result is consistent with the view that non-monotonicities in the effects of fiscal policy are associated with a shift in expectations. Slashing what they term as the “untouchable” items of the budget (public sector wages and pensions) could signal that a regime shift has occurred.

The IMF (1996), based on McDermott and Wescott (1996), defines “aggressive fiscal impulse” a tightening of the budget of at least 1.5 percentage points of GDP for 2, or more, consecutive years; and “successful” those stabilizations that managed to reduce by at least 3 percentage points the debt-GDP ratio within two years. Out of 63 “aggressive” episodes which occurred between 1970 and 1995, the 14 “successful” ones are associated with higher GDP growth, lower unemployment, lower real interest rates and real exchange rate appreciation. This is further evidence that fiscal policy can have non-monotonic effects.

In this paper we analyze the relation between fiscal policy and private saving using an ex-ante criterion based on the theories surveyed in Section 2. Accordingly, we test if the relation between fiscal policy and private saving changes when: (i) the fiscal impulse is sizable and protracted; (ii) the debt-GDP ratio has reached a threshold level, or (iii) public debt is growing very rapidly.⁵

Our strategy in the next section is to estimate a saving function interacting fiscal variables with a set of dummies which capture the various circumstances detected above: one

⁴In a similar vein, the OECD (1996) asks if similar results obtain with reference to output growth rather than consumption. It identifies 15 episodes - occurred between 1974 and 1995 - in which the cyclically-adjusted financial balance improves by at least 3 percentage points of GDP continuously over at least 2 consecutive years. It finds that fiscal consolidation did not uniformly lead to low growth, but the results are inconclusive: “overall there appears to be little relationship between either the extent or the pace of consolidation and growth rates during the process” (p. 39).

identifies fiscal episodes which are “sizable and protracted”, one those that happened after the debt-GDP ratio exceeded a given threshold, etc.

We define a “large and persistent fiscal episode” as one in which the full employment surplus changes by at least 1.5 percent per year, on average, over a two-year period. This definition is similar to that used by Giavazzi and Pagano (1996) and by the IMF (1996). As indicated in Table 2, we identify 38 episodes of sizable fiscal expansions and 65 contractions. These listed in the Appendix.

Table 2 reports averages of selected macroeconomic variables before, during and after these fiscal episodes, separately for large expansions and large contractions. The figures contradict the Keynesian wisdom about the effect of expansionary and contractionary fiscal policy. For instance, after expansions and contractions alike, GDP and consumption growth fall relative to their average before the fiscal episodes. However, for both GDP and consumption the average growth decline is stronger after the 38 expansions than after the 65 contractions. GDP and consumption growth are also higher during fiscal contractions than during expansions. The national saving rate falls considerably after fiscal expansions (from 23.29 percent to 20.22 percent), as would be expected under the Keynesian view. However, large fiscal contractions increase only slightly national saving (from 21.89 to 22.70 percent). The descriptive statistics thus uncover important asymmetries in the response of national saving to expansions and contractions. We shall properly address this issue in the next section by regression analysis. Notice finally that the table also indicates that the large fiscal consolidations have heavily relied on tax increases rather than cuts in public consumption, and have managed to stabilize the debt-GDP ratio, on average.

4. Empirical Results

We describe the impact of fiscal policy on national saving by estimating the regression:

$$\frac{S}{Y} = \alpha_0 + \alpha_1 \rho + \alpha_2 r + \beta_1 \frac{T}{Y} + \beta_2 d \frac{T}{Y} + \gamma_1 \frac{G}{Y} + \gamma_2 d \frac{G}{Y} \quad (2)$$

⁵ Early evidence pointing to a role of the debt-GDP ratio in determining the degree of tax discounting of

where ρ denotes the growth rate of national income and r the real interest rate. The variable d is a dummy variable which identifies the circumstances under which fiscal policy can have non-monotonic effects according to the theories surveyed in Section 2. A more detailed description of this variable is provided below.

