Flattening the Debt Curve: Empirical Lessons for Fiscal Consolidation

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ABSTRACT

This paper reviews the empirical literature to determine which forms of fiscal consolidation successfully reduce debt-to-GDP ratios and impact economic performance. We perform a cross-country analysis of fiscal adjustments in 26 democracies for 1995–2018 and find that expenditure-based fiscal adjustments are notably more successful at lowering debt levels than tax-based adjustments, with successful adjustments focusing around two-thirds on the expenditure side. Expenditure-based adjustments tend to cause small contractions, not significantly different from zero, while tax-based adjustments cause deep and long-lasting recessions. In addition, we find that periods of fiscal consolidation that last more than two years tend to be twice as successful as those that last only two years or less. We do not find the size of the fiscal consolidation to be a key determining factor in the success of fiscal adjustments.

JEL codes: E62, H62, H63, H50

Keywords: fiscal policy, fiscal consolidation, fiscal adjustment, budget, deficit reduction, debt management, debt, deficit

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The president elected in November 2020 will inherit a level of public debt not seen since the aftermath of World War II. With a fiscal deficit of 17.9 percent of GDP and public debt exceeding the annual output of the US economy, serious fiscal consolidation is needed if the government is to adequately prepare for the next economic crisis and avoid forgoing future economic opportunity. Since the fallout of the 2007–2008 financial crisis, several developed countries have spent the subsequent decade reining in their fiscal deficits and reducing their debt levels.[1] This is partly the result of countries adopting binding fiscal rules, but more importantly, it is the result of national governments taking serious action to consolidate their finances.

Fiscal consolidation can take two forms: (1) adopting a debt-reduction package driven primarily by tax increases or (2) adopting a package mostly consisting of spending restraint. Many countries have adopted a plan with some combination of the two. In Europe following the Great Recession, Ireland adopted primarily spending-based measures while France adopted almost exclusively tax-based consolidation measures. What policymakers might not know is which of these two forms of consolidation tend to be more effective at reining in debt levels and which are less harmful to economic performance: tax-based (TB) fiscal consolidation or expenditure-based (EB) fiscal consolidation. This policy brief will answer these two questions.

Some theoretical explanations for why EB fiscal consolidations might result in more positive outcomes than TB consolidations include the economic theory that both consumers and investors tend to be forward looking. During EB adjustments, both households and investors expect future income increases and a lesser possibility of future tax increases, which drive private consumption higher. These demand-side mechanisms can result in EB adjustments having expansionary economic outcomes while also increasing the probability of adjustment success as increased private consumption and investment drive revenues higher. On the supply side, TB adjustments can negatively affect supply in a variety of ways. For example, higher taxes on labor encourage early retirement for older workers or delay the entry of young workers into the market, thereby increasing the fiscal burden on social security systems.[2] Additional pressures on government entitlement programs worsen the fiscal balance and reduce the chances of consolidation success. Increases in corporate and personal income taxes also have adverse impacts on business investment by increasing the cost of capital.[3] Reduced investment means that businesses hire fewer workers, further increasing entitlement costs and forgoing potential increases in government revenues.

This study proceeds as follows. First, we review the empirical literature on historical fiscal consolidations across multiple sample countries and time periods to determine which

1. European countries that have taken action to successfully lower their debt-to-GDP ratios in recent years include Austria, Croatia, the Czech Republic, Denmark, Germany, Hungary, Iceland, Ireland, the Netherlands, Serbia, Slovakia, Slovenia, Sweden, Switzerland, Ukraine, and the United Kingdom.

2. Alberto F. Alesina, Carlo Favero, and Francesco Giavazzi, "Effects of Austerity: Expenditure- and Tax-Based Approaches," *Journal of Economic Perspectives* 33, no. 2 (2019): 141–62.

3. Laura Vartia, "How Do Taxes Affect Investment and Productivity? An Industry-Level Analysis of OECD Countries" (OECD Economics Department Working Paper No. 656, Organisation for Economic Co-operation and Development, Paris, December 17, 2008).

of the two types of consolidation measures successfully reduces debt-to-GDP ratios. We then perform a cross-country analysis of fiscal adjustments in 26 democracies for 1995–2018, concentrating mainly on the composition of the adjustments. Finally, we assess the impacts of the two types of consolidation on economic performance by reviewing the literature on episodes of consolidation. We find that EB fiscal adjustments are notably more successful at lowering debt levels than TB adjustments, with successful adjustments focusing at least 60 percent on the expenditure side. EB adjustments tend to cause small contractions, not significantly different from zero, while TB adjustments cause deep and long-lasting recessions. In addition, we find that periods of fiscal consolidation that last more than two years tend to be twice as successful as those that last only two years or less. We do not find the size of the fiscal consolidation to be a key determining factor in the success of fiscal adjustments.

