October 1999

The Relationship between Large Fiscal Adjustments and Short-Term Output Growth Under Alternative Fiscal Policy Regimes

Stephen M. Miller
University of Connecticut

Frank S. Russek
Congressional Budget Office

University of Connecticut

Department of Economics Working Paper Series

The Relationship between Large Fiscal Adjustments and Short-Term Output Growth Under Alternative Fiscal Policy Regimes

Stephen M. Miller
University of Connecticut

Frank S. Russek
Congressional Budget Office

Working Paper 1999-04

October 1999, revised March 2002

---

341 Mansfield Road, Unit 1063
Storrs, CT 06269–1063
Phone: (860) 486–3022
Fax: (860) 486–4463
http://www.econ.uconn.edu/

Abstract

A small, but growing, body of literature searches for evidence of non-Keynesian effects of fiscal contractions. That is, some evidence exists that large fiscal contractions stimulate short-run economic activity. Our paper continues this research effort by systematically examining the effects, if any, of unusual fiscal events - either non-Keynesian results within a Keynesian model or Keynesian results within a neoclassical model – on short-run economic activity. We examine this issue within three separate models – a St. Louis equation, a Hall-type consumption equation, and a growth accounting equation. Our empirical findings are mixed, and do not provide strong systematic support for the view that unusually large fiscal contractions/expansions reverse the effects of normal fiscal events. Moreover, we find only limited evidence that trigger points are empirically important.

THE RELATIONSHIP BETWEEN LARGE FISCAL ADJUSTMENTS AND SHORT-TERM OUTPUT GROWTH UNDER ALTERNATIVE FISCAL POLICY REGIMES

STEPHEN M. MILLER and FRANK S. RUSSEK*
This Version: March 2002

A small, but growing, body of literature searches for evidence of non-Keynesian effects of fiscal contractions. That is, some evidence exists that large fiscal contractions stimulate short-run economic activity. Our paper continues this research effort by systematically examining the effects, if any, of unusual fiscal events – either non-Keynesian results within a Keynesian model or Keynesian results within a neoclassical model -- on short-run economic activity. The authors examine this issue within three separate models -- a St. Louis equation, a Hall-type consumption equation, and a growth accounting equation. Our empirical findings are mixed, and do not provide strong systematic support for the view that unusually large fiscal contractions/expansions reverse the effects of normal fiscal events. Moreover, the authors find only limited evidence that trigger points are empirically important.

I. INTRODUCTION

During the past quarter century, nearly all OECD countries undertook at least one large fiscal contraction to deal with high levels and rapid growth of public debt. Although such fiscal contractions were necessary to curb the growth of public debt, significant concern emerged that such actions could weaken economic growth in the short run. Those concerns seemed justified when growth slowed in many cases, sometimes resulting in recessions. But in others – most notably the fiscal contractions in Denmark (1983- 1986) and in Ireland (1987-1989), growth accelerated. Those experiences, as well as the contractionary fiscal expansion in Sweden in the early 1990s, brings into question the conventional wisdom about the effect of fiscal actions meant to stabilize cyclical fluctuations. They also generated a small, but growing, body of empirical literature looking for evidence of so-called "non-Keynesian" effects on short-term growth (e.g., Giavazzi and Pagano, 1990, 1995; Alesina and Perotti, 1995, 1997; McDermott and Wescott, 1996; Perotti, 1999; Giavazzi, Jappelli, and Pagano, 2000). That literature concluded that under certain conditions large fiscal contractions stimulate rather than retard short-term growth.

Those studies frequently distinguish between normal and unusual times -- where fiscal regimes, as measured by the change in the cyclically adjusted primary deficit, change dramatically. In some cases, the idea of a fiscal crisis also comes into play. In large part, however, differences in fiscal policy regimes were determined on an ad hoc basis. While the adopted definitions of regime changes are generally reasonable, the results regarding non-Keynesian effects may be sensitive to the definition of a regime change.

The authors use more statistically based methods for determining changes in fiscal regimes, and empirically test for the significance of more types of fiscal crises – or so-called “trigger points.” After considering Hamilton’s (1994, Ch. 22) procedure for empirically determining regime changes, the authors use a procedure previously employed by Miller (1986, 1989) in his study of short-run money demand shifts, because of sample size limitations..

After identifying different fiscal policy regimes and associated trigger points in 19 OECD countries, the authors use that information in three alternative regression equations explaining economic activity with pooled time-series, cross-section data. First, the authors estimate a St. Louis equation similar to Batten and Hafer (1983). Second, the authors estimate a Martingale equation for consumption similar to those estimated by Hall (1978) and Flavin (1981). Finally, the authors estimate a growth accounting equation similar to Levin and Renault (1992), Barro (1991), and Miller and Russek (1997).

The existing empirical literature that searches for non-Keynesian outcomes generally estimates a consumption function. The authors provide similar estimates based on Hall's specification as well as on a St. Louis equation specification. Our third empirical analysis is based on a growth accounting specification that offers the first test of the Bertola-Drazen (1993) hypothesis that unusual fiscal events may turn neo-classical outcomes into Keynesian outcomes.

With few exceptions, our findings do not provide overwhelming support for strong unusual fiscal outcomes. Unusual fiscal outcomes fall into two categories – non-Keynesian outcomes within a Keynesian model and Keynesian outcomes within a neo-classical model. Moreover, the authors find mixed evidence that non-Keynesian outcomes are more likely for government spending cuts than for tax hikes. Finally, the evidence does not indicate that trigger points matter much empirically. In sum, the evidence on unusual fiscal outcomes is idiosyncratic rather than systematic.

The paper proceeds as follows. Section II briefly outlines the possible theoretical channels of non-Keynesian effects within a Keynesian model and non-classical effects within a classical model. Section III reviews the existing empirical literature, while section IV describes our method for determining changes in fiscal policy regimes. Section V presents some descriptive statistics for fiscal contractions lasting at least three years. Sections VI, VII, and VIII, respectively, describe our data, our estimation technique, and our empirical results. Conclusions are contained in section IX.

II. THEORY

The standard textbook Keynesian model implies that government tax hikes and spending cuts both reduce the pace of short-term economic activity through their adverse effects on aggregate demand. Those effects are weakened somewhat through the associated declines in interest and exchange rates that cushion the fall in domestic demand by raising private wealth, and stimulate net exports by depreciating the domestic currency.

In contrast with the standard Keynesian model, some economists argue that under certain conditions, fiscal contractions stimulate rather than retard short-term economic activity. First, an extraordinary fall in interest rates in response to the fiscal contraction and its effect on expected future financial market conditions can generate non-Keynesian effects. Second, a decline in expected future tax liabilities can boost the economy. Finally, the improvements in international competitiveness that result from lower labor costs can stimulate the economy. Those lower labor costs follow when a reduction in the government wage bill leads to reduced wages in general.

A few studies argue that certain pre-existing fiscal conditions are necessary before fiscal contractions will have reversed effects. Sutherland (1997) and Perotti (1999), for example, propose critically high or rising levels of public debt as necessary preconditions or triggers. In those models, the sign of the effect of a fiscal contraction depends on initial fiscal conditions. On the other hand, Bertola and Drazen (1993) describe how expectations are linked to "trigger points" defined as critically high levels of government consumption relative to GDP.

Sutherland (1997) constructs a model where a fiscal expansion has usual Keynesian effects at low levels of public debt because a tax increase is not imminently expected when a debt crisis is not present. At high levels of debt, however, a further increase in public debt is expected to trigger a large tax hike in the near future that outweighs the stimulative effect of the fiscal expansion. In that case, a non-Keynesian response of private consumption occurs.

Perotti (1999) presents a model where a fiscal adjustment has typical Keynesian effects at low levels of public debt, but non-Keynesian effects at high levels. The non-Keynesian effect occurs at high levels of public debt because the negative income effect on liquidity-constrained consumers of a tax hike is outweighed by the positive wealth effect of lower expected future taxes for those not liquidity constrained. Similarly, a cut in government consumption reduces disposable income. But at high levels of public debt, it has more of a positive effect on wealth because of the fall in expected future taxes and tax distortions.

Finally, Bertola and Drazen (1993) develop a neo-classical model where an increase in government consumption has typical neo-classical effects on private consumption at low levels of government consumption. But at high levels, a further increase in government consumption stimulates private consumption because it is expected to trigger a substantial downward adjustment of government consumption (and hence taxes) in the near future. In that case of high government consumption, the relationship between changes in current public and private consumption reflects Keynesian thinking.

In sum, Sutherland (1997) and Perotti (1999) both develop models where Keynesian effects emerge in normal times while non-Keynesian effects emerge only in unusual times. That view lies behind much of the empirical literature discussed in the next section. Bertola and Drazen (1993) stand this thinking on its head as non-Keynesian (neo-classical) results emerge in normal times while Keynesian effects emerge in unusual times.

III. REVIEW OF EMPIRICAL NON-KEYNESIAN FINDINGS

The empirical literature focuses on the non-Keynesian effects of fiscal policy and reports several conclusions, including the following. First, large fiscal contractions do not necessarily cause recessions. Second, large and persistent fiscal contractions that succeed in putting the public debt-GDP ratio on a downward trend are more likely than others to produce positive, or non-Keynesian, effects on short-term growth. Finally, fiscal contractions achieved by cuts in government spending are more effective in reducing the ratio of public debt to GDP than are those achieved through tax increases.

The empirical literature also reports some inconsistent findings. First, differences of opinion exist regarding whether the size or the composition of a fiscal contraction is more important. Second, some studies emphasize faster growth of private consumption while others stress private investment. Finally, net exports are important in some studies, but not in others.

Such differences in findings may reflect how large and persistent fiscal contractions are defined. Definitions vary across studies in terms of the length and strength of a fiscal adjustment, and sometimes depend on what happens to the public debt-GDP ratio. As a result, changes in fiscal regimes do not always occur in the same years across studies, and so may associate with different economic developments.

In one of the early studies, Giavazzi and Pagano (1990) report "descriptive" regressions showing that cuts in government spending sometimes positively, rather than negatively, associate with short-term growth. In those regressions, which are based on 1973-1989 data for 10 OECD countries, no distinction is made between different fiscal policy regimes. That is, annual changes in taxes and spending are simply correlated with annual growth rates of private demands.

In their later study, Giavazzi and Pagano (1995) separate the data into ordinary and extraordinary regimes. They conclude that cuts in government spending are more likely to stimulate short-term growth when the cuts are strong and persistent. Weaker evidence is reported for non-Keynesian effects of tax increases and reductions in transfers.

