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An Empirical Analysis of Fiscal Adjustments

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Abstract

This study uses the fiscal expansion and consolidation experiences of the industrial countries over the period 1970 to 1995 to examine the interplay between fiscal adjustments and economic performance. A key finding is that fiscal consolidation need not trigger an economic slowdown. Fiscal consolidation that concentrates on the expenditure side, and especially on transfers and government wages, is more likely to succeed in reducing the public debt ratio than tax-based consolidation. Also, the greater the magnitude of the fiscal consolidation, the more likely it is to succeed in reducing the debt ratio.

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Summary

According to traditional Keynesian theory, efforts to reduce budget deficits can slow the pace of economic growth, and this has been a worry for policymakers. Giavazzi and Pagano (1990), however, have suggested that deficit reduction may have positive effects on expectations that might offset or overpower the negative Keynesian effect. In their view, strong actions to reduce a budget deficit might make an economy better off, not just in the long run but also during the fiscal consolidation. Thus, if politicians could be convinced that fiscal consolidation might not severely constrain economic growth, they might be less inclined to delay appropriate adjustments.

This study uses the fiscal expansion and consolidation experiences of the industrial countries over the 1970-95 period to examine the interplay between fiscal changes and economic performance. It addresses whether fiscal consolidations can be good for growth, and the transmission mechanisms that seem to be important for these non-Keynesian effects. It considers claims by Alesina and Perotti (1995a) that the composition of fiscal consolidation influences whether it is likely to be successful, where success is defined as putting a country's ratio of public debt to GDP on a sustained downward trajectory. It also examines whether the world economic environment matters for the success or failure of fiscal consolidation.

Through a combination of simple statistical reports and econometric analysis, the paper finds evidence of outcomes that are not consistent with the standard Keynesian story. It is shown, for instance, that episodes of fiscal consolidation need not trigger an economic slowdown: interest rate premiums can decline and promote investment spending; expectations of falling future tax liabilities can encourage consumption and investment spending; and both forces can support economic growth. The evidence supports the view of Alesina and Perotti that fiscal consolidation that concentrates on the expenditure side, and especially on transfers and government wages, is more likely to succeed in reducing the public debt ratio than tax-based consolidation. Moreover, that the greater the magnitude of the fiscal consolidation, the more likely it is to succeed in reducing the debt ratio.



I. Introduction

Budget deficits and government debt have increased sharply in most industrial countries over the 1980s and 1990s, and as their negative consequences have become more apparent, many countries have been addressing the challenge of reining them in. According to traditional Keynesian theory, reductions in budget deficits can slow the pace of economic growth in the short run by reducing aggregate demand, and this has been a worry for policy makers. Giavazzi and Pagano (1990), however, suggest that there may be positive expectational effects that might offset or even swamp the standard negative Keynesian effect. In their view, strong actions to reduce a budget deficit problem may boost demand and growth, not just in the long run, but even over the phase of fiscal consolidation. Some have suggested that this outcome might be particularly likely for countries with especially large government debts and deficits, where consumer and business confidence might be heavily depressed because of the fiscal problem, and where financial markets may be imposing a large premium on interest rates. This view could have great policy relevance. If politicians could be convinced that fiscal consolidation might not impose a severe economic growth penalty, they might be less inclined to delay appropriate adjustments.

This study uses the fiscal expansion and consolidation experiences of the industrial countries over the 1970 to 1995 period to examine the interplay between fiscal changes and economic performance. Among the questions it addresses are: Can fiscal consolidations be good for growth? What transmission mechanisms seem to be important for these non-Keynesian effects? Are Alesina and Perotti (1995a) correct when they claim that the composition of fiscal consolidation influences whether it is likely to be successful, where success is defined as putting a country's ratio of public debt to GDP on a sustained downward trajectory? And does the world economic environment matter for the success or failure of fiscal consolidation? Through a combination of simple statistical and econometric analysis, this paper finds some evidence of outcomes that are inconsistent with the standard Keynesian story. It is shown, for example, that episodes of fiscal consolidation need not trigger an economic slowdown. The paper also suggests that structuring fiscal consolidation primarily around spending cuts, rather than tax increases, tends to increase the chances of success. It also finds that the greater the magnitude of the fiscal consolidation, the more likely it is to succeed in reducing the debt ratio.

The paper has five main sections. The first summarizes recent empirical work that has analyzed the relationship between fiscal changes and economic performance. The second describes the theoretical arguments for why the standard Keynesian outcome might not occur. The third section reports the results of our empirical analysis of the relationship between changes in fiscal stance on the one hand, and economic performance and debt reduction on the other. The results of an econometric investigation into the factors associated with successful fiscal consolidation are reported in the fourth section. The final section concludes and looks for confirmation of our empirical results in two specific cases.

II. Review of Previous Work

Giavazzi and Pagano (1990) was one of the first papers to explicitly describe the possibility that a sharp fiscal contraction could be expansionary for an economy. These authors identify something that they call the "consumption puzzle" and see it as evidence that fiscal contractions can have strong expectational effects. After taking into account movements in normal consumption function variables, such as income and wealth, they find that where governments have undertaken sharp cuts in government consumption—their focus was on Denmark and Ireland in the 1980s—private consumption did not decline as much as normal relationships would have predicted. To explain this "puzzle" they hypothesize that large fiscal contractions could signal lower future tax burdens, which could lead to an increase in expected lifetime disposable income, which in turn could boost consumption. While the study concentrates on the expectational effects on consumers, it also points out that lower expected corporate tax burdens can bolster investment spending. In more recent work, Giavazzi and Pagano (1996) report that positive non-Keynesian responses of private consumption are more likely when changes in fiscal policy are large and persistent. They also generalize their earlier result by finding that in addition to cuts in government consumption, cuts in transfer payments and increases in taxes can also have non-Keynesian effects.