THE DANGERS OF EXCESSIVE PUBLIC DEBT

Economists have long noted several macroeconomic channels through which debt can adversely impact medium- and long-run economic growth. More recent observations suggest that large increases in the debt-to-GDP ratio could lead to much higher taxes, lower future incomes, and intergenerational inequity.[4] High public debt can negatively affect capital stock accumulation and economic growth via heightened long-term interest rates,[5] higher distortionary tax rates,[6] inflation,[7] and a general constraint on countercyclical fiscal policies, which may lead to increased volatility and lower growth rates.[8]

Institutions have issued warnings too: the Congressional Budget Office has warned time and again that the trajectory of federal debt will eventually limit America's ability to respond to future crises. Increased government borrowing also competes for funds in the nation's capital markets, which in turn raises interest rates and crowds out private investment.[9] With entrepreneurs in the private sector facing higher costs of capital, innovation and productivity are stifled, which reduces the growth potential of the economy.

As growing interest payments consume an ever-larger portion of the federal budget, lesser amounts of public funds are allocated for capital investment projects such as research and development, infrastructure, and education. The combination of reduced private investment and crowding out of public investment has negative effects on productivity and social mobility.

4. Michael J. Boskin, "Are Large Deficits and Debt Dangerous?" (NBER Working Paper No. 26727, National Bureau of Economic Research, Cambridge, MA, February 2020).
5. Emanuele Baldacci and Manmohan S. Kumar, "Fiscal Deficits, Public Debt, and Sovereign Bond Yields" (IMF Working Paper No. WP/10/184, International Monetary Fund, Washington, DC, August 1, 2010), 1.
6. Michael Dotsey, "Some Unpleasant Supply Side Arithmetic," *Journal of Monetary Economics* 33, no. 3 (1994): 507–24.
7. John H. Cochrane, "Understanding Policy in the Great Recession: Some Unpleasant Fiscal Arithmetic," *European Economic Review* 55, no. 1 (2011): 2–30.
8. Philippe Aghion and Enisse Kharroubi, "Cyclical Macro Policy and Industry Growth: The Effect of Countercyclical Fiscal Policy" (BIS Working Paper No. 434, Bank for International Settlements, Basel, Switzerland, December 2013).
9. Thomas Laubach, "New Evidence on the Interest Rate Effects of Budget Deficits and Debt," *Journal of the European Economic Association* 7, no. 4 (2009): 858–85.

WHICH DEBT REDUCTION MEASURES SUCCESSFULLY LOWER DEBT LEVELS?

The United States is not the first country to face the challenge of reducing its debt to sustainable levels. A substantial empirical literature on international occurrences of fiscal consolidation spans several decades and examines which forms of consolidation are most effective at curbing debt and least harmful to economic output. In a 1995 working paper, Alberto Alesina and Roberto Perotti observe 52 efforts to reduce debt in 20 Organisation for Economic Co-operation and Development (OECD) countries between 1960 and 1992.[10] The authors define a successful fiscal adjustment as one in which the debt-to-GDP ratio declines by at least 5 percentage points three years after the adjustment takes place. In successful adjustments, government spending is reduced by almost 2.2 percent of gross national product (GNP) and taxes are increased by less than 0.5 percent of GNP. For unsuccessful adjustments, government expenditure is reduced by less than 0.5 percent of GNP and taxes are increased by almost 1.3 percent of GNP. These results suggest that successful fiscal adjustments are those that cut spending and include very modest increases in taxation. The authors conclude that "it is impossible to reduce government debt successfully without a sizeable retrenchment of the two components of spending which are notoriously more politically difficult to cut: transfers and the government wage bill."[11]

Following and building on the work of Alesina and Perotti, International Monetary Fund (IMF) economists John McDermott and Robert Wescott, in a 1996 paper, examine 74 episodes of fiscal adjustment in which countries attempted to address their budget gaps.[12] The authors define a successful fiscal adjustment as 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 an adjustment. The authors then divide episodes of fiscal consolidation into two categories: those in which the deficit was cut primarily (by at least 60 percent) through revenue increases, and those in which it was reduced primarily (by at least 60 percent) through expenditure cuts. Of the expenditure-based episodes of fiscal consolidation, almost half were successful, while of the tax-based episodes, less than one out of six met the criteria for success. Additionally, in successful adjustments government wages were cut significantly more than in unsuccessful adjustments, and government employment remained constant in successful outcomes whereas it increased in unsuccessful ones. The results are consistent with the findings of Alesina and Perotti insofar as they suggest 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-to-GDP ratio than TB consolidation.