Our empirical specification can nest conveniently the various hypothesis laid out in Section 2. Keynesian and finite horizon models suggest that an increase in taxes raises national saving ($\beta_1 > 0$), whereas an increase in government consumption reduces it ($\gamma_1 < 0$). In the infinite horizon model with lump-sum taxes, fiscal policy has no effect on national saving ($\beta_1 = 0$ and $\gamma_1 = 0$). However, in some circumstances, the private sector response to fiscal shocks can be dramatically altered by expectational mechanisms. To capture these circumstances, T and G are interacted with appropriately designed dummy variables d .

Several studies have estimated versions of equation (2) using time series data on individual countries and international cross-sections or panels (Modigliani, 1990; Masson, Bayoumi and Samiei, 1996). The main problem in estimating equation (2) is the potential endogeneity of current taxes. We thus instrument taxes with the full-employment government surplus net of interest payments, as measured by the OECD. We use data on 18 OECD countries from 1970 to 1996, but due to missing values for the full employment government surplus, for some countries the sample is shorter (details are provided in the Appendix). To avoid contemporaneous correlation between output and saving, the growth rate in equation (2) is measured as a five year average of past growth rates. The dynamics of the national saving rate is captured by its lagged value. The (ex post) real interest rate is the difference between the domestic short term rate and the inflation rate, based on the deflator of private consumption. Since the interest rate is also potentially endogenous, we use its lagged value as instrument. Each regression includes dummies to control for country-specific effects. Demographic variables (such as the proportion of the population in the 15-64 age bracket) were found to be not statistically significant, and are not included in the reported results.

Column (1) of Table 3 presents the estimates of equation (2). Initially we do not interact the fiscal variables with the dummy variables d , so as to have a benchmark specification where the effects of G and T are constrained to be linear. The estimated

the private sector is provided by Nicoletti (1988)

coefficient of the growth rate is consistent with several studies that document a positive correlation between saving and growth.⁶ The effect of a change in the real interest rate, which in principle is ambiguous, is estimated to be positive (0.050) and significantly different from zero at the 5 percent level. The coefficients of T and G are respectively positive (0.300) and negative (-0.637), and both are significantly different from zero at the 1 percent level. These results strongly contradict the infinite horizon model, and support the Keynesian view of the effects of fiscal policy. Given the continuing debate over the Ricardian irrelevance proposition, these results are of interest in their own right.⁷

The other regressions reported in Table 3 test the hypothesis that the fiscal policy coefficients are stable. Our strategy is to identify possible structural breaks in the relation between fiscal policy and saving in the specific circumstances identified by the theories surveyed in Section 2. These circumstances are identified by: (i) a protracted and sizable fiscal impulse, as described in Table 2; (ii) a high debt-GDP ratio; (iii) a rapidly growing debt-GDP ratio. In each case we define an appropriate dummy variable.⁸

The results indicate that the effect of both taxes and spending is highly non-linear. During “normal” times, the effect of taxes on national saving remains positive (0.578), but during strong fiscal contractions or expansions, the effect is significantly attenuated ($0.189 = 0.578 - 0.389$). In these episodes, also the effect of government spending is significantly smaller in absolute value ($-0.537 = -0.908 + 0.371$). Since the results may be sensitive to the values chosen to define a “sizable” change in the full-employment surplus, we also experiment with changes in the surplus of 2.0, 2.5, 3.0, and 4.0 percent. The results obtained are qualitatively similar, and for brevity they are not reported.

The response of the private sector may differ depending on the sign of the fiscal impulse (as in Bertola and Drazen, 1990). To test for this asymmetric behavior, we interact G and T with two separate dummies, one for large fiscal expansions and one for large

⁶Modigliani (1990), Carroll and Weil (1994) and Jappelli and Pagano (1994) find a positive coefficient in a regression of national saving on the contemporaneous or lagged growth rate.

⁷For instance, Bernheim’s (1987) survey concludes that the data do not support Ricardian equivalence, while Seater’s (1993) conclusion is the opposite.