Alesina and Perotti (1995a) perform a cross-country analysis of fiscal adjustments in the industrial countries, concentrating mainly on the composition of the adjustments. They report that fiscal consolidations over the past 25 years have been achieved mainly through tax increases, while fiscal expansions have been driven mainly by expenditure increases. Unlike Giavazzi and Pagano, they report that the size of a fiscal consolidation is not strongly related to whether the adjustment is a success or failure, again where success is defined as putting the ratio of debt to GDP on a sustained downward path. Rather they conclude that it is the composition of the consolidation that matters: in successful adjustments, the lion's share of deficit cuts tends to be in spending on transfers and government wages, while in unsuccessful adjustments there tend to be virtually no cuts in these categories but heavy reliance on either tax increases or cuts in public investment. They find some evidence that investment is "crowded in" during fiscal consolidations, and that international competitiveness, defined as the ratio of home to foreign unit labor costs, improves. Finally, they report that fiscal consolidations tend to be initiated when a country is growing faster than the G7 average.

In another paper, Alesina and Perotti (1995b) concentrate on analyzing the macroeconomic effects of fiscal adjustment and find that in cases where the ratio of debt to GDP is successfully put on a declining path, real GDP tends to accelerate and the unemployment rate tends to decline. When progress is not made on the debt ratio, growth tends to slow and the unemployment rate tends to rise. In both papers, these authors emphasize that a remaining unanswered question is the complex relationship between growth and successful debt reduction.

Roseveare (1996) critiques the work of Alesina and Perotti, claiming that one year is too short a period to qualify as a substantial episode of fiscal consolidation, and that most of

their fiscal contractions have been just year-after bounce backs following fiscal expansions, which are therefore not meaningful. But while a one-year rule does seem to be too short to qualify as a fiscal adjustment effort², these do not appear to be mainly bounce back episodes. Many of these countries spent the 1970s and 1980s getting into debt problems, and much of the late 1980s and 1990s trying to undo the damage. Roseveare also argues that a better definition of fiscal success would be sustained improvements in cyclically adjusted primary balances, i.e., cyclically adjusted balances excluding government interest payments.

Bartolini, Razin, and Symansky (1995) study the macroeconomic effects of the fiscal restructuring undertaken in the 1990s in the G7 countries using the IMF's multi-country model (MULTIMOD). Their general conclusion is that fiscal consolidation leads to output losses initially followed by recovery. More importantly, they find that those countries that rely primarily upon increases in indirect taxes and expenditure cuts face steeper short-run output losses, but can expect a quicker recovery and greater output benefits within a decade.

The present paper offers several extensions to the previous work summarized above. While following the general approach suggested by Alesina and Perotti, cyclically adjusted rather than unadjusted revenue and expenditure data are used to get a better picture of the underlying movements of these time series. In order to strengthen the durability criterion in the identification of episodes of fiscal consolidations, a two-year rule rather than a one-year rule is used. This paper also explores more carefully the dynamics between economic growth and debt ratio reduction by looking at experiences over various phases of the world business cycle. Finally, this paper adds econometric tests to provide more statistical rigor to the question about what forces tend to explain whether a fiscal consolidation will be successful or not.

III. Theoretical Aspects

As mentioned in the introduction, the simplest Keynesian view of fiscal consolidation is that lower government purchases or higher taxes reduce aggregate demand and income directly, and have a multiplied negative impact on output. In fuller Keynesian models represented, for example, by standard IS-LM curve analysis (or as presented in Blinder and Solow (1973)), negative multiplier effects are partially offset by "crowding in" effects through lower interest rates and currency depreciation. Neoclassical models emphasize other transmission mechanisms by which government budget deficits affect an economy, especially wealth effects and expectational effects, and these also may outweigh the negative Keynesian multiplier effect on demand and activity.³ A smaller budget deficit could reduce interest rates significantly by reducing the perceived risk that a government would depreciate

²Alesina and Perotti do provide a durability dimension by looking at the debt ratio three years after the year of the adjustment.

³For a useful summary see Frenkel and Razin (1992, Chapter 7).

its public debt via high inflation, and this could lead to positive wealth effects on demand. In countries that have suffered from extremely large fiscal imbalances and where the action is viewed as necessary to restore government solvency, it could also reduce the default risk premium in interest rates. This again could increase the market value of wealth held by the private sector and increase aggregate demand. Or consumers and businesses could view deficit reduction as signaling a permanent reduction in their future tax burden and feel that their permanent income had been increased, something that could also trigger higher spending and activity.

The widening of fiscal imbalances in industrial countries over the past 25 years is attributable to growth in government expenditures that has exceeded economic growth and left the growth of revenues trailing. While the average ratio of tax revenue to GDP in these countries increased from 28 percent in 1960 to 44 percent in 1994, the corresponding ratio for expenditures rose from 28 percent to 50 percent.⁴ Given the levels to which taxation has risen and the danger of exacerbating distortions by raising taxation further, to say nothing of the political resistance to such policies, it is reasonable to suppose that control of government spending offers the best means of eliminating these fiscal imbalances. Even in a neoclassical model with expectational effects, deficit reduction via distortionary tax increases can clearly have negative real effects. Auerbach and Kotlikoff (1987), for example, argue that the disincentives of capital income taxation can have negative wealth effects and make output fall. Conversely, a deficit reduction via spending cuts can result in increased output by reducing expected future taxes and the disincentives they entail.