In a second study on fiscal consolidation, Alesina and Perotti study how the composition of fiscal adjustments influences their likelihood of success, reviewing 378 observations from 1960 to 1994.[13] The authors define success as a reduction in the structural deficit of at least 2

10. Alberto F. Alesina and Roberto Perotti, "Reducing Budget Deficits," *Swedish Economic Policy Review* 3 (1996): 113–34.
11. Alesina and Perotti, "Reducing Budget Deficits," 133.
12. C. John McDermott and Robert F. Wescott, "An Empirical Analysis of Fiscal Adjustments," *IMF Staff Papers* 43, no. 4 (1996): 1.
13. Alberto F. Alesina and Roberto Perotti, "Fiscal Adjustments in OECD Countries: Composition and Macroeconomic Effects" (IMF Working Paper No. 96/70, International Monetary Fund, Washington, DC, July 1, 2006), 1.

percentage points or a reduction in the debt-to-GDP ratio of at least 5 percentage points three years after the adjustment. Their results show that in successful cases around 73 percent of the adjustment is EB, while in unsuccessful cases only about 44 percent of the adjustment is EB. The authors explain that the reason for this is that EB adjustments tackle items of the budget that have the strongest tendency to automatically increase: government wages and welfare programs.

Using similar definitions to those used by Alesina and Perotti, Jürgen von Hagen and Rolf Strauch observe 65 episodes in 20 OECD countries from 1960 to 1998 and define a successful adjustment as one in which the budget balance stands at no more than 75 percent of the initial balance two years after the adjustment period.[14] Using this definition, a 4 percent deficit (as a share of GDP) would have to be lowered to 3 percent or less two years after the adjustment period in order for the adjustment to be defined as a success. The study does not find that the size of the adjustment determines whether it is successful, but it does find that successful consolidations consist of expenditure cuts averaging more than 1.2 percent of GDP, while expenditure cuts in unsuccessful adjustments are smaller than 0.3 percent of GDP. The opposite pattern is true for revenue-based adjustments: successful consolidations consist of increases in revenue averaging around 1.1 percent, while unsuccessful adjustments consist of revenue increases exceeding 1.9 percent. The authors' conclusions sound familiar: successful adjustments generally put more emphasis on spending cuts than do unsuccessful ones and less emphasis on raising more revenue. Similar results are found by Andrea Zaghini, who found that among 14 European countries between 1970 and 1998, successful fiscal adjustments consisted of average spending reductions of 1.4 percent of GDP and modest tax increases of 0.4 percent of GDP.[15] Unsuccessful episodes of consolidation consisted of less than 0.1 percent of GDP in spending reductions and 1.9 percent of GDP in tax increases. The author concludes that "the striking difference in the composition of the two sets of adjustments induces to conclude that fiscal consolidations that concentrate on the expenditure side are more likely to achieve a long-lasting reduction in the public debt/GDP ratio than tax-based adjustments."[16]

Von Hagen and Strauch assess the importance of the quality of fiscal adjustments without arbitrarily predefining a measure of persistence to evaluate adjustment success. The authors employ a hazard-rate model that analyzes the likelihood that an adjustment episode will survive to a certain point in time based on its survival to an earlier time. A low hazard rate indicates that the consolidation is likely to continue (survive) into the next period, while a high hazard rate indicates that it is likely to end in the current period. In line with other studies, the authors find that longer-lasting fiscal consolidations are primarily driven by reductions in government expenditures. In particular, greater expenditure cuts, and especially cuts to transfers, subsidies, and wages, significantly reduce the hazard rate.[17] These findings reinforce

14. Jürgen von Hagen and Rolf R. Strauch, "Fiscal Consolidations: Quality, Economic Conditions, and Success," *Public Choice* 109, no. 3/4 (2001): 327–46.
15. Andrea Zaghini, "Fiscal Adjustments and Economic Performing: A Comparative Study," *Applied Economics* 33, no. 5 (2001): 613–24.
16. Zaghini, "Fiscal Adjustments and Economic Performing," 619.
17. Von Hagen and Strauch, "Fiscal Consolidations."

the existing literature that suggests that adjustments operating on the expenditure side have a higher chance of surviving than those based on revenue increases.

In a 2006, study António Afonso, Christiane Nickel, and Philipp Rother study the determinants of success for fiscal consolidations in 10 central and eastern European countries.[18] Using a logit model estimation, the authors find that for the Central and Eastern European sample countries EB adjustments have a higher probability of success. This is consistent with empirical literature that shows that basing fiscal adjustments on expenditure reduction rather than increased revenues raises the probability of success.