⁸We also experimented with a dummy which is equal to one if the effective exchange rate is devalued by more than 10 percent in the year preceding the fiscal impulse. According to the Keynesian model, a devaluation stimulates aggregate demand. Other things equal, a devaluation should compensate the recessionary impact arising from a fiscal contraction. However, the interaction terms between this dummy and fiscal variables are not significantly different from zero. For brevity, they are not reported.

contractions (the threshold is still an average change in the full-employment surplus of 1.5 percentage points for at least two years). The regression in column (3) of Table 3 indicates that the effects of fiscal policy differs across contractions and expansions. In particular, the effect of taxes is positive (0.504) in “normal” times, smaller during large fiscal expansions ($0.219=0.504-0.285$), and almost zero during large fiscal contractions ($0.036=0.504-0.468$). The bottom line is that an increase in taxes raises national saving, except during a sizable fiscal contraction. During such contractions, the increase in private consumption fully offsets the positive effect of taxes on the government surplus. The pattern of coefficients for government spending is very similar. The effect is always negative, but its absolute value is larger in normal times (-0.856) than during sizable fiscal expansions ($-0.600= -0.856+0.256$). The effect of government consumption is lowest in absolute value during sizable contractions ($-0.401= -0.856+0.455$).

According to some of the models outlined in Section 2, the effect of fiscal policy can depend on the size of public debt. In column (4) we interact taxes and spending with a dummy which is equal to 1 if the debt-GDP ratio exceeds 70 percent. The coefficients of the interaction terms are small in size and not significantly different from zero, indicating that a high debt-GDP ratio does not affect the impact of taxes and spending on national saving. Other values for the debt-GDP ratio were considered (such as 80 percent or 100 percent), but the results were qualitatively similar.

The sign and size of the response to fiscal impulses may also depend on the perceived sustainability of the fiscal regime. A regime may be perceived as “unsustainable” if the growth rate of the debt-GDP ratio at the outset of the fiscal impulse is particularly high. We thus replace the dummy for high debt with a dummy that equals 1 if the growth rate of the debt-GDP ratio exceeds 4 percent for two consecutive years, and 0 otherwise. Perotti (1997) proposes the same definition. The results of this experiment are reported in column (5) of Table 3. The sign of the interaction terms is consistent with the view that fiscal policy has a smaller impact on national saving in the wake of rapid debt accumulation. However, as in column (4), the magnitude of the interaction terms is small, and their standard errors are large.

The results so far suggest significant departures from the Keynesian model, especially at times of large fiscal contractions.⁹ The evidence that these departures are related to a high or fast-growing debt-GDP ratio is weak at best. In addition, we find that complete tax discounting occurs mainly during large fiscal contractions rather than during large fiscal expansions, a correlation not detected by previous empirical studies.

The specifications in columns (3), (4) and (5) do not allow for potential interactions among the ex-ante criteria considered. These may be complementary sources of the non-linear response of national saving to fiscal policy. The natural next step is to estimate a regression that includes all the interaction terms of these three specifications. The estimates obtained from this nested specification are displayed in column (6) of Table 3. The interaction terms of taxes and spending during large contractions are the only statistically significant coefficients (-0.443 with a t-statistic of 3.03 and 0.428 with a t-statistic of 3.04, respectively). This confirms that the main source of non-linearity is the size of the fiscal impulse, rather than the level or the growth rate of public debt. Furthermore, the size and significance of the interaction terms appear again to be stronger during fiscal contractions than during fiscal expansions. On the whole, the results strongly support the Keynesian view of fiscal policy in normal times, but reveal that the effects of changes in taxes and spending on national saving are much dampened during large fiscal contractions. The dampening is particularly strong for taxes.

We thus focus on large fiscal contractions and try to learn more about these experiences. Are there are special features of sizable fiscal contractions that make the non-linear response of national saving more likely to arise? For instance, the effect of large fiscal contractions on national saving may depend on whether they occur at a time when public debt is high or growing rapidly. Or it may depend on the composition of the fiscal impulse: the relative importance of tax hikes and cuts in government consumption, public investment, or pension transfers. These issues are addressed by interacting the dummy for “large fiscal contraction” with dummy variables capturing episodes in which:

- i. the public debt-GDP ratio exceeds 70 percent,
- ii. the average change in the debt-GDP ratio exceeds 4 percent in two consecutive years,
- iii. public investment is growing in real terms during the fiscal consolidation,

⁹ These results are consistent with Giavazzi and Pagano (1996), whose study focuses on private consumption rather than national saving.