This idea is given further theoretical support by Bertola and Drazen (1993), who show through the use of a model of intertemporal optimizing behavior that if government spending follows an upward-trending stochastic process and if the public believes that the resulting fiscal imbalance will be cut sharply by tax increases when a specific trigger point is reached, then there will be a nonlinear negative relationship between private sector consumption and government spending.⁵ The basic mechanism is that changes in current government spending induce expectations of future tax changes in the same direction. Thus, a spending cut can be expansionary since it lowers the present discounted value of future taxes. However, should the trigger point be reached and a deficit reduction carried out via tax increases, then the probability of a spending cut is lowered and the present discounted value of future taxes is increased, which could slow economic growth.⁶

⁴Data are from Tanzi and Schuknecht (1995).

⁵Although the extension to investment is suggested, it is not carried out formally.

⁶Tax increases have little effect on consumption in a neoclassical model because consumers are assumed to implicitly know about all future tax burdens, and adjust their spending behavior accordingly. Full Ricardian equivalence assumes that this adjustment is instantaneous and complete.

The question of whether deficit reduction will raise or lower demand and output, and especially how long it will take before positive effects materialize, cannot be determined by theory alone; it is an empirical question. The instrument—tax increases or expenditure cuts—that is best suited to achieving a consolidation that reduces the ratio of debt to GDP is also an open question that can be addressed empirically.

IV. Empirical Framework

We now examine the empirical evidence on episodes of fiscal adjustment in industrial countries. First, it is necessary to define what is meant by fiscal adjustment and what data and rules are used to identify episodes of consolidation and expansion. In examining these episodes, structurally adjusted primary balances are used, as opposed to actual government balances. This adjustment removes two components from the government budget balance: (i) interest payments, which cannot be directly influenced in the short run by government fiscal policies; and (ii) the component of the government balance that is a result of the business cycle. This structural balance is the balance that would arise if both expenditures and taxes were determined by potential rather than actual output.⁷

The sample comprises annual data from 1970 to 1995 for primary structural balances for twenty industrial countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, the United Kingdom, and the United States. Estimates of primary structural government balances come from the OECD economic outlook database and from the IMF's World Economic Outlook (WEO) database.⁸ Since we want to examine episodes of aggressive policy action, we use only observations with large fiscal adjustments. We define an episode of significant fiscal consolidation as one where the fiscal balance (the ratio of the primary structural government balance to potential GDP) improves by at least 1.5 percentage points over two years and does not decrease in either of the two years. The latter part of the rule is used to avoid including episodes that have partial reversals. Table 1 lists all 74 episodes that meet this two-year criterion of fiscal consolidation.

To check the robustness of this rule we consider two alternate rules for identifying a significant fiscal consolidation: (i) the primary structural fiscal balance increases by at least 1.5 percentage points in one year, and (ii) the primary structural fiscal balance increases by at least 2.0 percentage points over three years and does not decrease in any of the three years. The one-year rule was subject to the problem of including episodes that were reversed the

⁷Actually the only expenditure category that is adjusted for the structural balance is unemployment compensation. Historical elasticities are used to make these adjustments.

⁸The OECD was the primary source of structural balance estimates. The mix of data provided the broadest possible country coverage and the longest possible historical perspective.

Table 1. Industrial Countries: Episodes of Fiscal Consolidation¹

Country	Last Year of Two-Year Period of Fiscal Consolidation
Australia	81,82,87,88
Austria	78,81
Belgium	83,84,85,86,87,93
Canada	81,87,95
Denmark	84,85,86
Finland	76,89
France	80,84
Germany ²	77,82,83,93,94
Greece	83,87,91,92,93,94,95
Ireland	83,84,87,88,89
Italy	77,83,92,93
Japan	81,82,84,85,87
Netherlands	82,83,88
New Zealand ³	86,87,92,95
Norway	85,86,95
Portugal	70,80,85,86,95
Spain	84,87
Sweden	76,84,87,95
United Kingdom	80,81,82,95
United States	77

Source: OECD, *Economic Outlook*.

¹A primary structural government balance must increase by at least 1.5 percent of potential GDP over two years and not increase in either of the two years to register as a fiscal consolidation.

²Data before 1990 refer to West Germany.

³Calculations based on data from World Economic Outlook.

following year; it also has the potential to rule out episodes that achieved significant fiscal consolidation via smaller but steady improvements over more than one year. On the other hand, the three-year rule would degrade the quality of a sample by sometimes registering consolidations after they were clearly over. Overall, we determined that the two-year rule offered the best compromise between excluding obvious cases of policy reversal and including cases of small but steady improvements over more than one year. The list in Table 1 includes several well known episodes of multi-year fiscal adjustments, such as Denmark from 1983 to 1986, Ireland from 1982 to 1984 and 1986 to 1989, and New Zealand from 1985 to 1987 and in the early 1990s.

The next step is to determine which episodes of fiscal consolidation identified in Table 1 were successful. Determining what constitutes a successful fiscal consolidation is open to different interpretations but broadly speaking, if the ratio of public debt to GDP starts to decline and stays on a declining trend because of the discretionary change in fiscal policy, we follow Alesina and Perotti (1995a) and label this a successful consolidation. In a definitional sense, the change in the ratio of debt to GDP depends upon the primary balance, movements in the interest rate, and changes in GDP, which could be caused by business cycle factors. In a later section, we examine the complex relationship between the debt ratio and business cycle factors and interest rate movements. For most of the analysis in this paper, we concentrate on changes in the cyclically adjusted primary balance, and view it as the key determinant of success.

We examined three versions of this definition of successful fiscal consolidation: (i) a reduction of at least 3 percentage points in the ratio of gross public debt to GDP by the second year after the end of the two-year fiscal tightening, (ii) the same as (i) except that GDP is replaced by potential GDP, and (iii) a reduction of at least 5 percentage points in the debt ratio by the third year after the end of the two-year fiscal tightening. Successful fiscal consolidation episodes determined by these rules are shown in Table 2. Using rule (i) there are 14 successful episodes and 48 unsuccessful episodes.⁹ Using rule (ii) there are 12 successful episodes, most of which are the same as those identified under rule (i). As might be expected, fewer cases satisfy the more stringent rule (iii), but it is clear that to satisfy rule (iii) the episode will usually have satisfied rule (i). In this study we focus on the successful cases determined by rule (i). This criterion is satisfied by virtually all of the well documented fiscal consolidation successes of the period, including Denmark from 1983 to 1986, Ireland from 1986 to 1989, and New Zealand in the early 1990s.