Alesina and Perotti (1995) examine data for 19 OECD countries beginning in the 1960s. First, they observe that most strong fiscal contractions stem from tax increases. Second, cuts in transfers and government wages reduce the public debt-GDP ratio more than do increases in taxes or reductions in government investment. Finally, fiscal contractions that put the debt-GDP ratio on a downward trend start in periods of high growth, which may explain that result.

Alesina and Perotti (1997) conclude that fiscal contractions achieved with spending reductions endure longer and stimulate growth more than fiscal contractions achieved through tax increases. More specifically, they find non-Keynesian effects are more probable if the fiscal contraction relies on cuts in transfers and government employee compensation. They stress that cuts in government employment may put downward pressure on labor costs, and thus improve profits and international competitiveness, and stimulate domestic investment and net exports.

McDermott and Wescott (1996) report that large fiscal contractions need not produce an economic slowdown, especially if they reduce the public debt-GDP ratio. They agree with Alesina and Perotti (1995) that composition matters, and that spending cuts are more effective. But they also stress that size is important. Finally, they find that the positive response of short-term growth is related to investment rather than consumption.

Perotti (1999) examines whether changes in government spending and taxes have qualitatively different effects on private consumption with a large or rising public debt-GDP ratio. In his model, that can occur because expectations of lower future taxes disproportionately increase consumption by those who can finance additional consumption with credit. His empirical findings provide some support for such non-Keynesian effects, although most results are not statistically significant. His strongest findings are that cuts in government spending stimulate private consumption when the public debt is growing rapidly compared to GDP.

Finally, Giavazzi, Jappelli, and Pagano (2000) consider the effects of fiscal impulses on national saving rather than on private consumption. They estimate a simple saving function for OECD countries and developing countries separately. Their discussion focuses on non-linear rather than non-Keynesian effects of fiscal policy, where non-linear effects do not necessarily involve a sign reversal. For OECD countries, they conclude that large fiscal contractions possess larger non-linear effects than large fiscal expansions, consistent with the Giavazzi and Pagano (1996) results for consumption spending. Symmetry emerges, however, for large fiscal expansions and contractions in developing countries.

By focusing on non-linear effects, Giavazzi, Jappelli, and Pagano (2000) alter the terms of the debate surrounding unusual fiscal events. For example, they find that net taxes as a share of potential GDP possess a significant positive effect on national saving as a share of potential GDP under normal circumstances. If a large fiscal event occurs, the magnitude of this positive effect falls, but does not reverse. They never discover a sign reversal in their estimations. And a sign reversal must occur to produce non-Keynesian effects. Thus, finding non-linear fiscal events occurs more easily than non-Keynesian fiscal events. The authors carefully distinguish between such findings when discussing our results.

IV. IDENTIFYING FISCAL POLICY REGIMES

As indicated above, the empirical literature on the non-Keynesian effects of fiscal policy adjustments varies the definitions of changes in fiscal policy regimes. Some studies consider periods no longer than a year; others settle on two-year periods. Also, studies vary by the minimum amount of fiscal restraint or stimulus needed to qualify a fiscal adjustment as a regime change. Beyond that, studies use different criteria for changes in the public debt-GDP ratio to distinguish successful fiscal adjustments from unsuccessful ones. Such differences may explain the variation in reported non-Keynesian effects on short-term growth.

Although more than one acceptable definition of different fiscal policy regimes exists, it is surprising that most studies generally limit the preferred choice to a one- or two-year duration. Consequently, fiscal contractions or expansions lasting three years or more are viewed as a sequence of separate fiscal contractions or expansions rather than as one long and continuous period of fiscal restraint or stimulus. That practice may also affect the reported results.[1]

Limiting the length of a fiscal contraction or expansion to two years is especially questionable when examining the data for unusual fiscal effects. In large part, those effects depend on credible changes in the fiscal policy regime, and credibility may take several years to establish. Most studies that give some consideration to fiscal contractions lasting at least three years place more stress on the shorter fiscal contractions. The theoretical justifications for that are not compelling, and when results are reported for fiscal contractions lasting at least three years; they do not support the existence of strong unusual fiscal effects.

As such, the authors examine persistent fiscal adjustments lasting at least three years. For each country, a persistent and large fiscal adjustment is one whose cumulative magnitude (adjusted for the mean) exceeds what would be expected by chance by more than one standard deviation.[2] Most other studies do not use country-specific criteria. Thus, the authors distinguish (through the use of slope dummy variables) between large fiscal adjustments lasting at least three years and those that are shorter or smaller. The sign, magnitude, and statistical significance of those coefficients of the slope dummy variables measure the marginal effects of an unusual fiscal event. Those marginal may or may not cause the sign of the overall effects to differ in times of unusual fiscal adjustments.

The authors then determine the times when trigger points accompany the persistent and large fiscal adjustments. The authors measure trigger points with three different variables: (a) the public debt-GDP ratio, (b) the public consumption-GDP ratio, and (c) the cyclically adjusted (structural) primary deficit divided by potential GDP.[3] The first and second have their theoretical bases in the work of Sutherland (1997) and Bertola and Drazen (1993).[4] The level of the primary structural deficit represents the policy-induced change in the debt-GDP ratio.

For each of those three variables, the authors use two alternative criteria to determine if trigger points occur in the year immediately preceding a large and persistent fiscal adjustment. In one case, a trigger point exists when the variable in that year exceeds its mean plus one standard deviation. In the other case, a trigger point exists when the variable in that year is larger than all preceding values -- a step function approach. Applying those two criteria to each of the three variables produces six possibilities for trigger points, each of which defines an interactive dummy variable. Each of the six trigger dummy variables is included interactively with the slope dummy variables for large and persistent fiscal adjustments to distinguish large and persistent fiscal contractions and expansions with and without trigger points. Because of the limited number of large and persistent fiscal adjustments with trigger points, however, the authors use only one of the trigger dummy variables at a time.

Perotti (1999) incorporates trigger points into his empirical work. He considers both the level and the recent change in the public debt, cyclically adjusted and measured relative to potential GDP. For the level at the beginning of the fiscal adjustment, he uses two values, 0.8 and 0.9. He also tries increases in the public debt-GDP ratio of two and thee percent. His results suggest that the movement in the debt-GDP ratio is more important than the level itself. Giavazzi, Jappelli, and Pagano (2000) also consider the same trigger variables as Perotti (1999).

They find no significant effects for OECD countries but significant effects for developing countries.

Our analysis of persistent and large fiscal adjustments identifies 41 unusual fiscal events -- 22 contractions and 19 expansions. For the level of the public debt, the authors find that only three of the 41 unusual fiscal events have a debt-GDP ratio at least one standard deviation above the mean at the start of the event, thus qualifying as a trigger point. Based on the step-function approach, 19 of 41 potential trigger points based on the debt meet the criterion.

The authors have more success for the level of the primary structural balance. In that case, 17 of 41 potential trigger points possess a primary structural deficit larger than the mean plus a standard deviation. Based on the step function, only 10 of 41 cases meet that requirement.

Finally, the authors also apply the two criteria for determining trigger points using government consumption to GDP. Now, 10 of 41 years meet the requirement of one standard deviation above the mean. And 19 of 41 cases qualify based on the step-function approach.

V. SOME PRELIMINARY STATISTICS

Before presenting our regression analysis, some simple statistics provide some initial findings. In this section, the authors only consider fiscal contractions and thus exclude expansions. The authors divide the large and persistent fiscal contractions into two groups – those with and without recessions – and compare the characteristics of those two groups.

In most cases, the fiscal contractions associated with recessions do not differ much from those that are not. That conclusion draws on our examination of seven characteristics (Table 1).

A. Length of Fiscal Contraction.

Longer fiscal contractions may have stronger non-Keynesian effects than shorter ones, if they are more credible. On the other hand, longer fiscal contractions are more likely to encounter a recession simply because they cover a longer time period. Which factor is more important cannot be determined by theory.

The average length of the 10 fiscal contractions without recessions was four-and-a-half years. But that estimate includes a nine-year fiscal contraction in Japan. Excluding Japan reduces the average length to four years. By comparison, the average length of the fiscal contractions associated with recessions also was four years. Thus, for large fiscal contractions lasting at least three years, little or no difference exists between the average length between those that are associated with recessions and those that are not.

Even though the averages for the two groups are roughly the same, there is some limited evidence that the length of a fiscal contraction might matter. In particular, five of the eight fiscal contractions (62.5 percent) lasting exactly three years are associated with recessions, while only seven of the 14 longer than three years (50 percent) have recessions. In addition, 10 of the 17 fiscal contractions (59 percent) lasting three or four years are associated with recessions, while only one of the four longer than four years (25 percent) have recessions. Those differences suggest that the non-Keynesian effects of longer large fiscal contractions may be stronger than those of shorter fiscal contractions. But the sample is too small to put much confidence in that conclusion.

B. Size of Fiscal Contraction.

In theory, large fiscal contractions may have stronger non-Keynesian effects than small fiscal contractions, if larger ones signal a change in the policy regime.[5] On a cumulative basis, the average size of the 10 fiscal contractions without recessions is 6.5 percent of potential GDP, compared to 5.3 percent for those with recessions. On a per annum basis, the average amount of annual restraint for the 10 cases without recessions is 1.6 percent, compared to 1.3 percent per annum for those with recessions. Those differences are also consistent with the non-Keynesian view, but they seem too small to have major macroeconomic consequences.

Similar conclusions hold when looking at only the dozen or so largest fiscal contractions. Recessions are associated with exactly half of the dozen fiscal contractions with a cumulative restraint of at least five percent of potential GDP (Table 2, column 2). Moreover, recessions are associated with eight of the 13 fiscal contractions having an average annual restraint of more than one percent of potential GDP (Table 2, column 3).

C. Front-Loading.

The more a fiscal contraction is front-loaded (i.e., fiscal constraint concentrated in the early years), the more credible it may be. On average, the amount of front-loading in the first year is somewhat more for the fiscal contractions with recessions (27 percent) than for those without recessions (18 percent). The fiscal contractions without recessions have 43 percent of their total restraint in the first two years, compared to 55 percent for those with recessions. Those differences are not consistent with the non-Keynesian view because the fiscal contractions with recessions are the ones that have more front loading.

Similar conclusions hold when the focus is on the fiscal contractions with the most front loading. Of those, five of the six that have at least 30 percent of the restraint concentrated in the first year are associated with recessions. Moreover, six of the seven fiscal contractions with at least 60 percent of the restraint concentrated in the first two years are associated with recessions.

D. Spending Cuts Versus Tax Hikes.

Some empirical studies report that fiscal contractions dominated by reductions in government spending rather than by increases in taxes more likely possess strong non-Keynesian effects. For fiscal contractions without recessions, an average of 60 percent of the restraint stems from expenditure cuts. That is two-thirds higher than for the fiscal contractions with recessions (36 percent). Moreover, the averages include three cases when spending is raised, not lowered, and all of those three cases are associated with recessions. Finally, recessions do not accompany eight of the 13 fiscal contractions that have more than half of the fiscal restraint concentrated in spending cuts. Thus, there is some evidence supporting the view that fiscal contractions achieved mostly through spending cuts are less likely to be associated with recessions.