In a 2007 study assessing the role of fiscal rules and composition of fiscal consolidations among developed countries, Stephanie Guichard and coauthors find that, regarding the quality of fiscal policies, an emphasis on cutting current expenditures has been associated with overall larger consolidation.[19] This may be the result of governments demonstrating a stronger commitment to consolidate fiscal balances than they demonstrate in adjustments driven by revenue increases. Interestingly, the authors also find that fiscal rules with embedded expenditure targets result in larger and longer-lasting adjustments with higher success rates. This is consistent with the existing literature on the composition of fiscal rules and rates of rule compliance among advanced economies.[20]

American Enterprise Institute economists Andrew Biggs, Kevin Hassett, and Matthew Jensen examine over 100 episodes of fiscal consolidation in a 2010 study.[21] The authors define a successful fiscal adjustment as one in which the debt-to-GDP ratio declines by at least 4.5 percentage points three years after the first year of consolidation. Their study finds that countries that addressed their budget shortfalls through reduced spending burdens were far more likely to reduce their debt than countries whose budget-balancing strategies depended upon higher taxes. What's more, the results reveal that a typical unsuccessful adjustment consists of 53 percent tax increases and 47 percent spending cuts, while the typical successful adjustment consists of 85 percent spending cuts and just 15 percent tax increases.

A more recent study on the composition and success of fiscal adjustments is by Maria Attinasi and Luca Metelli.[22] Using quarterly data for 11 European countries, the authors define an adjustment as self-defeating if the debt-to-GDP ratio does not decrease from the preadjustment level. The results suggest that EB adjustments initially increase the debt-to-GDP ratio, but in the long term the ratio falls to less than preadjustment levels. For TB consolidations, they also find an initial increase in the debt-to-GDP ratio, but the increase is more pronounced than with EB adjustments. In the long term, after a

18. António Afonso, Christiane Nickel, and Philipp Rother, "Fiscal Consolidations in the Central and Eastern European Countries," *Review of World Economics / Weltwirtschaftliches Archiv* 142, no. 2 (2006): 402–21.
19. Stephanie Guichard et al., "What Promotes Fiscal Consolidation" (OECD Economics Department Working Paper No. 553, Organisation for Economic Co-operation and Development, Paris, May 28, 2007).
20. Veronique de Rugy and Jack Salmon, "Are Fiscal Rules an Effective Restraint on Government Debt?" (Mercatus Policy Brief, Mercatus Center at George Mason University, Arlington, VA, July 2019).
21. Andrew G. Biggs, Kevin A. Hassett, and Matthew Jensen, "A Guide for Deficit Reduction in the United States Based on Historical Consolidations That Worked" (AEI Economic Policy Working Paper No. 2010-04, American Enterprise Institute, Washington, DC, December 27, 2010).
22. Maria Grazia Attinasi and Luca Metelli, "Is Fiscal Consolidation Self-Defeating? A Panel-VAR Analysis for the Euro Area Countries," *Journal of International Money and Finance* 74, issue C (2017): 147–64.

TB adjustment the debt-to-GDP ratio slowly reverts to close to its initial preadjustment level after five years, but it fails to decline to less than preadjustment levels.

FISCAL ADJUSTMENTS FROM A SAMPLE OF 26 COUNTRIES: 1995–2018

Using a simple framework similar to the one used by Alesina and Perotti and McDermott and Wescott, we assess the empirical evidence on episodes of fiscal adjustment in 26 democratic countries.[23] We choose countries that have large economies and reliable data; all the countries are democracies, and many of them are relatively free economies. The sample comprises annual data from 1995 to 2018 for primary structural balances. Data on primary structural balances come from the OECD Economic Outlook database, data on debt levels come from the IMF's World Economic Outlook database, and data on government revenues and expenditure come from the World Bank's national accounts dataset.

Our analysis focuses on large fiscal consolidations, or consolidations in which the fiscal deficit as a share of GDP improves by at least 1.5 percentage points over two years and does not decrease in either of those two years. Table 1 lists all 135 episodes that meet this two-year criterion and breaks down each episode into successful and unsuccessful consolidations. A successful consolidation is defined as one in which the debt-to-GDP ratio declines by at least 5 percentage points three years after the adjustment takes places or by at least 3 percentage points two years after the adjustment. This criterion is satisfied by many well-documented fiscal consolidations during the study period, including Denmark from 1997 to 2000, Ireland from 2012 to 2016, and Canada from 1997 to 1999.

Composition of fiscal consolidations is determined by the proportion of the deficit that is cut primarily through revenue increases and the proportion that is cut primarily through decreases in spending as a share of GDP. Episodes in which the consolidation is at least 60 percent revenue increases are labeled TB, and episodes in which the consolidation is at least 60 percent spending decreases are labeled EB. Episodes of consolidation that do not fall into either of these two categories are labeled as balanced. Episodes of fiscal consolidation that raise taxes and spending or cut taxes and spending are considered TB and EB, respectively. For example, in 2009–2011, Germany cut taxes by 0.15 percent of GDP and cut spending by 0.99 percent of GDP, for a total adjustment of 0.84 percent of GDP; this would be considered an EB adjustment, as 100 percent of the improvement in the balance results from spending cuts. Table 2 shows that of the 45 EB episodes, more than half were successful, while of the 67 TB episodes, less than 4 in 10 were successful. For the 22 balanced adjustment cases, more than half were successful, but when the data are broken down by averages, balanced adjustments that were successful consisted of 52 percent spending cuts, whereas unsuccessful balanced adjustments consisted of 48 percent spending cuts. The results in table 2 show that while in unsuccessful adjustments most (74 percent) of the changes are on the revenue side, in successful adjustments most (60