We also identify episodes of fiscal stimulus. Following the methodology outlined above, an episode of significant fiscal stimulus is defined as a period in which the primary structural fiscal balance declines by at least 1.5 percentage points over two years and does not

⁹There are 12 episodes that could not be classified as successful or unsuccessful either because debt data were unavailable or the two-year period from the time of the consolidation had not yet expired.

Table 2. Industrial Countries: Episodes of Successful Fiscal Consolidation

Country	Period of Fiscal Consolidation ¹		
	Rules I	Rule II	Rule III
Australia	87,88	87,88	87
Belgium	87		
Denmark	84,85,86	84,85,86	84,85,86
Ireland	87,88,89	87,88,89	87,88,89
Japan	87		87
New Zealand ²	92	92	92
Norway	86	85,86	86
Sweden	87	87	84,87
United States	77		

Source: OECD, *Economic Outlook*.

¹Under Rule I gross debt must be 3 percent of GDP lower two years after the fiscal consolidation to register as a success. Under Rule II gross debt must be 3 percent of potential GDP lower two years after the fiscal consolidation to register as a success. Under Rule III gross debt must be 5 percent of GDP lower three years after the fiscal consolidation to register as a success. The unsuccessful fiscal consolidations can be derived by comparing Table 1 with Table 2. Note that because the definition of success depends on the change in the gross public debt two or three years after the consolidation, 13 episodes of fiscal consolidation which occur after 1993 cannot be classified under the two-year rule, while 16 episodes cannot be classified under the three-year rule. In addition, five episodes are not classified because data on public debt was unavailable (Australia 77,78,81,82; New Zealand 86).

²Calculations based on data from World Economic Outlook.

increase in either year. Table 3 shows 74 such episodes of fiscal stimulus, including the well known multi-period fiscal expansions in Japan 1991-94 and Sweden 1990-93.

1. Fiscal adjustments and economic performance

The next step in the analysis is to determine the consequences of fiscal consolidation for a series of economic performance measures, such as real GDP growth, employment growth, and changes in the unemployment rate, interest rates, exchange rates, and the shares of the major components of GDP. In order to correct for the effects of the world business cycle, real GDP growth, employment growth, and changes in the unemployment rate are measured as differences from a weighted average of the industrial country rates, while interest rates are measured as differences from a weighted average of major industrial country rates. Movements in consumption, investment, and net exports are expressed as shares of GDP.

Table 4 follows the paths of these macroeconomic variables by reporting averages for the year before the episodes of significant fiscal action, for the two-year period during which it takes place, and for the year following. Examining the episodes of consolidations first, real GDP growth on average slightly outpaced average industrial country GDP growth in the year before fiscal contractions were undertaken, but fell somewhat below average growth over the two-year fiscal consolidation phase and the year after. Employment growth also tended to drop and the unemployment rate increased, again relative to what was happening in the industrial countries as a whole. But in the 14 episodes in which countries were successful in reducing their ratios of public debt to GDP, economic growth and job creation increased both in the adjustment phase and in the year after; the unemployment rate declined, both short- and long-term real interest rates declined, and currencies appreciated in real effective terms following a few strong depreciations prior to the consolidation efforts.¹⁰ Thus, successful fiscal consolidations tended to be associated with successful economic performance. Furthermore, in contrast to the findings of Giavazzi and Pagano (1990), most of this economic growth was from investment growth rather than consumption growth.

For fiscal expansions, the episodes were also divided into two categories: (i) those in which debt increased significantly, and (ii) those in which debt did not. The former category identifies cases where the ratio of debt to GDP increased by at least 3 percentage points over the two years following the fiscal stimulus. The other cases were those in which the ratio of debt to GDP increased by less than 3 percentage points over the two years following the fiscal

¹⁰The 4.60 percent average depreciation in the year before the consolidation phase in the successful cases was heavily influenced by sharp depreciations in Australia (87,88) and Ireland (88,89). In the ten other successful cases, there was no currency depreciation on average in the year before the consolidation.

Table 3. Industrial Countries: Episodes of Fiscal Stimulus¹

Country	Last Year of Two-Year Periods of Fiscal Stimulus
Australia	76,84,91,92,93
Austria	75,76,94,95
Belgium	76,80,81
Canada	72,78,83,84,85
Denmark	75,76,80,82,88,89,90
Finland	78,79,80,83,91,92,93
France	78,82
Germany ²	75,91
Greece	85,89
Ireland	79,95
Italy	79
Japan	76,78,92,93,94
Netherlands	79,90
New Zealand ³	
Norway	92,93
Portugal	72,73,74,75,76,90,91
Spain	82,90,91
Sweden	73,74,78,79,91,92,93
United Kingdom	71,72,73,84,90,93
United States	71,83

Source: OECD, *Economic Outlook*.

¹A primary structural government balance must decrease by at least 1.5 percent of potential GDP over two years to register as a fiscal expansion.

²Data before 1990 refer to West Germany.

³Calculations based on data from World Economic Outlook.