E. Government Consumption.

Fiscal contractions can possess strong non-Keynesian effects if they occur at times when government consumption absorbs so much output that it triggers expectations of a cutback in government consumption. The data provide some support for that view. On average, government consumption is 20.5 percent of GDP immediately before the fiscal contractions without recessions. In the 12 cases with recessions, government consumption is, on average, 17.8 percent of GDP at the beginning of the fiscal contractions. In addition, eight of the dozen fiscal contractions with the highest ratios of government consumption to GDP are not associated with recessions.

F. Primary Structural Deficit.

The primary structural deficit is a major determinant of the growth of public debt relative to GDP, and may be a better indicator of a trigger point than the debt-GDP ratio itself. The sizes of the primary structural deficits at the beginning of fiscal contractions, however, are not substantially different between the two groups. For fiscal contractions without recessions, the average size is 4.1 percent of potential GDP, compared to 3.5 percent for those with recessions. Moreover, half of the dozen fiscal contractions with the largest primary structural deficits measured relative to potential GDP are associated with recessions.

G. Level of Public Debt Relative to GDP.

According to the non-Keynesian view, a fiscal contraction will generate strong non-Keynesian effects if it is undertaken when the debt-GDP ratio is high enough to trigger expectations of imminent action on the budget. But, the two groups of fiscal contractions differ little in terms of the average debt-GDP ratio at the beginning of the fiscal contraction -- 62.0 percent for the cases without recessions and 60.8 percent for the cases with recessions. Thus, high debt-GDP ratios do not seem to have triggered strong non-Keynesian effects. Moreover, the same conclusion holds for the dozen fiscal contractions with the highest government debt-GDP ratios at the beginning of the fiscal contractions. Exactly half are accompanied by recessions.

VI. DATA FOR ANALYSIS

With one exception, all data come from the OECD. The monetary variables come from International Financial Statistics. The tax and spending components of the cyclically-adjustment primary deficits (measured relative to potential GDP) are data provided by the OECD. The data for GDP and its components for each country are from the OECD National Accounts, Volume I.

The data for 20 OECD countries end in 1996. For a few countries, the data begin in 1970. For most, the data begin in the early or middle 1970s. For New Zealand, however, the data does not start until 1986. Consequently, the authors exclude New Zealand from the analysis.

After excluding New Zealand from our sample, the authors still have an unbalanced panel data set of 19.[6] It is unbalanced because only some of the countries have data beginning in 1970, although all end in 1996. The authors use the procedure for unbalanced data sets outlined in Greene (1990). Since the authors are estimating our models with pooled cross-section, time-series data, the authors employ the fixed-effect panel regression technique, allowing for differences across countries due to omitted country-specific variables.

VII: ESTIMATION

Our regression analysis examines three different models that capture the effects, if any, of fiscal variables on economic activity. The three models are: (1) A fixed-effect panel estimation of a St. Louis equation similar to Batten and Hafer (1983); (2) A fixed-effect panel estimation of a Martingale model of consumption similar to Hall (1978) and Flavin (1981); and (3) A fixed-effect panel estimation of a growth accounting relationship similar to Levin and Renault (1992), Barro (1991), and Miller and Russek (1997).

A. St. Louis Equation.

The St. Louis equation traces its origins to the work of Anderson and Jordan (1968). The impetus for their work came from the Ando and Modigliani (1965) and Friedman and Meiselman (1965) debate. Friedman and Meiselman were criticized on several fronts, including the points that the right-side variables in the regressions are endogenous, opening the possibility of reverse causality, and the measure of autonomous government spending is problematic. Anderson and Jordan attempt to mitigate some of this criticism by using high-employment fiscal spending and taxes to lower the problem of endogeneity, and including lagged values of the right-side variables (including the fiscal variables) to decrease potential problems of reverse causality.

Extending the analysis beyond the U.S., Batten and Hafer (1983) examine the St. Louis equation using quarterly data for six` countries -- Canada, France, Germany, Japan, the U.K., and the U.S. They perform their tests on a country-by-country basis and do not consider using pooled data. Moreover, they make two changes to the standard St. Louis specification. First, they are forced to use the measured (unadjusted) versions of the fiscal variables, because consistent cyclically adjusted measures are not available at that time. Second, since countries other than the U.S. are probably more open to the rest of the world, they add exports as another right-side variable, finding significant effects in each country except Japan and the U. S.

The OECD now computes and makes available data on high-employment fiscal spending and taxes, but only on an annual basis. Prior work on the St. Louis equation generally employs quarterly data. As a consequence, the authors use pooled estimation to add degrees of freedom to our regression work. Of course, the cost the authors bear is the assumption that the effects of the right-side variables are the same across the countries in the sample, or at least that the regression results capture the average effects across the countries in the sample. The authors also include exports as a potential explanatory variable. That is, the authors estimate the following equation:

$$(1) \qquad dlnY_t = \alpha_0 + \Sigma_{i=0}^{2} \ \alpha_{Hi} dlnH_{t-i} + \Sigma_{i=0}^{2} \ \alpha_{Gi} dlnG_{t-i} + \Sigma_{i=0}^{2} \ \alpha_{Ti} dlnT_{t-i} + \Sigma_{i=0}^{2} \ \alpha_{Xi} dlnX_{t-i} + \varepsilon_{dYt} ,$$

where *dlnY, dlnH, dlnG, dlnT,* and *dlnX* are the rates of growth in nominal GDP, base money, nominal high-employment spending, nominal high-employment revenue, and nominal exports, respectively, *ln* is the natural logarithm operator, $\alpha_{ji}s$ are parameters to be estimated, and ε_{dY} is the random error. The authors choose to include the current and two lags of each variable, allowing the effects to accumulate over three years.[7]

B. Consumption Equation.

Hall (1978) argues that if the permanent income hypothesis is accurate, then consumption spending is well approximated by a random-walk model. Hall specifies private consumption spending as a random walk and then adds several potential explanatory variables to see if they contribute significantly to explaining private consumption spending where the model already incorporates the information contained in lagged consumption. For example, Hall considers lagged income and the stock market index as possible additional explanatory variables. Flavin (1981) and Campbell and Mankiw (1989) carry out important related work.

The authors adopt a version of the Hall (1978) approach in our cross-country evaluation of the role of fiscal policy variables in economic activity. In addition to including lagged real consumption spending in an equation to explain real consumption spending, the authors also include the lagged values of real export spending, real high-employment government spending, and real high-employment tax revenue. Our basic specification is as follows:

(2) $$C_t = \beta_0 + \beta_1 C_{t-1} + \beta_2 X_{t-1} + \beta_3 G_{t-1} + \beta_4 T_{t-1} + \varepsilon_{Ct},$$

where *C, X, G,* and *T* are real per capita values of consumption, exports, high-employment government spending, and high-employment government revenue, respectively, β_is are parameters to be estimated, and ε_C is the random error.

C. Growth Accounting Equation.

By contrast with our other empirical analysis, this section tests for the conclusions set forth by Bertola and Drazen (1993). More specifically, it examines whether the standard findings from the growth accounting literature are reversed by unusual fiscal events. The empirical work on the determinants of economic growth has experienced an explosion of activity. The publication of comparable cross-country data (e.g., Summers and Heston (1991) and World Bank Tables) has facilitated a growth industry in the estimation of cross-country growth equations. Our data come almost entirely from the OECD, which has recently reported comparable cross-country data on high-employment government spending and revenue.

The original empirical work on the determinants of growth (e.g., Kormendi and Meguire, 1985; Barro, 1991; Levin and Renelt, 1992) use average data for each country to generate a cross section of observations. That is, each country provides one data point to the regression analysis. Some researchers introduce a time dimension to their analysis (e.g., Grier and Tullock, 1989; Islam, 1995; Miller and Russek, 1997) either by breaking the sample into sub-periods of time over which the data are averaged or by considering each time period as a separate observation in a pooled regression.

The initial papers average data over time to try to eliminate short-run cyclical activity and to isolate the long-run trend relationships. We, by contrast, determine the effects, if any, of unusual fiscal events on short-run economic activity. Thus, the authors employ our pooled cross-section, time-series data set without averaging across any sub-period. That is, the authors examine the effects of various variables on real per capita GDP growth, where each year represents another observation. That approach enables us to examine the effects, if any, of fiscal policy on short-run economic activity.

Levin and Renelt (1992) provide sensitivity analysis of the determinants of growth that are proposed and estimated in the literature. They identify variables as robust and fragile, finding that most variables fall into the fragile category. Among the robust variables are the investment to GDP ratio, the growth rate of population, and lagged real GDP. The authors include those three variables in the growth accounting regressions along with the measures of fiscal actions -- high-employment spending and revenue divided by high-employment GDP. In addition, the authors include the growth rate of base money as an explanatory variable. Although Levin and Renelt (1992) identify this variable as fragile, the literature continues to employ a money growth variable in growth regressions. Consequently, our basic specification is as follows:

(3) $$dlny_t = \gamma_0 + \gamma_1 lny_{t-1} + \gamma_2 inv_t + \gamma_3 dlnpop_t + \gamma_4 g_t + \gamma_5 t_t + \gamma_6 dlnH_t + \varepsilon_{dyt}\ ,$$

where *dlny*, *dlnpop*, and *dlnH* are the rates of growth of real per capita GDP, population, and base money, respectively, *lny* is the logarithm of real per capita GDP, *inv* is the investment to GDP ratio, *g* and *t* are high-employment spending and revenue relative to high-employment GDP, γ_i*s* are the parameters to be estimated, and ε_{dy} is the random error.

D. Testing for Different Fiscal Regimes.

As noted above, the authors identify unusual fiscal expansions and contractions based on the change in the cyclically adjusted primary fiscal balance, either an increase or a decrease lasting at least three years. Unusual fiscal expansions or contractions are those that exceed the mean by one-standard deviation measured over the period of duration. That is, the authors cumulate uninterrupted large positive or negative changes in the cyclically-adjusted primary fiscal balance and test whether those changes over a three-year or longer period exceed one-standard deviation from a normal movement adjusted for the mean. the authors identify, as noted previously, 41 such events in the 19 countries over the 27-year period -- 22 contractions and 19 expansions. Table 2 reports the unusual fiscal contractions and expansions.