23. The countries are Australia, Austria, Belgium, Brazil, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, India, Ireland, Italy, Japan, the Netherlands, New Zealand, Poland, Portugal, South Korea, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

TABLE 1. SUCCESSFUL AND UNSUCCESSFUL FISCAL CONSOLIDATIONS OF EUROPEAN DEMOCRACIES FROM 1995 TO 2018

Country	Successful consolidation	Unsuccessful consolidation
Australia	1997, 1998, 1999, 2002	2003, 2013
Austria		1997, 2001, 2011, 2012
Belgium	1997, 1998, 1999	
Brazil		2000, 2001, 2008
Canada	1997, 1998, 1999	2000, 2012, 2014, 2015
Czech Republic	2014, 2016	1997, 2011
Denmark	1997, 1998, 1999, 2000, 2005, 2014	2006
Finland	1997, 1998, 1999, 2006	2000, 2007, 2016
France		1997, 1998, 1999, 2011, 2012
Germany	2012	1997, 2000, 2006, 2007, 2008, 2011
Greece		1997, 2000, 2006, 2011, 2012
Hungary		2000, 2008
India	2004	
Ireland	1997, 1998, 1999, 2000, 2012, 2013, 2014, 2015, 2016	
Italy	1997, 1998	2007, 2011
Japan		2004, 2005, 2006, 2007, 2014, 2015
Netherlands	1997, 1999, 2000, 2005, 2013, 2014, 2016	2006
New Zealand	2003	2012, 2013, 2014
Poland	2012	1999, 2005, 2007
Portugal	2016	2006, 2007
South Korea		2000, 2005, 2006, 2007, 2011
Spain	1997, 1998, 1999, 2005	2006, 2014, 2015
Sweden	1997, 1998, 2004, 2005, 2006, 2016	2007
Switzerland	2006	2007
United Kingdom	1997, 1998, 1999	2000, 2011, 2016
United States	1997, 1998, 1999	2005, 2006, 2011, 2012, 2013, 2014
Total episodes:	62	73

Sources: Authors' calculations based on Organisation for Economic Co-operation and Development, OECD Economic Outlook (database), accessed May 14, 2020, https://www.oecd-ilibrary.org/economics/data/oecd-economic-outlook-statistics-and-projections_eo-data-en; International Monetary Fund, World Economic Outlook (database), accessed May 14, 2020, https://www.imf.org/external/pubs/ft/weo/2020/01/weodata/index.aspx; World Bank, "GDP (Current US$)" (dataset), accessed May 14, 2020, https://data.worldbank.org/indicator/NY.GDP.MKTP.CD.

percent) of the changes are on the expenditure side. In successful adjustments, for every 1.00 percent of GDP increase in revenues, expenditures are cut by 1.50 percent. By contrast, in unsuccessful adjustments, for every 1.00 percent of GDP increase in revenues, expenditures are cut by less than 0.35 percent. From these findings we conclude that successful fiscal adjustments are those that involve significant spending reductions with only modest increases in taxation. Unsuccessful fiscal adjustments, however, typically involve significant increases in taxation and very modest spending reductions.

Figure 1 shows the composition of all fiscal consolidations for every country over the period of study. During this period, countries such as France and Greece predominantly focused their adjustments on raising tax revenues, while countries such as Ireland and Switzerland relied primarily on cutting government expen-

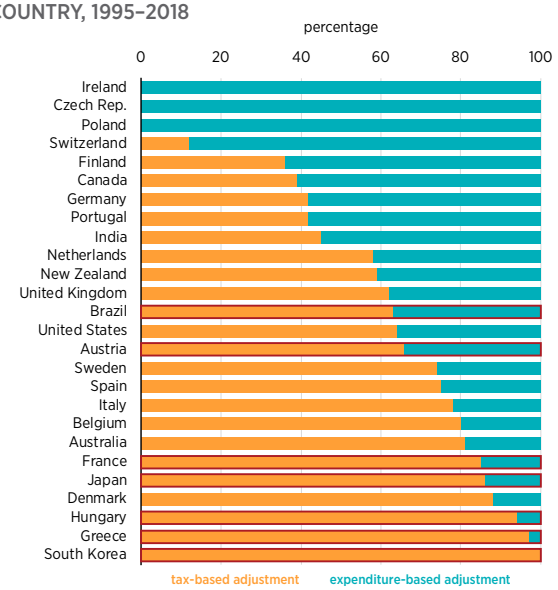
TABLE 2. CHARACTERISTICS OF SUCCESSFUL AND UNSUCCESSFUL FISCAL CONSOLIDATIONS

Characteristics	Total episodes	Successful	Unsuccessful
Tax-based fiscal consolidations	69	26 (38%)	43 (62%)
Expenditure-based fiscal consolidations	45	24 (53%)	21 (47%)
Balanced fiscal consolidations	22	12 (55%)	10 (45%)
Average expenditure cut (percentage of GDP)	0.51	0.69	0.32
Average revenue increase (percentage of GDP)	0.72	0.46	0.92