Table 4. Industrial Countries: Macroeconomic Effects of Fiscal Actions

Macroeconomic Variables	Type of Fiscal Action	Time Frame		
		One year Before	Two years During	One year After
Real GDP ¹ (percentage change)	Consolidation	0.05	-0.39	-0.11
	Successful	-0.18	0.10	0.65
	Unsuccessful	0.11	-0.71	-0.97
	Stimulus	-0.42	-0.17	0.22
	Debt increasing	-0.33	-0.31	-0.10
	Debt stable	-0.58	0.08	0.79
Employment ¹ (percentage change)	Consolidation	0.01	-0.53	-0.61
	Successful	-0.18	0.10	0.65
	Unsuccessful	0.06	-0.71	-0.97
	Stimulus	-0.51	-0.50	-0.39
	Debt increasing	-0.47	-0.57	-0.62
	Debt stable	-0.61	-0.32	0.14
Government Employment (percentage change)	Consolidation	2.09	1.27	0.09
	Successful	1.56	0.19	0.20
	Unsuccessful	2.29	1.61	1.13
	Stimulus	2.66	2.22	1.25
	Debt increasing	2.54	2.04	0.90
	Debt stable	2.88	2.53	1.88
Unemployment rate ¹ (change in percent of labor force)	Consolidation	0.91	1.08	1.47
	Successful	2.12	1.90	0.30
	Unsuccessful	0.55	0.84	1.52
	Stimulus	0.24	0.72	0.98
	Debt increasing	0.24	0.80	1.37
	Debt stable	0.24	0.53	-0.02
Real interest rates short ² (percent a year)	Consolidation	0.63	0.88	1.52
	Successful	2.44	2.06	1.86
	Unsuccessful	0.09	0.52	1.42
	Stimulus	0.73	1.27	0.57
	Debt increasing	1.03	1.51	0.92
	Debt stable	0.03	0.72	-0.24
Real interest rates long ² (percent a year)	Consolidation	0.41	0.02	-0.01
	Successful	1.34	1.06	1.08
	Unsuccessful	0.15	-0.27	-0.33
	Stimulus	-0.05	0.57	0.77
	Debt increasing	0.07	0.81	1.09
	Debt stable	-0.28	0.13	0.17
Exchange rates, real effective (1990 = 100)	Consolidation	96.59	96.42	97.20
	Successful	92.42	93.69	97.44
	Unsuccessful	97.88	97.27	97.13
	Stimulus	101.52	99.98	97.85
	Debt increasing	102.71	101.52	96.62
	Debt stable	98.91	96.59	98.35
Exchange rates, real effective (percentage change)	Consolidation	-2.68	0.35	1.29
	Successful	-4.60	1.18	5.41
	Unsuccessful	-0.02	0.10	-0.02
	Stimulus	0.77	-1.19	-1.32
	Debt increasing	0.48	-1.14	-2.97
	Debt stable	1.40	-1.28	2.30

Table 4 (concluded). Industrial Countries: Macroeconomic Effects of Fiscal Actions

Macroeconomic Variables	Type of Fiscal Action	Time Frame		
		One year Before	Two years During	One year After
Private consumption (change in percent of GDP)	Consolidation	0.30	-0.06	-0.28
	Successful	-0.40	0.22	-0.40
	Unsuccessful	0.40	-0.14	-0.25
	Stimulus	-0.06	0.60	0.40
	Debt increasing	0.06	0.94	0.01
	Debt stable	-0.27	0.01	-0.21
Private investment (change in percent of GDP)	Consolidation	-0.42	-0.41	-0.09
	Successful	-0.02	0.80	2.45
	Unsuccessful	-0.54	-0.76	-0.83
	Stimulus	-1.09	-1.74	-0.47
	Debt increasing	-0.72	-2.20	-1.06
	Debt stable	-1.80	-0.86	0.64
Net exports (change in percent of GDP)	Consolidation	0.63	1.36	0.72
	Successful	0.99	1.09	-0.08
	Unsuccessful	0.54	1.46	0.95
	Stimulus	0.18	0.23	-0.36
	Debt increasing	-0.25	0.07	-0.09
	Debt stable	0.92	0.52	-0.84

Source: OECD, *Economic Outlook*, IMF, *World Economic Outlook* data base; and *International Financial Statistics*.

¹Differential with industrial country average.

²The real rates differential with respect to the major industrial country average is constructed using the short rates as defined in Table 36 of the OECD *Economic Outlook* less the annual percentage change in the GDP deflator.

³The real rates differential with respect to the major industrial country average is constructed using the long rates as defined in Table 36 of the OECD *Economic Outlook* less the three-year average of the annual percentage change in the GDP deflator.

stimulus.¹¹ On average, in cases of fiscal stimulus, real GDP growth and employment creation improved relative to average industrial country performance, although the unemployment rate remained above average and even worsened. In the 45 cases of debt-increasing fiscal expansions, the unemployment rate deteriorated markedly while employment creation was largely unchanged, and growth improved marginally. In the other 23 cases where debt was relatively stable, fiscal expansions generated more growth and employment than the industrial country average, while the unemployment rate ultimately fell below its initial position. Both short- and long-term real interest rates increased during the period of fiscal expansion relative to average rates in the major industrial countries.

There was significant depreciation of real effective exchange rates during periods of significant fiscal expansion. In the stable debt cases this reversed itself one year after the expansion, while currencies in the increasing debt cases continued to depreciate. Debt-increasing fiscal expansions have very strong "crowding out" effects on investment, while there was some growth in private consumption. The opposite was true in stable debt cases. Broadly speaking, there was a symmetric reaction between fiscal expansions and contractions. Keeping debt under control seems to have had a large influence on private sector investment growth and thus on growth in general.