- iv. social security benefits are reduced in real terms during the fiscal consolidation,
- v. the consolidation is effected more by raising net taxes than by cutting public consumption.

The results are reported in Table 4. All regressions are directly comparable with our preferred specification of column (3) in Table 3. The five dummy variables defined above are introduced one at a time in this basic specification. The only coefficients of the additional interaction terms that turn out to be significantly different from zero are those in column (5), where we allow for the effect of the composition of the fiscal consolidation. Specifically, we find that when large fiscal contractions are mainly carried out by raising taxes, the effects of taxes and spending on national saving are further attenuated.

The best way to understand this result is to plot the estimated impact of taxes (T/Y) on national saving. In normal times, this effect equals the product of the T/Y variable and the estimate of the coefficient β_1 . During sizable fiscal contractions, one must add to this effect the interaction of T/Y with the dummy for large contractions multiplied by the estimate of the coefficient β_2 . When fiscal contractions are mainly carried out by raising net taxes, one must add the further interaction of taxes with the corresponding dummy and coefficient. A similar decomposition can be made for the effect of government consumption.

In Figures 1 and 2 we plot the national saving rate and the estimated effects of taxes and government consumption in some of the countries that have witnessed the largest swings in fiscal policy in the last three decades: Denmark, Ireland, Italy and Sweden. We use the coefficients estimated in column 5 of Table 4. Consider the effect of taxes in the case of Ireland, displayed in the upper-right corner of Figure 1. The line marked with diamonds is the national saving rate. The middle line with circles shows the positive effect of taxes in normal times ($0.481 \times T/Y$). The dips represent the effect of the interaction terms. In our sample period, Ireland experienced four large fiscal contractions (in 1977-78, 1983-85, 1987-89, and 1991-92). In two of these, the consolidation was achieved mainly by raising net taxes (in 1983-85 and 1987-89). The effect of taxes in large fiscal contractions is smaller than in normal times $(0.481 - 0.339) \times (T/Y) = 0.142 \times (T/Y)$, and can be read off from the two dips in 1977-78 and 1991-92. When large fiscal contractions are carried out mainly by raising net taxes, the effect of taxes is negative, $(0.481 - 0.339 - 0.235) \times (T/Y) = -0.093 \times (T/Y)$. In the figure, this corresponds to the dips of 1983-85 and 1987-89, where the line falls below zero. Similar considerations

apply to the other three countries in Figure 1. In Denmark, the only two consolidations were also achieved mainly via tax increases, in Italy three out of four, and in Sweden three out of five. The figures clearly convey that taxes have a highly non-linear effect on national saving, an effect that depends on the size and the composition of the fiscal impulse.

Similar non-linear effects appear in Figure 2 for government consumption, where we plot national saving together with the effect of government consumption. In normal times the contribution of government consumption to national saving is large in absolute value and negative ($-0.788 \times G/Y$), as shown by the line marked with circles. The humps marked with crosses indicate that this effect is attenuated in large fiscal contractions (for instance, in Ireland during 1977-78 and 1991-92). The effect is further dampened when the consolidation is achieved mainly by raising net taxes. In the figure these consolidations correspond to the largest humps, which come closer to the zero line (for instance, in Ireland during 1983-85 and 1987-89).

5. Conclusions

In this paper we search systematically for the circumstances in which national saving responds to fiscal policy impulses in a way that contradicts conventional Keynesian predictions. The evidence of 18 OECD countries confirms some previous findings and complements them with a few new ones.