Sources: Authors' calculations based on Organisation for Economic Co-operation and Development, OECD Economic Outlook (database); International Monetary Fund, World Economic Outlook (database); World Bank, "GDP (Current US$)" (dataset).

ditures to adjust their fiscal positions. Among the sample nations, many countries took a balanced approach of roughly equal amounts of tax increases and spending reductions. Cases highlighted in a red outline indicate countries whose every fiscal consolidation resulted in failure. Put another way, these are nations that have failed 100 percent of the time when attempting to rein in their debt levels during the period studied. The composition of these failed consolidations tends to lean heavily toward TB adjustments, from 62 percent TB in Brazil to 100 percent in South Korea. The Czech Republic and Poland are two potential anomalies, as both countries gained independence in the early 1990s and experienced significant revenue declines in the preceding years. If one were to remove the data sets from the 1990s for both former Soviet satellite states, one would observe that spending reductions have made up 59 percent and 71 percent of their fiscal consolidations, respectively. Doing this would also raise the success rate of EB consolidations from 53 percent to 58 percent.

FIGURE 1. COMPOSITION OF ALL FISCAL ADJUSTMENTS BY COUNTRY, 1995–2018

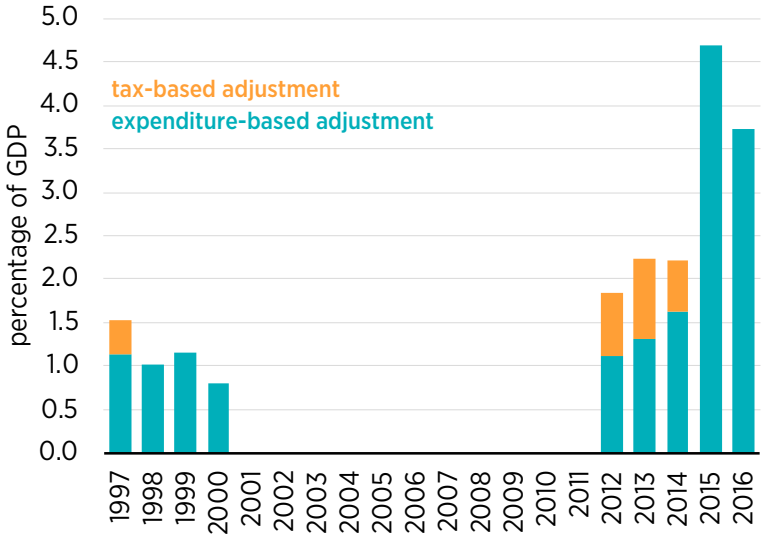


Sources: Authors' calculations based on Organisation for Economic Co-operation and Development, OECD Economic Outlook (database); International Monetary Fund, World Economic Outlook (database); World Bank, "GDP (Current US$)" (dataset).

Figures 2, 3, and 4 reveal the composition of fiscal adjustments that took place in Ireland, the United States, and Greece during 1997–2016. In figure 2 one sees that Ireland experienced two periods of significant consolidation from 1997 to 2000 and again from 2012 to 2016. Both of these periods of fiscal adjustment were driven primarily by spending reductions, and both episodes were notably successful in reducing the country's debt-to-GDP ratio. Two years after the consolidation episode in the late 1990s, Ireland's debt-to-GDP ratio had halved, from 62 percent before the adjustment to just 31 percent. Again, after Ireland's second episode of adjustment, the country's debt-to-GDP ratio declined from 120 percent in 2012 to just 65 percent in 2018.