2. Factors that seem to contribute to success

What factors seem to have contributed to the success of fiscal consolidation? Following procedures suggested by Alesina and Perotti (1995a and 1995b) and Giavazzi and Pagano (1996), we find that the size of the fiscal consolidation may be an important factor. The average magnitude of the two-year fiscal contraction was 4.0 percent of potential GDP for the successful cases, but only 3.2 percent for unsuccessful cases.¹² A timid commitment to fiscal consolidation may be more likely to fail than a strong one. This may be partly due to a nonlinear relationship between fiscal policy and output growth, whereby small reductions in budget deficits may reduce aggregate demand while large adjustments may revive confidence so that growth is given a boost. Also, in many of the successful cases the fiscal consolidation was undertaken as part of a broader adjustment and reform program that may have enhanced the overall credibility of government commitment to the consolidation.

Real short-term interest rates tended to decline in the successful consolidation cases, but to increase in the unsuccessful cases (again, relative to movements in a weighted average of real short-term interest rates in the major industrial countries). It is possible that the larger fiscal action in successful cases may have been a factor in restoring financial market confidence and allowing monetary authorities to ease monetary conditions. Real long-term

¹¹For the 74 fiscal expansion episodes, two cannot be classified because the two-year period from the time of the expansion had not yet expired. In addition, 4 episodes are not classified because data on public debt were unavailable (Australia 76,84) and Denmark (75,76).

¹²The significance of the size of the fiscal impulse is tested in the next section.

interest rates decreased in both successful and unsuccessful cases, but perhaps for different reasons—because of improved financial confidence in the successful cases where the policy initiatives were more vigorous, but because of weaker economic growth in the unsuccessful cases.

The composition of the fiscal consolidation also seems to have played a role. The 62 episodes of fiscal consolidation were divided into two categories: those in which the deficit was cut mainly (by at least 60 percent) through revenue increases, and those in which it was reduced mainly (at least 60 percent) through noninvestment expenditure cuts (Table 5). The use of structurally adjusted revenue and expenditure data eliminates what would have been a bias in the selection of expenditure cutting episodes.¹³ Of the 17 cases where most of the policy action was achieved through expenditure reductions, just under half were successful, while among the 37 cases where the consolidation was achieved mainly on the revenue side, less than one out of six had successful outcomes.¹⁴

The message is reinforced by the fact that the average structurally adjusted expenditure cut in the episodes with successful outcomes was 3.7 percent of GDP, whereas in the unsuccessful cases it was just 2.1 percent. There was a particularly large difference in the change in government wage outlays between the two cases. In the successful cases, the government wage bill was cut by 0.9 percent of GDP, while the cuts averaged just 0.3 percent in the unsuccessful cases. In the successful cases government employment was virtually constant, but it increased in the unsuccessful cases. Government consumption excluding wages was also cut much more sharply in the successful episodes than in the unsuccessful cases. Social security payments and transfers were kept in check in the successful cases, but expanded as a share of GDP in unsuccessful cases.

A few factors that other researchers have claimed to be important for predicting the success or failure of fiscal consolidation did not appear to be significant in this study. The pace of real economic growth in the year before the fiscal contraction, for example, did not seem to be positively related to the success of the action. In fact, a larger share of fiscal contraction cases that were launched in the face of sub-par growth, as opposed to above average growth, ended up succeeding. One interpretation is that some sense of economic crisis, associated with slow or negative growth, might have been necessary to convince governments to make tough choices—especially larger budget cuts and cuts more focused on expenditures. Finally, real exchange rate movements do not appear on average to have played

¹³In periods of high growth, the cyclical components of expenditure will tend to fall as items such as unemployment benefits are reduced, while the cyclical components of revenue will tend to rise as the tax base increases.

¹⁴Eight of the 62 episodes were excluded because they involve a roughly equal mix of revenue and expenditure measures.

Table 5. Industrial Countries: Characteristics of Fiscal Consolidation

Characteristics	All episodes	Successful	Unsuccessful
Type of Consolidation ¹			
Revenue increasing	37	6	31
Expenditure cuts	17	7	10
Of which:			
Average expenditure cuts ²	-3.22	-3.73	-2.12
Average government wage cuts ³	-0.60	-0.86	-0.33
Average transfers cut ³	0.19	0.05	0.28
Average subsidies cut ³	-0.26	-0.26	-0.24
Average social security cut ³	-0.28	-0.83	0.18
Average government consumption less wage ³	-0.34	-0.64	-0.07

Source: OECD, *Economic Outlook*, IMF, World Economic Outlook data base; and *International Financial Statistics*.

¹Eight episodes are excluded because they involve a roughly equal mix of revenue and expenditure measures.

²Structural expenditure cuts as a percent of potential GDP (negative value denotes a cut).

³As a percent of GDP (negative value denotes a cut).

a major role in explaining why cases of fiscal consolidation succeeded.¹⁵ Between the year before the fiscal consolidation and the end of the two-year contraction, the real exchange rate on average appreciated slightly in the successful cases and depreciated slightly in the unsuccessful cases.¹⁶ This would suggest that on average, the successful cases did not benefit from a depreciation-driven growth in net exports. This view is supported by the net export share data in Table 4.

3. The relationship between growth and fiscal consolidation

Given the interactions between economic growth and changes in public debt ratios, it is difficult to distinguish between the contribution of good growth to successful consolidations and the effect of successful consolidation in boosting demand and growth. One way to analyze this relationship is to examine fiscal adjustments over different phases of the business cycle. This is achieved by repeating the previous exercise for the period 1980-81, a time of global recession and spiking interest rates, and the period 1984-89, a period of solid industrial country growth and flat or declining world interest rates. Clearly, it is difficult to reduce debt ratios in the midst of a global recession, especially if interest rates are increasing sharply at the same time.¹⁷ None of the 7 efforts at fiscal consolidation over 1980-81, for example, including the highly visible efforts in the United Kingdom, were successful in lowering debt ratios, in part because of these economic headwinds. Even in the 1984-89 period, however, only 12 of the 30 cases of fiscal consolidation were successful. Thus, even in the favorable 1984-89 period, most efforts to reduce ratios of debt to GDP failed. Thus, although good timing in relation to the world business cycle helps, it does not guarantee success.