To test for significant differences in the effects of those unusual fiscal events, the authors construct interactive dummy variables for unusual fiscal contractions (D_C) and unusual fiscal expansions (D_E). The estimated coefficients for those dummy variables measure the marginal effects of unusual fiscal events relative to normal fiscal events. Whenever the authors consider one of our models (i.e., equations 1, 2, and 3), the authors estimate two models. The first does not include any dummy variables, and this does not distinguish between usual and unusual fiscal events. The second includes the dummy variable for unusual fiscal contractions (D_C) and the dummy variable for unusual fiscal expansions (D_E), each interacted with the fiscal variables. The authors perform F-tests to see if unusual fiscal contractions possess different effects from unusual fiscal expansions. In each case, the authors *reject* the null hypothesis that the unusual fiscal expansions and contractions have the same effect.

As a second step, the authors identify trigger points beyond which unusual fiscal events may have significantly different effects. That is, it may not be sufficient to identify unusual fiscal events. An unusual fiscal event may only begin to have a significantly different effect from a normal fiscal event, if some other fiscal variable has achieved some critical level. For example, an unusual fiscal contraction may only have a significantly different effect if the debt-GDP ratio exceeds some unusual value. This idea builds on the recent work of Perotti (1999), who performs similar tests.

The authors consider six different possible trigger points over three different variables -- the public sector debt-GDP ratio, the primary structural deficit-potential GDP ratio, and the government consumption-GDP ratio. The authors apply two different methods to identify trigger points for each of those three variables. A trigger point is identified if the value of the variable exceeds by one standard deviation the normal mean of the variable in the year preceding the unusual fiscal policy change or if the variable reaches a new peak relative to its history in that year.

Having identified these six possible trigger points, the authors then interact them with the slope dummy variables for the unusual fiscal expansions and contractions. When the authors include the interaction dummy variables (i.e., an unusual fiscal event multiplied by one of the trigger dummy variables), the authors also include the original unusual fiscal event dummy variable. As a consequence, fiscal policy can possess three levels of effects – an effect during normal times, an effect during unusual fiscal events, and an effect during an unusual fiscal event preceded by a triggering event. During unusual fiscal adjustments, the total effect is either the sum of the first two coefficients for an unusual fiscal event or the sum of all three coefficients for an unusual fiscal event preceded by a triggering event. For fiscal expansions, the authors have empty sets for all but two of the six triggers -- a trigger based on achieving a new peak in the public sector debt or in government consumption relative to GDP. By contrast, all six trigger dummy variables associate with some unusual fiscal contractions. Table 2 reports information about the six different trigger variables.

In sum, the authors provide a comprehensive examination of unusual fiscal contractions and expansions combined with a series of possible triggering variables. The authors find some robust and consistent evidence that the outcomes of unusual fiscal events – either contractions or expansions -- differ significantly from normal fiscal events. But that evidence is not overwhelming or pervasive. Thus, our findings do not provide much support for the view that systematic non-Keynesian fiscal policy effects within a Keynesian model and/or non-classical effects within a classical model exist and dominate.

VIII. EMPIRICAL RESULTS

A. St. Louis Equation.

Tables 3 and 4 report the results for the estimation of the St. Louis equation. Column one of Table 3 shows the standard St. Louis equation without any dummy variables. These results correspond generally with the standard findings for St. Louis equation estimations. To wit, the high-employment fiscal spending and revenue variables do not possess a long-lasting significant effect on the growth of nominal GDP. Both base money growth and export growth have enduring significant positive effects on nominal GDP growth.

Focusing on the fiscal variables, the growth of high-employment revenue has a significant positive contemporaneous effect on nominal GDP growth, a finding counter to the traditional Keynesian view of the world. This finding may merely reflect reverse causality, however. That is, the secular growth in nominal GDP causes the growth in nominal high-employment revenue on a contemporaneous basis, because the cyclical growth in revenue could be underestimated. At the same time, it is consistent with the non-Keynesian view that increasing taxes today can stimulate aggregate spending by reducing expected future tax rates. The growth of high-employment fiscal spending has a positive effect with a lag of one year at the 10-percent level of significance. Otherwise, it is not significant.

The inclusion of the fiscal dummy variables in column two of Table 3 produces some evidence of differences in the effects of normal and unusual fiscal events. Most of the action appears with the unusual fiscal *expansions*. There are significant positive coefficients on the growth rate of high-employment government spending during normal times at one- and two-year lags at the one- and 10-percent levels, respectively. But note that the overall outcomes undergo a sign reversal from normal times to unusual fiscal expansions. Those outcomes are measured by the sum of the coefficients for normal times, and the coefficient for unusual episodes. Now the unusual fiscal expansion possesses negative outcomes that are significant at the five- and 10-percent levels for the current and one-year lagged effects.[8] Those marginal negative effects measured by the interactive fiscal dummy variables are consistent with a non-Keynesian view, and dominate the overall effect. That is, during unusual fiscal expansions, increased high-employment spending associates with lower nominal GDP growth. Moreover, those findings do not depend on any of the trigger dummy variables (see Table 4).

In addition, the authors find a positive and significant effect of the growth of high-employment government revenue on nominal GDP growth during unusual fiscal expansions with a one-year lag at the one-percent level, with a two-year lag at the 10-percent level, and contemporaneously at the 20-percent level. The contemporaneous effect reinforces the non-Keynesian finding for high-employment government revenue during normal times. But the one- and two-year lagged effects reverse the insignificant negative (Keynesian) effects under normal times at the five- and 10-percent levels, respectively.[9] Those outcomes for the lag coefficients probably reflect non-Keynesian effects rather than the reverse causality channel mentioned above. But they could reflect reverse causality because GDP is autocorrelated. In any event, those results do not depend on any of the trigger dummy variables (see Table 4).

Only one coefficient achieves statistical significance when considering unusual fiscal contractions as opposed to expansions. In this case, increases in high-employment government spending stimulate nominal GDP growth on a contemporaneous basis. But that effect significant only at the 10-percent level.

Turning to Table 4 where the authors introduce the trigger dummy variables, the authors see a few instances when an unusual fiscal event has a significant effect while its interaction with a trigger dummy variable has a significant effect of the opposite sign. But, no consistent pattern emerges. In only one instance does the sign completely reverse and become significant – the contemporaneous growth of high-employment government spending with the new peak of the public-sector debt to GDP trigger. In that instance, however, the significant positive effect captures a standard Keynesian effect.

B. Consumption Equation.

Tables 5 and 6 present the findings for the martingale consumption equation. Column one of Table 5 reports the results of regressing real consumption per capita onto its once-lagged value, real exports per capita lagged one year, and real high-employment government spending and revenue per capita lagged one year. Each variable is significant at the one-percent level. Observe that the coefficient of lagged real per capita consumption spending does not differ significantly from one at even the 10-percent level, which is consistent with the view that real per capita consumption spending follows a random walk. Nevertheless, the remaining three variables are also significant. That is, higher real exports per capita, higher real high-employment government spending per capita, and lower real high-employment government revenue per capita all associate with higher real per capita consumption spending after controlling for lagged real per capita private consumption spending. Those coefficients for the fiscal variables do not support the non-Keynesian view.

Distinguishing unusual fiscal expansions and contractions from other periods does not alter the results much. The coefficients of real high-employment government spending and revenue per capita during the unusual fiscal expansions and contractions are only significant at the 10- and 20-percent levels. Although the signs change in the case of unusual fiscal expansions, those sign reversals only partly offset, and do not reverse, the positive effect of real government spending per capita in normal times and the negative effect of real government revenue per capita in normal times. So the marginal effects of unusual fiscal expansions might be called non-Keynesian, but they are not large enough to produce non-Keynesian outcomes on aggregate consumption. They only reduce the magnitude of the Keynesian effects in normal times, although neither outcome is significant at the 10-percent level.[10] Finally, there are not even partial offsets in the case of unusual fiscal contractions.

Table 6 presents the results of introducing the various trigger points. The strongest findings emerge when the primary structural deficit or government consumption triggers are used. First, regardless of whether it is the variance or the threshold of the primary structural deficit, the coefficients of high-employment real government spending and revenue per capita strengthen their normal effects during unusual fiscal contractions and then reverse signs when the unusual fiscal contraction associates with the trigger dummy variable. High-employment real government spending now has a negative effect while high-employment real government revenue has a positive effect.[11] That is, those results reverse the Keynesian effects observed under normal conditions. Although the signs reverse, the effects are not significantly different from zero (except at the 20-percent level for high-employment real government spending per capita during a fiscal contraction with a trigger based on the variance of the primary structural deficit). Second, when the authors use the government consumption to GDP trigger dummy variables, the signs reverse on the coefficients of fiscal contractions from normal times to unusual times, and then reverse again from unusual times to unusual times with a trigger.[12] In other words, the Keynesian effects in normal times are reversed during unusual times, becoming non-Keynesian, and then re-reversed when the unusual fiscal contraction associates with the government consumption trigger dummy variables becoming Keynesian once again.

In sum, the consumption equations provide some evidence for non-Keynesian effects during episodes of unusual fiscal contractions. Those findings, however, do not tell a consistent story. In one instance the non-Keynesian effect occurs when an unusual fiscal expansion associates with the primary structural deficit trigger dummy variables, while in another instance, the non-Keynesian effect occurs for unusual fiscal contractions not associated with the government consumption trigger dummy variables.

C. Growth Accounting Equation.

Tables 7 and 8 provide the findings for the growth accounting regressions. As noted above, these results test an expanded version of the conclusions of Bertola and Drazen (1993), where the growth of output replaces the growth of private consumption. Column one of Table 7 reports the results without dummy variables for unusual fiscal expansions and contractions. The coefficient of lagged real GDP per capita is negative and significant at the one-percent level. This effect matches the findings in the literature on the international growth convergence hypothesis. That is, low real per capita GDP countries grow faster, on average, than high real per capita GDP countries. The investment to GDP ratio has the expected positive sign, but is significant only at the 20-percent level. The rate of growth of base money has a significant positive effect on real per capita GDP growth, a result that is inconsistent with a number of studies in the literature (e.g., Fischer, 1993; Miller and Russek, 1997). The rate of population growth has an expected significantly negative effect on real per capita GDP growth (Levine and Renelt 1992).

High-employment government spending (as a share of potential GDP) has a significant negative effect on real per capita GDP growth while high-employment government revenue to GDP has a positive, but insignificant, effect. The negative effect of government spending matches the standard neo-classical result in the literature (e.g., Barro, 1991; Landau, 1983; Miller and Russek, 1997). The negative sign may signal that the large government share of the economy retards economic growth. Alternatively, reverse causality may exist, indicating that slowing economic growth may call for expansionary fiscal policy through spending increases.