First, the data confirm that a non-Keynesian response of the private sector is more likely when fiscal impulses are large and persistent. Second, such response can be traced to changes in taxes and transfers, more than to changes in government consumption. Non-Keynesian effects are larger and more precisely estimated for tax changes than for changes in public consumption, as in Giavazzi and Pagano (1996). Thirdly, non-Keynesian responses appear to be asymmetric: they are stronger and more precisely estimated for fiscal contractions than for fiscal expansions. In particular, during large fiscal contractions an increase in taxes has little or no effect on national saving. Fourth, we find that high or rapidly growing public debt is not *per se* a good predictor of the occurrence of these non-monotonic responses of the private sector, in contrast with many of the relevant theoretical models and the evidence in Perotti

(1997). Fifth, and finally, when one concentrates on large fiscal contractions, one finds that the composition of the fiscal impulse matters. But, in contrast with what is often argued, the non-Keynesian effects of a large fiscal contraction are enhanced when this is carried out primarily by raising taxes. Reducing pension benefits *per se* does not appear to increase the likelihood of these effects.

These findings have potentially important policy implications. They highlight that in order to trigger the expectational mechanisms which are at the root of the non-Keynesian response of national saving it is important to act swiftly, drastically improving the budget, and that reducing the deficit via tax hikes does not reduce the likelihood of these effects compared to a cut in public consumption.

Our results are also relevant for the theories that try to explain the non-Keynesian effects of fiscal policy. Such theories typically predict that these effects should be present when the debt-GDP ratio is historically high. Our evidence does not support this prediction. The finding that only strong and persistent fiscal impulses trigger non-monotonic responses of national saving can instead be rationalized by models of regime changes, where only large and politically costly fiscal actions signal a regime change, and thus can impact private sector expectations and behavior in a non-Keynesian fashion.

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Table 1**Predicted Effects of a Fiscal Impulse on National Saving in Various Models**

| | <i>Increase in net taxes (given government consumption)</i> | <i>Increase in government consumption (given net taxes)</i> |
|---|--|--|
| Keynesian model | Positive | negative |
| Keynesian model with wealth effects | Uncertain | uncertain |
| OLG models | positive | negative |
| Infinite horizon and non distortionary taxes | No effect | no effect |
| Blanchard (1990) Sutherland (1995) | depends on debt-income ratio and on the size of tax increase (positive in normal times; attenuated or negative if debt is high or tax increase is high) | |
| Bertola and Drazen (1993) | | depends on the ratio of public consumption to income (positive if the ratio is small, lower and possibly negative otherwise); non-monotonicity applies only to expansions |

Table 2**Large Fiscal Expansions and Contractions: Summary Statistics
(OECD Countries: 1970-96)**

| | Fiscal expansions | Fiscal contractions |
|---|-------------------|---------------------|
| Growth rate of GDP | | |
| Before | 2.57 | 2.21 |
| During | 1.12 | 2.36 |
| After | 2.00 | 2.13 |
| | | |
| Growth rate of private consumption | | |
| Before | 2.43 | 2.38 |
| During | 1.91 | 2.22 |
| After | 1.71 | 2.29 |
| | | |
| Growth rate of government consumption / GDP | | |
| Before | 3.64 | 3.48 |
| During | 3.09 | 2.48 |
| After | 1.86 | 2.94 |
| | | |
| Growth rate of taxes | | |
| Before | 4.39 | 2.71 |
| During | 0.27 | 4.19 |
| After | 3.40 | 2.25 |
| | | |
| Debt / GDP | | |
| Before | 48.23 | 57.23 |
| During | 49.12 | 57.02 |
| After | 56.29 | 56.29 |
| | | |
| National saving / GDP | | |
| Before | 23.29 | 21.89 |
| During | 21.07 | 22.63 |
| After | 20.22 | 22.70 |
| | | |
| Number of fiscal episodes | 38 | 65 |

Notes. A fiscal expansion (contraction) is defined as one in which the full employment surplus falls (increases), over a two-year average, by more than 1.5 percentage points for at least two consecutive years. The growth rates before (after) the episode are the average growth rate of the variable in the three years preceding (following) the start (end) of the fiscal episode. The debt-GDP ratio and the national saving rate before (after) the episode refer to one year before (after) the start (end) of the episode. Due to missing values, the number of observations used to compute the averages in the table is in some case less than 41 for expansions and 69 for contractions.