The manner in which the fiscal consolidation is conducted still seems to be important, even with a strong global economy. Table 6 reports the macroeconomic effects of fiscal consolidations that took place between 1984 and 1989; it shows that the direction of the macroeconomic effects for both successful and unsuccessful episodes was the same in this sub-period as the full 1970-95 period. More important, the same characteristics of successful fiscal consolidation cases can still be observed in the data (Table 7). Of the 11 episodes in which the fiscal consolidation was concentrated on expenditure cuts over half were successful, while only a third of the 14 cases that

¹⁵Notable exceptions may be Australia and Ireland in the late 1980s, and New Zealand in the late 1980s and early 1990s, where the currencies depreciated sharply in real terms before, and sometimes during, the consolidation period.

¹⁶It is interesting to note, however, that in the year after the two-year contraction, the real exchange rate appreciated sharply in the successful cases.

¹⁷If a fiscal deficit is clearly unsustainable, it might well be the case that it is better to start correcting it as soon as possible, even if world growth is weak and the prospects of the debt-to-GDP ratio declining are low.

Table 6. Industrial Countries: Macroeconomic Effects of Fiscal Consolidation, 1984-89

Macroeconomic Variables	Type of Fiscal Action	Time Frame		
		One year Before	Two years During	One year After
Real GDP ¹ (percentage change)	Consolidation	0.09	-0.42	0.29
	Successful	0.09	0.33	0.57
	Unsuccessful	0.09	-0.91	0.10
Employment ¹ (percentage change)	Consolidation	0.02	-0.55	-0.30
	Successful	-0.14	-0.07	0.38
	Unsuccessful	0.13	-0.88	-0.76
Government Employment (percentage change)	Consolidation	1.78	1.07	0.57
	Successful	1.34	0.29	-0.16
	Unsuccessful	2.19	1.68	1.11
Unemployment rate ¹ (change in percent of labor force)	Consolidation	1.32	1.46	1.47
	Successful	2.03	1.78	1.32
	Unsuccessful	0.85	1.25	1.58
Real interest rates short ² (percent a year)	Consolidation	0.96	0.89	1.74
	Successful	2.48	2.22	1.99
	Unsuccessful	-0.06	0.01	1.57
Real interest rates long ³ (percent a year)	Consolidation	0.55	0.09	0.13
	Successful	1.34	1.07	1.07
	Unsuccessful	0.02	-0.56	-0.49
Exchange rates, real effective (1990 = 100)	Consolidation	93.53	93.13	96.87
	Successful	89.90	92.25	97.18
	Unsuccessful	95.96	93.72	96.67
Exchange rates, real effective (percentage change)	Consolidation	-4.02	0.40	3.76
	Successful	-4.35	1.99	5.13
	Unsuccessful	-3.80	-0.66	2.85
Private consumption (change in percent of GDP)	Consolidation	0.25	-0.21	-0.64
	Successful	-0.35	0.14	-0.24
	Unsuccessful	0.64	-0.44	-0.91
Private investment (change in percent of GDP)	Consolidation	-0.75	0.21	1.62
	Successful	-0.03	0.80	2.45
	Unsuccessful	-1.36	-0.29	0.91
Net exports (change in percent of GDP)	Consolidation	1.59	1.74	-0.15
	Successful	1.53	0.62	-0.87
	Unsuccessful	1.64	2.48	0.33

Source: OECD, *Economic Outlook*, IMF, World Economic Outlook data base; and *International Financial Statistics*.

¹Differential with industrial country average.

²The real rates differential with respect to the major industrial country average is constructed using the short rates as defined in Table 36 of the OECD *Economic Outlook* less the annual percentage change in the GDP deflator.

³The real rates differential with respect to the major industrial country average is constructed using the long rates as defined in Table 36 of the OECD *Economic Outlook* less the three-year average of the annual percentage change in the GDP deflator.

Table 7. Industrial Countries: Characteristics of Fiscal Consolidation, 1984-89

Characteristics	All episodes	Successful	Unsuccessful
Type of Consolidation ¹			
Revenue increasing	14	5	9
Expenditure cuts	11	6	5
<i>Of which:</i>			
Average expenditure cuts ²	-3.24	-3.49	-2.24
Average government wage cuts ³	-0.84	-0.89	-0.60
Average transfers cut ³	-0.15	0.08	-0.42
Average subsidies cut ³	-0.44	-0.30	-0.14
Average social security cut ³	-0.73	-0.84	-0.42
Average Government consumption less wage ³	-0.44	-0.59	-0.14

Source: OECD, *Economic Outlook*, IMF, World Economic Outlook data base; and *International Financial Statistics*.

¹Five are excluded because they involve an equal mix of revenue and expenditure measures.

²Structural expenditure cuts as a percent of potential GDP.

³As a percent of GDP.

mainly employed revenue increasing measures were successful. Again, successful episodes were associated with strong expenditure cuts, dominated by cuts in government wages, other government consumption, and social security.