The introduction of dummy variables for unusual fiscal expansions and contractions does not reveal reversals of neo-classical outcomes. As in the base case, high-employment government spending has a significant negative effect on the growth rate of real GDP per capita in normal times. Now, however, high-employment government revenue has a significant positive effect during normal times, but only at the 10-percent level. The coefficient on government revenue during unusual fiscal contractions reverses the sign of the effect in normal times, but the overall outcome is not significant.[13] Those finding continue to hold once the authors introduce the trigger dummy variables (see Table 8).

Table 8 reports the results of interactively including the six fiscal trigger dummy variables. Nearly all findings remain unchanged with one exception. The effect of high-employment government spending reverses sign when the authors use the trigger based on the variance of the public-sector debt. But that reversal is significant only at the 20-percent level.[14]

IX. CONCLUSION

While the authors find limited evidence of reversal outcomes for unusually large fiscal contractions and expansions from time-to-time and under special conditions, the authors find no robust, consistent evidence. The authors do find a few more cases of outcome reversals when the authors take into account trigger points that attempt to measure times of extreme fiscal stress.

The authors find weak evidence of non-Keynesian outcomes in our analysis of the St. Louis equation, as measured by the sum of the coefficient in normal times and the coefficient in unusual times. That evidence emerges for unusual fiscal expansions, but not for unusual fiscal contractions. With an unusual fiscal expansion, the effect of nominal growth in high-employment government spending becomes negative while the effect of nominal growth in high-employment government revenue becomes positive, and the sign reversals on the sum of the coefficients are significant at the five- and 10-percent levels, respectively.[15] Those findings do not rely on the inclusion of fiscal trigger points.

The strongest evidence for non-Keynesian effects emerges in our estimation of the consumption equation, but only for the equation estimated with trigger points based on the primary structural fiscal deficit and government consumption. Without trigger points, unusual fiscal contractions simply magnify the conventional positive and negative effects of real per capita government spending and revenue on real per capita real private consumption spending. When the authors interact unusual fiscal contractions with the primary structural deficit or the government consumption triggers, then the authors generate the sign reversals characteristic of the non-Keynesian literature. For the primary structural deficit triggers, the sign reversal occurs only for the unusual fiscal contraction associated with those trigger dummy variables. The unusual fiscal contraction by itself strengthens the standard Keynesian outcome. Conversely, for the government consumption triggers, the sign reversal occurs for the unusual fiscal contraction by itself, while the unusual fiscal contraction associated with the trigger dummy variables produces once again the standard Keynesian outcome.

Almost no evidence of Keynesian effects emerges when the authors consider the growth accounting equation. The baseline model exhibits neo-classical effects, and the introduction of unusual fiscal expansion or contraction variables with or without trigger dummies produces few significant changes. The one exception is a marginally significant sign reversal for the effect of high-employment government spending during an unusual fiscal contraction with a trigger point based on the variance of public-sector debt.

In sum, with few exceptions our analysis provides little systematic evidence of unusual fiscal outcomes for the 19 OECD countries in our sample from 1970 to 1996. Our analysis, however, considers only whether unusual fiscal outcomes exist across all countries in our sample. Previous research suggests that unusual fiscal outcomes may emerge on a significant scale in particular countries and in particular time periods. Our findings cast some doubt on the possibility that unusual fiscal outcomes are a result of some systematic relationships in the macro economy. Rather, special circumstances and conditions may dictate when and where unusual fiscal outcomes emerge. The authors do not rule out the possibility of systematic unusual fiscal outcomes. But our findings raise serious doubts.

REFERENCES

Afonso, A. “Non-Keynesian Effects of Fiscal Policy in the EU-15.” Manuscript, Universidade Técnica de Lisboa, Lisbon, Portugal, 2001.

Alesina, A., and R. Perotti. "Fiscal Expansions and Fiscal Adjustments in OECD Countries." *Economic Policy: A Policy Forum,* 21(October), 1995, 205-48.

Alesina, A., and R. Perotti. "Fiscal Adjustments in OECD Countries: Composition and Macroeconomic Effects." International Monetary Fund *Staff Papers,* 44(2), 1997, 210-48.

Anderson, L. C., and J. L. Jordan. "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization." Federal Reserve Bank of St. Louis *Review,* 50(11), 1968, 11-24.

Ando, A., and F. Modigliani. "Velocity and the Investment Multiplier. *American Economic Review,* 55(4), 1965, 693-728.

Barro, R. J. "Economic Growth in a Cross Section of Countries." *Quarterly Journal of Economics,* 106(2), 1991, 407-44.

Batten, D. S., and R. W. Hafer. "The Relative Impact of Monetary and Fiscal Actions on Economic Activity: A Cross-Country Comparison." Federal Reserve Bank of St. Louis *Review,* 65(1), 1983, 5-12.

Bertola, G., and A. Drazen. "Trigger Points and Budget Cuts: Explaining the Effects of Fiscal Austerity." *American Economic Review,* 83(1), 1993, 11-26.

Blanchard, O. J. "Comment." in *NBER Macroeconomic Annual 1990*, Vol. 5, edited by O. J. Blanchard and S. Fischer. Cambridge, MA: MIT Press, 1990, 111-116.

Campbell, J. Y., and N. G. Mankiw. “Consumption, Income, and Interest Rates: Reinterpreting the Time Series Evidence.” in *NBER Macroeconomics Annual 1989*, Vol. 4, edited by O. J. Blanchard and S. Fischer. Cambridge, MA: MIT Press, 1989, 185-216.

Fischer, S. "The Role of Macroeconomic Factors in Growth." *Journal of Monetary Economics,* 32(3), 1993, 485-512.

Flavin, M. A. "The Adjustment of Consumption to Changing Expectations about Future Income." *Journal of Political Economy,* 89(5), 1981, 974-1009.

Friedman, M., and D. Meiselman. "Reply to Ando and Modigliani and to DePrano and Mayer." *American Economic Review,* 55(4), 1965, 753-85.

Giavazzi, F., T. Jappelli, and M. Pagano. “Searching for Non-Linear Effects of Fiscal Policy: Evidence from Industrial and Developing Countries.” *European Economic Review,* 44(7), 2000, 1259-89.

Giavazzi, F., and M. Pagano. "Can Severe Fiscal Adjustments Be Expansionary? Tales of Two Small European Countries." in *NBER Macroeconomic Annual 1990*, Vol. 5, edited by Olivier J. Blanchard and Stanley Fischer. Cambridge, MA: MIT Press, 1990, 75-111.

Giavazzi, F., and M. Pagano. "Non-Keynesian Effects of Fiscal Policy Changes: International Evidence and the Swedish Experience." *Swedish Economic Policy Review,* 3(1), 1996, 135-65.

Greene, W. H. *Econometric Analysis.* New York: MacMillan, 1990.

Grier, K. B., and G. Tullock. “An Empirical Analysis of Cross-National Economic Growth, 1951-1980.” *Journal of Monetary Economics,* 24(2), 1989, 259-76.

Hall, R. E. "Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence." *Journal of Political Economy,* 86(6), 1978, 971-87.

Hamilton, J. D. *Time Series Analysis*. Princeton, NJ: Princeton University Press, 1994.

Heylen, F., and G. Everaert. "Success and Failure of Fiscal Consolidations in the OECD: A Multivariate Analysis." *Public Choice,* 105(1-2), 2000, 103-24.

Islam, N. "Growth Empirics: A Panel Data Approach." *Quarterly Journal of Economics,* 110(4), 1995, 1127-70.

Kormendi, R., and P. Meguire. "Macroeconomic Determinants of Growth: Cross-Country Evidence." *Journal of Monetary Economics,* 16(2), 1985, 141-65.

Landau, D. "Government Expenditure and Economic Growth: A Cross-Country Study." *Southern Economic Journal,* 49(3), 1983, 783-92.

Levine, R., and D. Renelt, "A Sensitivity Analysis of Cross-Country Growth Regression," *American Economic Review,* 82(4), 1992, 942-63.

McDermott, C. J., and R. F. Wescott. "An Empirical Analysis of Fiscal Adjustments." International Monetary Fund *Staff Papers,* 43(4), 1996, 725-53.

Miller, S. M. "Financial Innovation, Depository-Institution Deregulation, and the Demand for Money." *Journal of Macroeconomics,* 8(3), 1986, 271-96.

Miller, S. M. "Money Demand Instability: Has It Ended?" *Economics Letters,* 30(4), 1989, 345-49.

Miller, S. M., and F. S. Russek. "Fiscal Structures and Economic Growth: International Evidence." *Economic Inquiry,* 35(3), 1997, 603-13.

Perotti, R. "Fiscal Policy When Things Are Going Badly." *Quarterly Journal of Economics,* 114(4), 1999, 399-436.

Summers, R., and A. Heston. “The Penn World Table (Mark 5): An Expanded Set of International Comparisons 1950-1988.” *Quarterly Journal of Economics,* 106(2), 1991, 327-68.

Sutherland, A. "Fiscal Crises and Aggregate Demand: Can High Public Debt Reverse the Effects of Fiscal Policy?" *Journal of Public Economics,* 65(2), 1997, 147-62.

* This paper was first presented at the 1998 Western Economic Association meetings in Lake Tahoe and subsequently presented in revised form at the Bank of England in August 2000. The authors acknowledge the helpful comments of participants at those seminars. The views expressed in this paper are those of the authors and should not be interpreted as those of the Congressional Budget Office.

Miller: Professor and Chair of Economics, University of Nevada, Las Vegas, NV. Phone 1-702-895-3969, Fax 1-702-895-1354, E-mail stephen.miller@ccmail.nevada.edu

Russek: Principal Analyst, Congressional Budget Office, Washington, DC. Phone 1-202-226-2766, Fax 1-202-226-0332, E-mail frank.mad@cbo.gov

1. Heylen and Everaert (2000) also make this criticism.

2. To be precise, the cumulative magnitude (adjusted for the mean) exceeds the square root of the length of the fiscal adjustment times the standard deviation of the annual change in the cyclically adjusted (structural) primary deficit divided by potential GDP. Miller (1986, 1989) employed that statistic in his study of short-run money demand shifts. Afonso (2001) uses a similar procedure, but for only one or two years.

3. The primary deficit equals the total deficit less interest payments.

4. Unlike Sutherland (1997) who models the economy to have non-Keynesian effects in unusual times, Bertola and Drazen (1993) model the economy to have neo-classical results in normal times and Keynesian effects in unusual times.

5. A larger fiscal contraction in one country compared to another, however, may not produce a larger reduction in the public debt-GDP ratio of that country. That is because the level of interest rates and the rate of economic growth are also important factors determining what happens to that debt-GDP ratio.