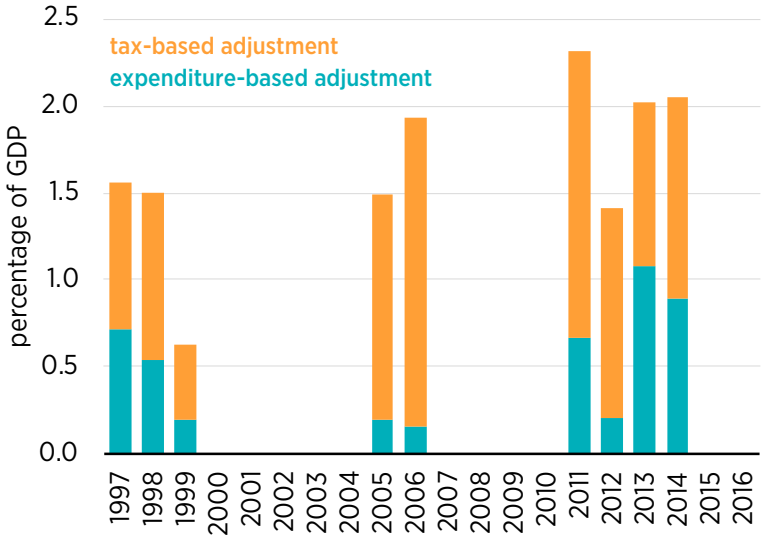
Figure 3 shows that the United States has experienced three periods of fiscal adjustment during the period observed. Unlike episodes of

FIGURE 2. COMPOSITION OF FISCAL CONSOLIDATION EPISODES IN IRELAND, 1997–2016



Sources: Authors' calculations based on Organisation for Economic Co-operation and Development, OECD Economic Outlook (database); International Monetary Fund, World Economic Outlook (database); World Bank, "GDP (Current US$)" (dataset).

FIGURE 3. COMPOSITION OF FISCAL CONSOLIDATION EPISODES IN THE UNITED STATES, 1997–2016

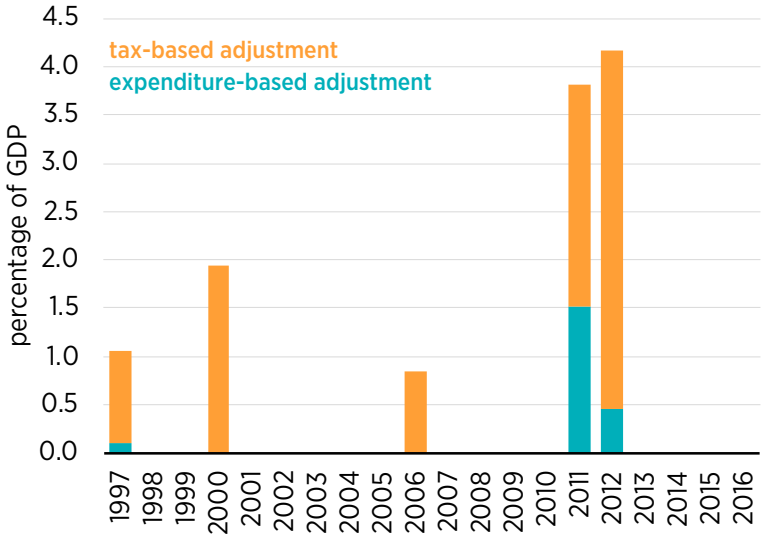


Sources: Authors' calculations based on Organisation for Economic Co-operation and Development, OECD Economic Outlook (database); International Monetary Fund, World Economic Outlook (database); World Bank, "GDP (Current US$)" (dataset).

adjustment in Ireland, these adjustments tend to be smaller (as a share of GDP), and about two-thirds of the fiscal consolidations are TB. The period of consolidation from 1997 to 1999 was successful in reducing the debt-to-GDP ratio by a modest 8.2 percentage points, whereas the other two adjustment episodes were unsuccessful.

Taking the opposite approach to Ireland, Greece (as shown in figure 4) focused primarily on TB fiscal adjustments in an attempt to rein

FIGURE 4. COMPOSITION OF FISCAL CONSOLIDATION EPISODES IN GREECE, 1997–2016



Sources: Authors' calculations based on Organisation for Economic Co-operation and Development, OECD Economic Outlook (database); International Monetary Fund, World Economic Outlook (database); World Bank, "GDP (Current US$)" (dataset).

in the debt-to-GDP ratio. Greece experienced multiple episodes of small adjustment before the Great Recession and one notably large adjustment period from 2011 to 2012. Greece's average consolidation over the entire period consists of revenue increases of 1.9 percent of GDP and spending cuts amounting to less than 0.1 percent of GDP. All five of Greece's consolidation episodes ended in failure, meaning that the debt-to-GDP ratio did not decline by at least 5 percentage points three years after the adjustments took place or by at least 3 percentage points two years after the adjustments.

Contrary to other studies on episodes of fiscal consolidation, our results suggest that there is no relationship between the size of the fiscal adjustment and the rate of success in reducing the debt-to-GDP ratio. For successful episodes of consolidation, the budget balance (deficit as a share of GDP) is improved by just under 1.2 percentage points on average, while for unsuccessful episodes the budget balance is improved by just over 1.2 percentage points. We do not, therefore, find that the size of a consolidation is a significant factor in predicting the success or failure of fiscal adjustments for our sample period and countries. On the basis of these results, the length of consolidation periods might be a significant factor for the effectiveness of fiscal adjustments. From our data sample, we observe that consolidation episodes of two years or less succeeded in reducing the debt-to-GDP ratio only 26 percent of the time, whereas in episodes of greater than two years the average success rate is 52 percent. Longer periods of fiscal consolidation may be indicative of greater political commitment by governments to rein in their debt-to-GDP ratios, so we would expect prolonged consolidations to be more successful on the basis of this logic.