To further explore the relationship between economic growth and movements in the debt-to-GDP ratio, we searched for episodes when the debt ratio declined even though there was more minor or no fiscal consolidation. The search was conducted by using the following rule: the ratio of gross debt to GDP must have decreased by at least 3 percentage points over a two-year period, while the primary structural balance must have tightened by less than 1.5 percent of GDP. To reduce the chances that an earlier fiscal consolidation might taint the results, episodes of debt reduction that occurred within four years after an identified consolidation were excluded. Table 8 shows the 21 episodes when debt ratios fell despite the lack of a sharp fiscal consolidation—11 in the United Kingdom. Seven episodes occurred in the early 1970s when inflation was accelerating rapidly, nominal GDP growth was relatively high, and real interest rates were plunging—that is, the debt ratio was reduced by an inflation surprise. A number of other episodes were a result of privatization programs. The three episodes in Norway were a result of substantial changes in the extent of government financial intermediation following the acquisition of financial assets in the 1970s. The reductions in debt from 1993 to 1995 in Denmark and Ireland can be attributed to the impressive real GDP growth performance of the two economies while debt interest payments were still falling significantly because of earlier consolidations. On balance, the data suggest that aside from some special cases, rapid GDP growth alone has not caused the ratio of debt to GDP to decline noticeably. In most cases, a substantial fiscal consolidation effort, as defined earlier in this paper, is a necessary condition for a successful debt-reduction outcome.

Table 8. Industrial Countries: Episodes of Debt-to-GDP Reductions with Minor or No Fiscal Consolidation¹

Country	Base Year Before Debt-to-GDP Reduction
Canada	72
Denmark	93
Ireland	93
Norway	80,81,82
Portugal	77,90
United Kingdom	70,71,72,74,76,77,78,85,86,87,88
United States	71,72

Source: OECD, Economic Outlook.

¹Gross debt must decrease by at least 3 percent of GDP over a two-year period following the year indicated, while in the proceeding two years the fiscal impulse must be less than 1.5 percentage points of GDP and be at least four years from any fiscal consolidation period indicated in Table 1.

V. Logistic Probability Model

1. Predicting debt reducing fiscal consolidations

Below we report the results of an econometric investigation into the factors associated with successful fiscal consolidations. This is a binary outcome problem for which the logistic probability model was used. The goal was to predict the probability that the ratio of debt to GDP would decline at least 3 percentage points within two years following an episode of fiscal consolidation, conditional upon information about how the consolidation was implemented and upon the macroeconomic environment. Using a logistic probability model allows us to make comparisons with the previous section since the criterion for success is identical. The model is

$$\log \frac{P_i}{1-P_i} = \beta_0 + \beta_1 f_i + \beta_2 D_i + \beta_3 g_i + \beta_4 g_i^w + \varepsilon_i \quad (1)$$

where P_i is the probability that episode i will be successful, f_i is the two-year fiscal impulse with sign reversed, i.e., the cumulative two-year change in the cyclically adjusted primary balance, D_i is a dummy variable representing how consolidation was implemented ($D=1$ if at least 60 percent of the fiscal improvement comes from current expenditure cuts and 0 otherwise), g_i is domestic GDP growth minus a weighted average of industrial country growth during the period of consolidation, and g_i^w is the weighted average of industrial country growth during the period of consolidation.

The fiscal impulse is included as a predictor of a successful consolidation because it has a direct effect on the debt-to-GDP ratio and thus future debt servicing requirements, and an indirect effect that works through confidence and expectations channels. The dummy variable is included to test whether expenditure cuts are a better instrument for stabilizing the debt-to-GDP ratio than revenue measures, because of the influence of distortionary taxes or the nonlinear relationship between government spending and economic activity. A dummy variable is used for this purpose to avoid problems with extreme outliers: if the proportion of the consolidation attributable to expenditures cuts were used, this could exceed 100 percent and it could reach extreme values when expenditure cuts are accompanied by tax cuts. Finally, growth variables are included to control for the effects of the domestic and global business cycles.

The logistic model was estimated using a maximum likelihood nonlinear estimation routine and a sample of 60 fiscal consolidation episodes.¹⁸ The estimation results (with asymptotic standard errors in parentheses) are

¹⁸Two episodes from our sample of 62 (Portugal 1970 and 1980) are excluded because data are not available.

$$\frac{P_i}{1-P_i} = \frac{-5.698}{(1.553)} + \frac{.571}{(.266)} f_i + \frac{1.721}{(.874)} D_i + \frac{.375}{(.166)} g_i + \frac{.385}{(.183)} g_i^w \quad (2)$$

$LR=21.2 \quad Pseudo R^2=.32$

The LR test is a test of the significance of the entire logistic model and follows a chi-square distribution with 4 degrees of freedom. The results indicate that two policy variables may be important in improving the chances of success: the magnitude of the fiscal impulse as captured by the fiscal impulse measure, and the dummy variable indicating whether the consolidation was undertaken via higher taxes or lower expenditures. The importance of these factors can be seen in Figure 1, which shows that for any size of two-year fiscal impulse, the probability of a successful consolidation increases dramatically if it is conducted mostly via expenditure cuts.¹⁹ Even with a 7 percent improvement of potential GDP over a two-year period, the probability of a tax increase-based consolidation being successful is about 0.5. On the other hand, an expenditure cut-based consolidation needs just a 4 percent improvement in the structural primary balance to have about a 50 percent chance of

being successful. A nonpolicy factor significant in determining the probability of success is the timing of the world business cycle.²⁰ The results imply that for a fiscal episode that has a 50 percent probability of success, a 1 percentage point increase in average industrial country growth will increase the probability of success by 0.1.²¹ Figure 2 shows the relationship between the probability of success and world economic growth, whether it is weak or strong. The curve showing the probability of success when world economic growth is weak is calculated under the assumption that growth is 0.8 percent, the average growth rate of the industrial countries over the recessionary period 1980-1982. The curve showing the probability of success when growth is strong is calculated with a growth assumption of 3.7 percent per year, the average growth rate of

where variables are set to their means as follows: $g^w = -1$ and $g^w = 5$. Other variables were tried in the regression but proved to be statistically insignificant. These other variables included real long-term interest rates, real effective interest rates, and the debt stock prior to the period of fiscal consolidation. To interpret the effect of a change in a continuous variable x on the probability of success, we can use the approximation $\Delta P_i \approx \beta [P_i(1-P_i)] \Delta x$.