Table 3**Determinants of Non-Keynesian Effects of Fiscal Policy**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|-----------------------------------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|
| Lagged saving | 0.504 (0.039) | 0.522 (0.040) | 0.582 (0.044) | 0.515 (0.039) | 0.520 (0.041) | 0.588 (0.049) |
| Growth rate | 0.105 (0.047) | 0.116 (0.050) | 0.134 (0.051) | 0.122 (0.046) | 0.108 (0.053) | 0.148 (0.059) |
| Interest rate | 0.050 (0.024) | 0.044 (0.025) | (0.026) (0.026) | 0.031 (0.027) | 0.044 (0.042) | -0.008 (0.046) |
| Taxes (T/Y): | 0.300 (0.075) | 0.578 (0.126) | 0.504 (0.126) | 0.294 (0.070) | 0.356 (0.082) | 0.496 (0.181) |
| --- and large change in surplus | | -0.389 (0.111) | | | | |
| --- and large increase in surplus | | | -0.468 (0.119) | | | -0.443 (0.146) |
| --- and large decrease in surplus | | | -0.285 (0.116) | | | -0.218 (0.182) |
| --- and high debt | | | | -0.039 (0.083) | | 0.042 (0.162) |
| --- and high debt growth | | | | | -0.101 (0.607) | -0.673 (0.870) |
| Government consumption (G/Y): | -0.637 (0.076) | -0.908 (0.117) | -0.856 (0.117) | -0.606 (0.076) | -0.648 (0.079) | -0.822 (0.151) |
| --- and large change in surplus | | 0.371 (0.107) | | | | |
| --- and large increase in surplus | | | 0.455 (0.114) | | | 0.428 (0.141) |
| --- and large decrease in surplus | | | 0.256 (0.113) | | | 0.183 (0.186) |
| --- and high debt | | | | 0.051 (0.073) | | -0.043 (0.159) |
| --- and high debt growth | | | | | 0.131 (0.472) | 0.560 (0.681) |
| Adjusted R^2 | 0.928 | 0.922 | 0.927 | 0.928 | 0.926 | 0.894 |

Notes. The dependent variable is the ratio of national saving to national income. The total number of observations is 417. Instruments for taxes and the interest rate are full employment government surplus and the lagged interest rate. Countries included in the estimation and sample size is reported in the Appendix. See text for the definition of the interaction terms.

Table 4**Characteristics of Large Fiscal Adjustments and Impact on National Saving**

| | (1) | (2) | (3) | (4) | (5) |
|---|-------------------|-------------------|--------------------|-------------------|-------------------|
| Lagged saving | 0.571 (0.043) | 0.588 (0.046) | 0.585 (0.044) | 0.581 (0.046) | 0.580 (0.044) |
| Growth rate | 0.103 (0.051) | 0.119 (0.056) | 0.140 (0.051) | 0.136 (0.051) | 0.165 (0.055) |
| Interest rate | 0.043 (0.027) | 0.029 (0.029) | (0.029) (0.027) | 0.024 (0.027) | 0.015 (0.027) |
| Taxes (T/Y): | 0.517 (0.128) | 0.493 (0.126) | 0.482 (0.130) | 0.511 (0.127) | 0.481 (0.127) |
| --- and large increase in surplus | -0.375 (0.108) | -0.465 (0.129) | -0.469 (0.149) | -0.473 (0.121) | -0.339 (0.131) |
| ---, large increase in surplus, and high debt | -0.192 (0.116) | | | | |
| ---, large increase in surplus, and large change in debt | | -0.275 (0.500) | | | |
| ---, large increase in surplus, and increase in public investment | | | 0.026 (0.143) | | |
| ---, large increase in surplus, and increase in pensions | | | | 0.064 (0.211) | |
| ---, large increase in surplus, and high taxes | | | | | -0.235 (0.139) |
| --- and large decrease in surplus | -0.286 (0.117) | -0.277 (0.118) | -0.267 (0.119) | -0.289 (0.117) | -0.273 (0.118) |
| Government consumption (G/Y): | -0.877 (0.119) | -0.863 (0.118) | -0.860 (0.115) | -0.856 (0.117) | -0.788 (0.121) |
| --- and large increase in surplus | 0.371 (0.107) | 0.455 (0.126) | 0.463 (0.141) | 0.459 (0.117) | 0.313 (0.131) |
| ---, large increase in surplus, and high debt | 0.136 (0.101) | | | | |
| ---, large increase in surplus, and large change in debt | | 0.179 (0.381) | | | |
| ---, large increase in surplus, and increase in public investment | | | -0.040 (0.137) | | |
| ---, large increase in surplus, and increase in pensions | | | | -0.034 (0.176) | |
| ---, large increase in surplus, and high taxes | | | | | 0.245 (0.137) |
| --- and large decrease in surplus | 0.257 (0.113) | 0.248 (0.114) | 0.239 (0.115) | 0.259 (0.113) | 0.248 (0.114) |
| Adjusted R^2 | 0.922 | 0.921 | 0.924 | 0.922 | 0.920 |