6. The countries in our data set with sample periods in parentheses include the following: Australia (1973-96), Austria (1974-96), Belgium (1974-96), Canada (1973-96), Denmark (1971-96), Finland (1973-96), France (1972-96), Germany (1970-96), Greece (1975-96), Ireland (1971-96), Italy (1972-96), Japan (1972-96), the Netherlands (1974-96), Norway (1975-96), Portugal (1970-96), Spain (1970-96), Sweden (1970-96), the U.K. (1970-96), and the U.S. (1970-96). The series for Germany possesses a structural break in 1991 after unification. The authors incorporate a dummy variable to capture this break in the series, but the dummy variable is never significant. Thus, The authors report results without that structural break.

7. The authors experiment with lag lengths, examining no, one, two, and three lags. The best performing specification includes two lags.

8. Specifically, the coefficients on government spending in normal times at lags zero (0.0257) and one (0.0975) plus the coefficients on government spending in unusual fiscal expansions at lags zero (-0.2643) and one (-0.3104) produce the overall outcomes at lags zero (-0.2386) and one (-0.2129). Those overall outcomes are significant at the five- and 10-percent levels with the following test statistics: F(1,387) = 4.36 and F(1, 387) = 2.89.

9. Here, the overall outcomes for lags one (0.2982 = -0.0177 + 0.3159) and two (0.1983 = -0.0066 + 0.2049) record the following test statistics: F(1, 387) = 5.78 and F(1. 387) = 3.13.

10. More precisely, the overall effects of government spending (0.1791 = 0.5414 – 0.3623) and government revenue (-0.2962 = -0.6103 + 0.3141) in unusual expansions are not significant [F(1, 441) = 0.54] and significant at only the 20-percent level [F(1, 441) = 1.75].

11. For the overall outcomes of government spending with the variance of the primary structural deficit (-0.3776 = 0.5672 + 0.5783 – 1.5231) and its threshold (-0.5384 = 0.5607 + 0.4837 – 1.5828) triggers, the test statistics are F(1, 439) = 2.03 (significant at 20-percent level)

and F(1, 439) = 1.24. For the overall outcomes of government revenue with the variance of the primary structural deficit (0.1317 = - 0.6325 – 0.4687 + 1.2329) and its threshold (0.1969 = - 0.6270 – 0.4004 + 1.2243) triggers, the test statistics are F(1, 439) = 0.46 and F(1, 439) = 0.60.

12. For the overall outcomes of government spending under normal and unusual times, but excluding unusual times associated the trigger dummy variables for the variance of government consumption (-0.4995 = 0.5598 – 1.0593) and its threshold (-0.9030 = 0.5614 – 1.4644), the test statistics are F(1, 437) = 2.51 (significant at the 20-percent level) and F(1, 437) = 1.08. For the same overall outcomes of government revenue with the variance of government consumption (0.2646 = - 0.6264 + 0.8910) and its threshold (0.4443 = - 0.6274 + 1.0717) triggers, the test statistics are F(1, 439) = 1.18 and F(1, 437) = 1.13. For the overall outcomes of government spending under normal and unusual times, and unusual times with the trigger dummy variables for the variance of government consumption (1.0016 = 0.5598 - 1.0593 + 1.5011) and its threshold (0.9406 = 0.5614 – 1.4644 + 1.8436) triggers, the test statistics are F(1, 439) = 45.83 and F(1, 437) = 43.62 (both significant at the one-percent level). For the same overall outcomes of government revenue with the variance of government consumption (0.9941 = - 0.6264 + 0.8910 - 1.2587) and its threshold (-0.9489 = - 0.6274 + 1.0717 - 1.3932) triggers, the test statistics are F(1, 439) = 81.63 and F(1, 437) = 79.97 (both significant at the one-percent level).

13. The overall outcome's (-0.0007 = 0.0011 – 0.0017) test statistic is F(1, 470) = 0.08.

14. Here, the test statistic for the overall outcome (0.0035 = -0.0018 – 0.0011 + 0.0064) is F(1, 468) = 1.99.

15. As The authors noted in the text, however, that result suggests the failure of standard Keynesian pump priming, when the pump priming becomes too large (i.e., unusual).

GDP	Gross Domestic Product
OECD	Organization for Economic Cooperation and Development

TABLE 1
Characteristics of Fiscal Contractions With and Without Recession

	Period of Restraint	Cumulative Restraint	Average Restraint per year	Proportion of Restraint in year 1	Proportion of Restraint in yrs. 1 & 2	Proportions due to spending cuts	Initial Government Consumption	Initial Structural Surplus	Debt/GDP rate at beginning
Fiscal Consolidation Without Recession									
United States	'93 - '96	2.9	0.7	0.21	0.52	0.52	17.3	-1.9	61.8
Japan	'79 - '87	7.9	0.9	0.03	0.15	0.03	9.6	-4.9	39.6
France	'83 - '87	3.3	0.7	0.24	0.58	0.09	19.3	-1.8	34.2
United Kingdom	'94 - '96	2.7	0.9	0.19	0.70	0.89	21.9	-3.9	56.6
Canada	'94 - '96	5.0	1.7	0.22	0.56	0.78	22.0	-0.3	94.4
Australia	'85 - '88	3.7	0.9	0.03	0.14	0.73	18.3	-1.0	n.a.
Belgium	'82 - '87	9.6	1.6	0.35	0.42	0.68	18.6	-6.3	91.3
Denmark	'83 - '86	12.5	3.1	0.26	0.56	0.62	28.2	-5.3	67.0
Norway	'93 - '96	7.2	1.8	0.06	0.32	0.89	22.1	-6.9	36.5
Sweden	'94 - '96	9.9	3.3	0.16	0.35	0.74	28.1	-8.2	76.3
Average	4.5 yrs.	6.5	1.6	0.18	0.43	0.60	20.5	-4.1	62.0
Fiscal Consolidation With Recession									
United States	'76 - '79	2.3	0.6	0.52	0.74	1.34	18.2	-2.0	39.9
Germany	'80 - '85	5.4	0.9	0.15	0.28	0.58	19.7	-3.4	29.3
Italy	'91 - '93	4.9	1.6	0.39	0.84	-0.24	17.6	-3.4	104.5
United Kingdom	"79 - '82	5.6	1.4	0.14	0.27	-0.38	20.3	-2.8	57.7
Canada	'79 - 81	3.2	1.1	0.34	0.44	0.19	19.7	-2.5	46.3
Australia	'80 - '82	3.0	1.0	0.30	0.63	0.04	17.6	-2.0	n.a.
Greece	'90 - '96	12.3	1.8	0.13	0.41	0.24	15.2	-7.6	66.6
Ireland	'81 - '84	5.9	1.5	0.03	0.18	0.17	19.9	-8.0	72.8
Ireland	'86 - '89	7.6	1.9	0.24	0.46	1.33	17.8	-3.5	104.8
Netherlands	'81 - '83	2.5	0.8	0.24	0.64	0.72	17.4	-2.4	46.9
Portugal	'84 - '86	8.1	2.7	0.78	0.88	0.90	14.0	-4.6	49.4
Spain	'91 - '94	3.1	0.8	0.03	0.84	-0.58	15.6	-3.1	50.4
Average	4.0 yrs.	5.3	1.3	0.27	0.55	0.36	17.8	-3.8	60.8

Source: Congressional Budget Office calculations based on data from the *OECD's Fiscal Positions and Business Cycles*.

TABLE 2
Unusual Fiscal Contractions, Expansions, and Trigger Variables

			Trigger Points Measured By:					
	Unusual Fiscal Contractions	Unusual Fiscal Expansions	Std. Dev. of the Public-Sector Debt	New Peak of the Public-Sector Debt	Std. Dev. of the Primary Structural Deficit	New Peak of the Primary Structural Deficit	Std. Dev. of Government Consumption	New Peak of Government Consumption
Australia	80-82; 85-88	89-94	--	80-82; 85-88; 89-94	80-82	--	--	85-88
Austria	--	--	--	--	--	--	--	--
Belgium	82-87	--	--	82-87	82-87	82-87	82-87	82-87
Canada	79-81; 94-96	82-85	94-96	94-96	79-81	79-81	94-96	--
Denmark	83-86	74-77; 79-82; 87-94	--	83-86	83-86	83-86	83-86	74-77; 83-86
Finland	--	77-80; 90-92	--	--	--	--	--	77-80
France	83-87	73-75	--	83-87	83-87	--	--	83-87
Germany	80-85	--	--	80-85	80-85	--	--	--
Greece	90-96	--	--	90-96	90-96	90-96	90-96	90-96
Ireland	81-84; 86-89	--	--	81-84; 86-89	81-84	81-84	81-84	81-84
Italy	91-93	--	--	91-93	--	--	91-93	91-93
Japan	79-87	75-78; 90-96	--	75-78; 79-87	79-87	79-87	--	75-78
Netherlands	81-83	78-80	--	--	81-83	81-83	81-83	78-80
Norway	93-96	76-82; 87-92	--	--	93-96	93-96	93-96	87-92; 93-96
Portugal	84-86	--	--	84-86	84-86	--	84-86	84-86
Spain	91-94	80-82; 88-90	--	80-82	91-94	--	--	80-82; 88-90; 91-94
Sweden	94-96	72-74; 77-80; 90-93	94-96	72-74; 94-96	94-96	94-96	--	72-74; 77-80
United Kingdom	79-82; 94-96	--	--	--	79-82	--	--	--
United States	76-79; 93-96	90-92	93-96	93-96	76-79; 93-96	76-79	76-79	--
Number of Events	22	19	3	19	17	10	10	19

NOTE: Columns two and three report the time periods for the unusual fiscal contractions and expansions, respectively, while the last six columns report the time periods when the trigger variables are operative. The trigger dummy variables for the standard deviations of the public sector debt, the primary structural deficit, and government consumption as well as for the new peak of the primary structural deficit do not have any corresponding unusual fiscal expansions, only the trigger dummy variables for the new peaks of the public-sector debt and government consumption do. This explains the lack of coefficient estimates in Tables 5 and 7. See the text.