Notes. The dependent variable is the ratio of national saving to national income. The total number of observations is 417. Instruments for taxes and the interest rate are full employment government surplus and the lagged interest rate. Countries included in the estimation and sample size is reported in the Appendix. See text for the definition of the interaction terms.

Appendix

1. Definition of the Variables

All data are drawn from the OECD Economic Outlook database published in June 1997. Government data refer to the general government.

| Variable | OECD series |
|------------------------------------|-------------|
| Private consumption | CP |
| Government Consumption | CG |
| Government savings | SAVG |
| Government Debt | GGFL |
| Gross National/Domestic Product | GDPV |
| Deflator for consumer expenditure | PCP |
| Total taxes net of transfers | SAVG+CG |
| Government investment | IG |
| Social security contributions | SS |
| Social security benefits | SSPG |
| Full employment government surplus | NLQGA |

2. Countries and Sample Period Used in the Estimation

| Countries | Sample period | Expansions | Contractions |
|----------------|---------------|----------------------------|-----------------------------------|
| Australia | 1973-96 | 83-84; 90-92 | 73-74; 76-77; 80-82; 86-88; 95-96 |
| Austria | 1974-96 | 93-94 | 74-75; 77-78; 80-81; 83-85; 95-96 |
| Belgium | 1974-96 | 79-80 | 74-75; 81-87; 92-94 |
| Canada | 1973-96 | 75-76; 82-85 | 73-74; 80-81; 86-87; 94-96 |
| Denmark | 1981-96 | 81-82; 87-90 | 83-86 |
| Finland | 1973-96 | 77-80; 82-83; 86-87; 90-92 | 73-76; 84-85; 88-89; 93-96 |
| France | 1972-96 | 77-78; 81-82 | 72-73; 79-80; 83-84; 95-96 |
| Germany | 1970-96 | 74-75; 89-91 | 71-72; 76-77; 81-83; 92-94 |
| Greece | 1975-96 | 80-81; 84-85; 88-89 | 75-76; 82-83; 86-87; 90-96 |
| Ireland | 1977-96 | 89-90; 94-95 | 77-78; 82-84; 86-88; 91-92 |
| Italy | 1972-96 | 74-75; 78-79; 84-85 | 72-73; 76-77; 82-83; 92-96 |
| Japan | 1972-96 | 75-79; 92-94 | 72-74; 80-85 |
| Netherlands | 1974-96 | 76-80; | 74-75; 81-83; 87-88; 90-92 |
| Portugal | 1970-96 | 72-76; 80-81; 89-90 | 70-71; 82-86; 91-92; 94-95 |
| Spain | 1970-96 | 81-82; 89-90 | 86-87; 91-93; 95-96 |
| Sweden | 1983-96 | 90-93 | 83-84; 86-88; 94-96 |
| United Kingdom | 1970-96 | 72-74; 83-84; 91-93 | 70-71; 79-82; 89-90; 94-96 |
| United States | 1970-96 | 74-75; 82-83 | 70-71; 76-77; 94-95 |