TABLE 3
Estimates of St. Louis Equation

Variable	No Dummies	Fiscal Contraction (D_C) and Expansion (D_E) Dummies
$dlnH_t$	0.0336*	0.0354*
	(3.10)	(3.33)
$dlnH_{t-1}$	0.0573*	0.0597*
	(5.03)	(5.33)
$dlnH_{t-2}$	0.0368*	0.0391*
	(3.20)	(3.46)
$dlnG_t$	0.0153	0.0257
	(0.57)	(0.84)
$dlnG_{t-1}$	0.0531‡	0.0975*
	(1.86)	(2.86)
$dlnG_{t-2}$	0.0199	0.0597‡
	(0.72)	(1.90)
D_C*dlnG_t	--	0.1412‡
		(1.68)
D_C*dlnG_{t-1}	--	-0.0511
		(-0.54)
D_C*dlnG_{t-2}	--	-0.0681
		(-0.75)
D_E*dlnG_t	--	-0.2643**
		(-2.24)
D_E*dlnG_{t-1}	--	-0.3104**
		(-2.45)
D_E*dlnG_{t-2}	--	-0.1074
		(-0.96)
$dlnT_t$	0.1513*	0.0925**
	(4.21)	(2.15)
$dlnT_{t-1}$	0.0115	-0.0177
	(0.33)	(-0.44)
$dlnT_{t-2}$	0.0275	-0.0066
	(0.85)	(-0.18)
D_C*dlnT_t	--	0.0133
		(0.15)
D_C*dlnT_{t-1}	--	0.0356
		(0.35)
D_C*dlnT_{t-2}	--	0.0537
		(0.57)
D_E*dlnT_t	--	0.1759‡‡
		(1.43)
D_E*dlnT_{t-1}	--	0.3159*
		(2.41)
D_E*dlnT_{t-2}	--	0.2049‡
		(1.75)

TABLE 3
Estimates of St. Louis Equation (continued)

Variable	No Dummies	Fiscal Contraction (D_C) and Expansion (D_E) Dummies
$dlnX_t$	0.1694*	0.1584*
	(8.49)	(7.97)
$dlnX_{t-1}$	0.0572*	0.0656*
	(3.03)	(3.46)
$dlnX_{t-2}$	0.0870*	0.0922*
	(4.76)	(5.06)
R^2	0.5542	0.5837

Note: The dependent variable is the rate of growth of nominal GDP. The variables *dlnH, dlnG, dlnT,* and *dlnX* are the rates of growth of base money, nominal high-employment spending, nominal high-employment revenue, and nominal exports while D_C and D_E are the unusual fiscal contraction and expansion dummy variables. R^2 is the adjusted coefficient of determination.

* means the coefficient is significantly different from zero at the one-percent level
** means the coefficient is significantly different from zero at the five-percent level
‡ means the coefficient is significantly different from zero at the 10-percent level
‡‡ means the coefficient is significantly different from zero at the 20-percent level

TABLE 4
Estimates of St. Louis Equation, Including Trigger Points for Unusual Fiscal Events

		Trigger Dummy Variables (τ_i) Based on:					
Variable	Fiscal Contraction (D_C) and Expansion (D_E) Dummies	Std. Dev. of the Public-Sector Debt	New Peak of the Public-Sector Debt	Std. Dev. of the Primary Structural Deficit	New Peak of the Primary Structural Deficit	Std. Dev. Of Government Consumption	New Peak of Government Consumption
$dlnH_t$	0.0353*	0.0337*	0.0364*	0.0338*	0.0363*	0.0335*	0.0302*
	(3.33)	(3.13)	(3.38)	(3.18)	(3.47)	(3.12)	(2.79)
$dlnH_{t-1}$	0.0597*	0.0595*	0.0605*	0.0583*	0.0602*	0.0589*	0.0517*
	(5.33)	(5.25)	(5.33)	(5.21)	(5.33)	(5.22)	(4.61)
$dlnH_{t-2}$	0.0391*	0.0409*	0.0411*	0.0375*	0.0395*	0.0383*	0.0334*
	(3.46)	(3.58)	(3.58)	(3.31)	(3.43)	(3.37)	(2.96)
$dlnG_t$	0.0257	0.0258	0.0232	0.0287	0.0245	0.0264	0.0331
	(0.84)	(0.84)	(0.75)	(0.94)	(0.80)	(0.86)	(1.09)
$dlnG_{t-1}$	0.0975*	0.0978*	0.0946*	0.1021*	0.0973*	0.0956*	0.1048*
	(2.86)	(2.86)	(2.75)	(3.00)	(2.86)	(2.79)	(3.10)
$dlnG_{t-2}$	0.0597‡	0.0600‡	0.0553‡	0.0619**	0.0592‡	0.0566‡	0.0639**
	(1.90)	(1.91)	(1.75)	(1.98)	(1.88)	(1.79)	(2.05)
D_C*$dlnG_t$	0.1412‡	0.0993	-0.1530	0.2412	0.1753‡‡	0.1378	0.2897‡
	(1.68)	(1.11)	(-0.69)	(0.91)	(1.59)	(0.96)	(1.83)
D_C*$dlnG_{t-1}$	-0.0511	-0.0623	0.3119‡‡	-0.5241‡‡	-0.1479	-0.0388	-0.0695
	(-0.54)	(-0.64)	(1.31)	(-1.39)	(-1.19)	(-0.22)	(-0.33)
D_C*$dlnG_{t-2}$	-0.0681	-0.0620	-0.0803	-0.2248	-0.0889	0.1021	-0.0386
	(-0.75)	(-0.67)	(-0.30)	(-0.59)	(-0.77)	(0.62)	(-0.21)
τ_i*D_C*$dlnG_t$	--	-0.3431	0.3299‡‡	-0.0872	-0.08918	-0.0055	-0.2264
		(-0.52)	(1.40)	(-0.31)	(-0.51)	(-0.03)	(-1.25)
τ_i*D_C*$dlnG_{t-1}$	--	-0.9739	-0.3987‡‡	0.4681	0.1715	-0.0195	0.0036
		(-0.51)	(-1.56)	(1.21)	(0.93)	(-0.10)	(0.02)
τ_i*D_C*$dlnG_{t-2}$	--	0.0538	-0.0010	0.0876	0.0736	-0.2744‡‡	-0.0773
		(0.03)	(0.03)	(0.22)	(0.42)	(-1.44)	(-0.37)
D_E*$dlnG_t$	-0.2643**	-0.2635**	-0.1357	-0.2611**	-0.2494**	-0.2629**	-0.4023**
	(-2.24)	(-2.22)	(-0.88)	(-2.22)	(-2.12)	(-2.22)	(-2.15)
D_E*$dlnG_{t-1}$	-0.3104**	-0.3099**	-0.4114**	-0.3157**	-0.2995**	-0.3086**	-0.6047*
	(-2.45)	(-2.43)	(-2.33)	(-2.50)	(-2.36)	(-2.43)	(-2.81)
D_E*$dlnG_{t-2}$	-0.1074	-0.1014	-0.1203	-0.1041	-0.1153	-0.1063	-0.1927
	(-0.96)	(-0.90)	(-0.79)	(-0.93)	(-1.03)	(-0.95)	(-0.99)
τ_i*D_E*$dlnG_t$	--	--	-0.2515	--	--	--	0.2596
			(-1.12)				(1.12)
τ_i*D_E*$dlnG_{t-1}$	--	--	0.2145	--	--	--	0.4829‡
			(0.88)				(1.87)
τ_i*D_E*$dlnG_{t-2}$	--	--	0.0205	--	--	--	0.1687
			(0.09)				(0.73)

TABLE 4
Estimates of St. Louis Equation, Including Trigger Points for Unusual Fiscal Events (continued)

		Trigger Dummy Variables (τ_i) Based on:					
Variable	Fiscal Contraction (D_C) and Expansion (D_E) Dummies	Std. Dev. of the Public-Sector Debt	New Peak of the Public-Sector Debt	Std. Dev. of the Primary Structural Deficit	New Peak of the Primary Structural Deficit	Std. Dev. Of Government Consumption	New Peak of Government Consumption
$dlnT_t$	0.0925**	0.0921**	0.0959**	0.0877**	0.0937**	0.0978**	0.0916**
	(2.15)	(2.14)	(2.21)	(2.05)	(2.19)	(2.26)	(2.14)
$dlnT_{t-1}$	-0.0177	-0.0199	-0.0113	-0.0236	-0.0178	-0.0189	-0.0175
	(-0.44)	(-0.49)	(-0.28)	(-0.59)	(-0.44)	(-0.47)	(-0.44)
$dlnT_{t-2}$	-0.0066	-0.0085	-0.0074	-0.0086	-0.0073	-0.0045	-0.0150
	(-0.18)	(-0.23)	(-0.20)	(-0.23)	(-0.20)	(-0.12)	(-0.41)
D_C*dlnT_t	0.0133	0.0379	0.3316‡	-0.1448	0.0058	0.0128	-0.1321
	(0.15)	(0.42)	(1.65)	(-0.38)	(0.42)	(0.09)	(-0.85)
D_C*dlnT_{t-1}	0.0356	0.0251	-0.4563**	0.8230‡	0.1074	-0.0561	-0.0031
	(0.35)	(0.25)	(-2.03)	(1.74)	(0.87)	(-0.33)	(-0.02)
D_C*dlnT_{t-2}	0.0537	0.0423	0.2083	0.5687	0.1942‡	-0.0180	0.0491
	(0.57)	(0.45)	(0.95)	(1.13)	(1.66)	(-0.11)	(0.28)
$\tau_i*D_C*dlnT_t$	--	0.6227	-0.3784‡	0.1747	0.0073	0.0110	0.2159
		(0.72)	(-1.72)	(0.45)	(0.04)	(0.06)	(1.18)
$\tau_i*D_C*dlnT_{-1}$	--	1.5879	0.6076**	-0.7967‡	-0.1208	0.2122	0.1228
		(0.61)	(2.47)	(-1.66)	(-0.62)	(1.02)	(0.54)
$\tau_i*D_C*dlnT_{t-2}$	--	0.6707	-0.1969	-0.5108	-0.3383‡	0.0496	0.0257
		(0.31)	(-0.82)	(-1.00)	(-1.91)	(0.26)	(0.13)
D_E*dlnT_t	0.1759‡‡	0.1754‡‡	0.1019	0.1833‡‡	0.1662‡‡	0.1722‡‡	0.2765‡‡
	(1.43)	(1.42)	(0.65)	(1.49)	(1.35)	(1.39)	(1.47)
D_E*dlnT_{t-1}	0.3159**	0.3173**	0.3466**	0.3163**	0.3154**	0.3135**	0.6348*
	(2.41)	(2.41)	(1.97)	(2.42)	(2.41)	(2.38)	(2.82)
D_E*dlnT_{t-2}	0.2049‡	0.1946‡‡	0.2554‡	0.2004‡	0.2118‡	0.2060‡	0.2570‡‡
	(1.75)	(1.64)	(1.67)	(1.71)	(1.81)	(1.75)	(1.31)
$\tau_i*D_E*dlnT_t$	--	--	0.0570	--	--	--	-0.3453‡‡
			(0.24)				(-1.43)
$\tau_i*D_E*dlnT_{t-1}$	--	--	-0.0303	--	--	--	-0.6242**
			(-0.12)				(-2.31)
$\tau_i*D_E*dlnT_{t-2}$	--	--	-0.0460	--	--	--	-0.2151
			(-0.19)				(-0.89)
$dlnX_t$	0.1584*	0.1598*	0.1588*	0.1585*	0.1576*	0.1574*	0.1528*
	(7.97)	(7.97)	(7.87)	(7.99)	(7.93)	(7.90)	(7.75)
$dlnX_{t-1}$	0.0656*	0.0679*	0.0692*	0.0663*	0.0655*	0.0648*	0.0602*
	(3.4655)	(3.55)	(3.57)	(3.51)	(3.46)	(3.41)	(3.17)
$dlnX_{t-2}$	0.0922*	0.0942*	0.0882*	0.0947*	0.0903*	0.0902*	0.0840*
	(5.06)	(5.13)	(4.77)	(5.21)	(4.92)	(4.93)	(4.59)
R^2	0.5837	0.5812	0.5804	0.5871	0.5868	0.5829	0.5950

Note: See Table 3. The τ_is are the trigger dummy variables corresponding to the column heading.

TABLE 5
Estimates of Consumption Equation

Variable	No Dummies	Fiscal Contraction (D_C) and Expansion (D_E) Dummies
C_{t-1}	0.9816*	1.0027*
	(77.87)	(68.71)
X_{t-1}	0.3448*	0.3135*
	(12.41)	(10.47)
G_{t-1}	0.6055*	0.5414*
	(15.08)	(11.80)
D_C*G_{t-1}	--	0.1767‡‡
		(1.29)
D_E*G_{t-1}	--	-0.3623‡‡
		(-1.46)
T_{t-1}	-0.6664*	-0.6103*
	(-19.69)	(-15.66)
D_C*T_{t-1}	--	-0.1717‡
		(-1.66)
D_E*T_{t-1}	--	0.3141‡‡
		(1.38)
R^2	0.9948	0.9949

Note: See Table 3. The dependent variable is real consumption spending per capita. The independent variables *C, X, G,* and *T*, all lagged one year, are real consumption per capita, real exports per capita, real high-employment spending per capita, and real high-employment revenue capita.

TABLE 6
Estimates of Consumption Equation, Including Trigger Points for Unusual Fiscal Events

		Trigger Dummy Variables (τ_i) Based on:					
Variable	Fiscal Contraction (D_C) and Expansion (D_E) Dummies	Std. Dev. of the Public-Sector Debt	New Peak of the Public-Sector Debt	Std. Dev. of the Primary Structural Deficit	New Peak of the Primary Structural Deficit	Std. Dev. Of Government Consumption	New Peak of Government Consumption
C_{t-1}	1.0027*	1.0025*	0.9983*	0.9912*	0.9741*	0.9947*	0.9938*
	(68.71)	(68.52)	(67.11)	(69.09)	(69.32)	(68.97)	(67.98)
X_{t-1}	0.3135*	0.3138*	0.3211*	0.3361*	0.3305*	0.3301*	0.3308*
	(10.47)	(10.47)	(10.58)	(11.43)	(11.24)	(11.17)	(11.10)
G_{t-1}	0.5414*	0.5418*	0.5509*	0.5672*	0.5607*	0.5598*	0.5614*
	(11.80)	(11.78)	(11.89)	(12.66)	(12.49)	(12.41)	(12.35)
D_C*G_{t-1}	0.1767‡‡	0.1787‡‡	-0.1586	0.5783*	0.4837*	-1.0593*	-1.4644‡
	(1.29)	(1.30)	(-0.10)	(3.79)	(3.29)	(-3.32)	(-1.68)
$\tau_i*D_C*G_{t-1}$	--	-0.6230	0.3791	-1.5231*	-1.5828**	1.5011*	1.8436**
		(-0.04)	(0.23)	(-3.13)	(-3.13)	(4.30)	(2.09)
D_E*G_{t-1}	-0.3623‡‡	-0.3625‡‡	-0.5295‡	-0.3827‡‡	-0.3777‡‡	-0.3773‡‡	-0.5611**
	(-1.46)	(-1.46)	(-1.86)	(-1.59)	(-1.56)	(-1.56)	(-1.97)
$\tau_i*D_E*G_{t-1}$	--	--	0.4985	--	--	--	0.5522
			(0.63)				(0.89)
T_{t-1}	-0.6103*	-0.6106*	-0.6181*	-0.6325*	-0.6270*	-0.6264*	-0.6274*
	(-15.66)	(-15.62)	(-15.71)	(-16.61)	(-16.42)	(-16.34)	(-16.26)
D_C*T_{t-1}	-0.1717‡	-0.1731‡	0.0009	-0.4687*	-0.4004*	0.8910*	1.0717**
	(-1.66)	(-1.67)	(0.00)	(-4.09)	(-3.62)	(3.61)	(2.55)
$\tau_i*D_C*T_{t-1}$	--	-0.0314	-0.2024	1.2329*	1.2243*	-1.2587*	-1.3932*
		(0.00)	(-0.13)	(5.44)	(4.39)	(-4.70)	(-3.22)
D_E*T_{t-1}	0.3141‡‡	0.3145‡‡	0.5154‡	0.3397‡‡	0.3333‡‡	0.3325‡‡	0.5450‡
	(1.38)	(1.37)	(1.83)	(1.54)	(1.50)	(1.49)	(1.95)
$\tau_i* D_E*T_{t-1}$	--	--	-0.5277	--	--	--	-0.5709
			(-0.81)				(-1.07)
R^2	0.9949	0.9949	0.9949	0.9952	0.9952	0.9951	0.9951

Note: See Tables 3 and 4. The τ_is are the trigger dummy variables corresponding to the column heading.

TABLE 7
Estimates of Growth Equation

Variable	No Dummies	Fiscal Contraction (D_C) and Expansion (D_E) Dummies
$ln\,y_{t-1}$	-0.0261*	-0.0239*
	(-4.68)	(-4.25)
inv_t	0.0705‡	0.0629‡‡
	(1.83)	(1.60)
$dlnpop_t$	-0.6691*	-0.6736*
	(-8.87)	(-8.97)
g_t	-0.0017*	-0.0018*
	(-4.17)	(-3.58)
D_C*g_t	--	-0.0002
		(-0.19)
D_E*g_t	--	0.0003
		(0.25)
t_t	0.0005	0.0010‡
	(1.13)	(1.77)
D_C*t_t	--	-0.0017‡
		(-1.77)
D_E*t_t	--	-0.0013
		(-1.12)
$dlnH_t$	0.0117‡	0.0117‡
	(1.67)	(1.66)
R^2	0.2367	0.2450

Note: See Table 3. The dependent variable is the rate of growth of real GDP per capita. The independent variables *lny, inv, dlnpop, g, t,* and *dlnH* are the natural logarithm of real GDP per capita, the ratio of investment to GDP, the population growth rate, the ratio of high-employment spending to potential GDP, the ratio of high-employment revenue to potential GDP, and the base money growth rate.

TABLE 8
Estimates of Growth Equation, Including Trigger Points for Unusual Fiscal Events

		Trigger Dummy Variables (τ_i) Based on:					
Variable	Fiscal Contraction (D_C) and Expansion (D_E) Dummies	Std. Dev. of the Public-Sector Debt	New Peak of the Public-Sector Debt	Std. Dev. of the Primary Structural Deficit	New Peak of the Primary Structural Deficit	Std. Dev. Of Government Consumption	New Peak of Government Consumption
$ln\, y_{t-1}$	-0.0239*	-0.0237*	-0.0238*	-0.0239**	-0.0239*	-0.0236*	-0.0219*
	(-4.25)	(-4.25)	(-4.20)	(-4.24)	(-4.25)	(-4.20)	(-3.84)
inv_t	0.0629‡‡	0.0763‡	0.0576‡‡	0.0631‡‡	0.0651‡‡	0.0599‡‡	0.0471
	(1.60)	(1.94)	(1.46)	(1.61)	(1.63)	(1.52)	(1.18)
$dlnpop_t$	-0.6736*	-0.6759*	-0.6729*	-0.6733*	-0.6752*	-0.6733*	-0.6769*
	(-8.97)	(-9.06)	(-8.96)	(-8.95)	(-8.98)	(-8.97)	(-9.07)
g_t	-0.0018*	-0.0018*	-0.0018*	-0.0018*	-0.0017*	-0.0018*	-0.0018*
	(-3.58)	(-3.61)	(-3.58)	(-3.57)	(-3.57)	(-3.57)	(-3.57)
$D_C{*}g_t$	-0.0002	-0.0011	0.0026	-0.0007	0.0001	0.0008	0.0006
	(-0.19)	(-1.00)	(0.97)	(-0.28)	(0.06)	(0.50)	(0.35)
$\tau_i{*}D_C{*}g_t$	--	0.0063**	-0.0035	0.0006	-0.0003	-0.0021	-0.0013
		(2.44)	(-1.24)	(0.21)	(-0.16)	(-1.11)	(-0.66)
$D_E{*}g_t$	0.0003	0.0003	-0.0001	0.0003	0,0003	0.0002	-0.0007
	(0.25)	(0.33)	(-0.06)	(0.26)	(0.27)	(0.23)	(-0.57)
$\tau_i{*}D_E{*}g_t$	--	--	0.0013	--	--	--	0.0027‡‡
			(0.52)				(1.40)
t_t	0.0010‡	0.0011‡	0.0010‡	0.0010‡	0.0010‡	0.0010‡	0.0009‡‡
	(1.77)	(1.90)	(1.72)	(1.77)	(1.78)	(1.73)	(1.56)
$D_C{*}t_t$	-0.0017‡	-0.0014‡‡	-0.0039‡‡	-0.0018	-0.0022‡‡	-0.0020‡‡	-0.0022‡‡
	(-1.77)	(-1.36)	(-1.47)	(-1.01)	(-1.49)	(-1.32)	(-1.51)
$\tau_i{*}D_C{*}t_t$	--	-0.0008	0.0023	0.0001	0.0010	0.0002	0.0008
		(-0.30)	(0.83)	(0.06)	(0.55)	(0.13)	(0.45)
$D_E{*}t_t$	-0.0013	-0.0014	-0.0014	-0.0013	-0.0013	-0.0013	-0.0020‡‡
	(-1.12)	(-1.18)	(-1.13)	(-1.11)	(-1.12)	(-1.10)	(-1.37)
$\tau_i{*}D_E{*}t_t$	--	--	0.0007	-	--	--	0.0010
			(0.26)				(0.46)
$dlnH_t$	0.0117‡	0.0122‡	0.0119‡	0.0116‡	0.0115‡‡	0.0116‡	0.0134‡
	(1.66)	(1.75)	(1.69)	(1.65)	(1.64)	(1.65)	(1.91)
R^2	0.2450	0.2549	0.2450	0.2420	0.2425	0.2453	0.2543

Note: See Tables 3 and 6. The τ_is are the trigger dummy variables corresponding to the column heading.