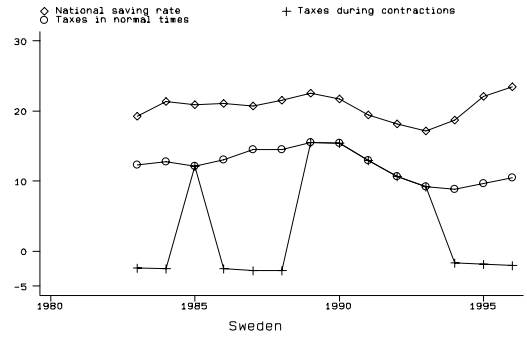
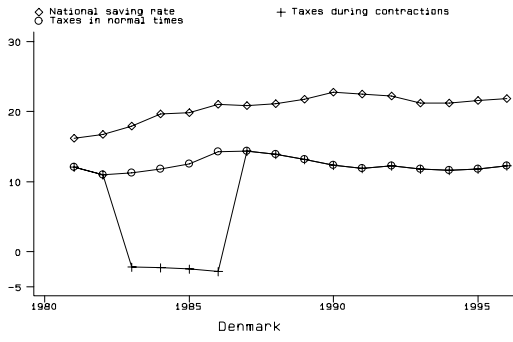


Figure 1: Effect of taxes on national saving

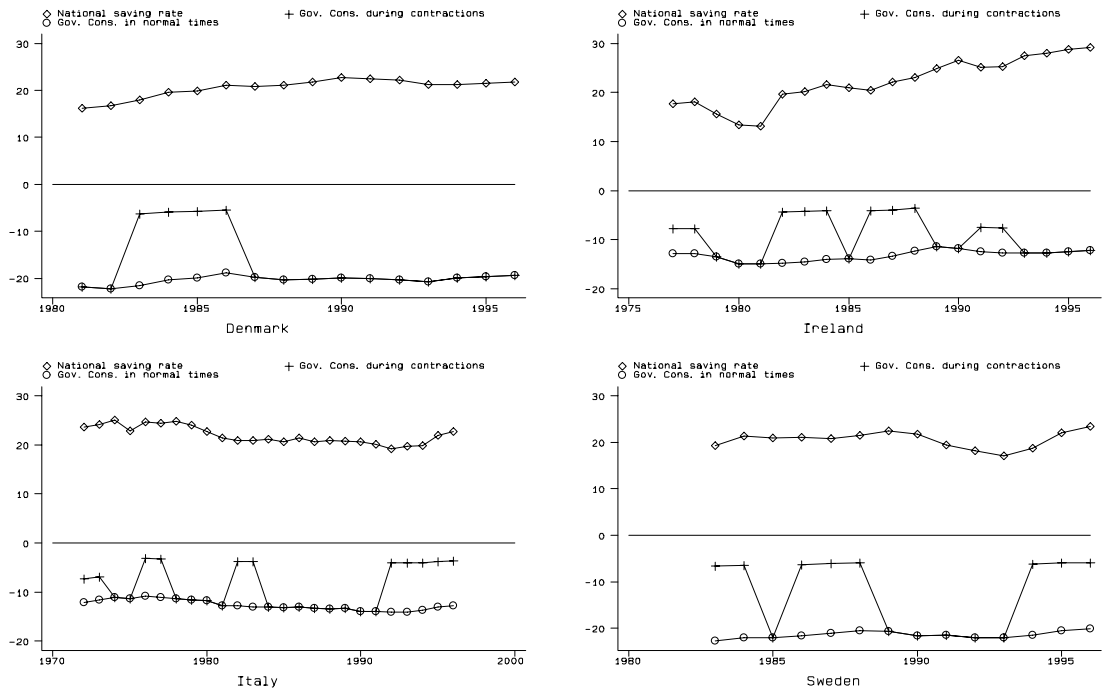


Figure 2: Effect of government consumption on national saving