ADJUSTMENT COMPOSITION AND ECONOMIC PERFORMANCE

While the empirical literature and available data suggest that EB fiscal adjustments are more likely

to succeed in reducing a country's debt-to-GDP ratio, the debate surrounding the effects of fiscal adjustments on economic performance is still unresolved. Policymakers may be reluctant to rein in debt levels if they believe such action to be contractionary, since adverse economic effects would be a political liability. One of the earliest studies attempting to answer this question is by Francesco Giavazzi and Marco Pagano.[24] The paper uses data from fiscal consolidations in 10 developed countries during the 1980s to determine whether the Keynesian view or the expectations view does better at explaining the effects of fiscal adjustment on private consumption. While the Keynesian view focuses on the direct effects of adjustments on aggregate demand, the expectations view emphasizes the importance of reductions in government spending as signals of future reductions in taxation. Traditionally, Keynesian economists have advocated the view that reductions in government expenditure will contract aggregate demand, thereby increasing unemployment and dampening business investment. Economists who hold the expectations view argue that the indirect effect on aggregate demand of the initial reduction in expenditure growth occurs through improved expectations, as consolidation is designed to permanently reduce the share of government consumption of GDP and therefore future taxation. The authors explain that with examples such as Denmark, one can observe how positive deficit reduction effects on expectations might offset more immediate negative Keynesian effects. The authors conclude, "In [the view of Giavazzi and Pagano], strong actions to reduce a budget deficit may boost demand and growth, not just in the long run but even over the phase of the fiscal consolidation."[25]

In a 1998 Brookings Institution paper, Alberto Alesina and coauthors reexamined the research on the economic effects of fiscal adjustments.[26] Using data drawn from 19 OECD countries, the authors assess whether the composition of fiscal adjustments results in different economic outcomes, and they investigate whether governments lose popularity as they pursue policies of fiscal adjustment. Contrary to the Keynesian view that fiscal adjustments are contractionary, the results of this study suggest that consolidation achieved primarily through spending reductions often has expansionary effects. The authors conclude that corrections relying mostly on spending cuts and especially on cuts to government wages and transfers tend to be expansionary, whereas those relying mainly on tax increases are often contractionary. The authors also find no evidence of a systematic electoral penalty for governments that pursue policies of fiscal restraint. Another study that observes which features of fiscal adjustments are more or less likely to predict whether the fiscal adjustment is contractionary or expansionary is by Alesina and Silvia Ardagna.[27] Using data from 20 OECD countries during 1960 to 1994, the authors label an adjustment *expansionary* if the average GDP growth rate in the period of adjustment and in the two

24. Francesco Giavazzi and Marco Pagano, "Can Severe Fiscal Contractions Be Expansionary? Tales of Two Small European Countries," in *NBER Macroeconomics Annual 1990, Volume 5*, ed. Olivier Blanchard and Stanley Fischer (Cambridge, MA: National Bureau of Economic Research, 1990), 75–111.
25. McDermott and Wescott, "Empirical Analysis of Fiscal Adjustments," 725.
26. Alberto F. Alesina et al., "The Political Economy of Fiscal Adjustments," *Brookings Papers on Economic Activity* 1 (1998): 197–266.
27. Alberto F. Alesina and Silvia Ardagna, "Tales of Fiscal Adjustment," *Economic Policy* 13, no. 27 (1998): 487–545.

years after is greater than the average value (of G7 countries) in all episodes of adjustment. For successful fiscal adjustments, private consumption, investment, and economic growth increase during and immediately after the period of consolidation. For unsuccessful adjustments that consist primarily of tax increases, private consumption remains flat during and immediately after the adjustment, while investment and economic growth both turn negative. The authors conclude, "The composition of the adjustment appears as the strongest predictor of the growth effect: all the non-expansionary adjustments were tax-based and all the expansionary ones were expenditure-based."[28]

Building on his previous work, Alesina and coauthors investigate how fiscal adjustments impact the components of growth, with a particular focus on investment.[29] Focusing on the role of profits as a determinant of investment, the authors assess the effects of changes in taxation and expenditure for a panel of 18 OECD countries. The results reveal that a 1 percentage point reduction in spending relative to GDP leads to an increase in investment; the increase is particularly strong when the spending cuts focus on government wages. By contrast, a 1 percentage point increase in taxes on labor leads to a reduction in investment; this may be the result of higher taxes on labor, implying higher pretax wages demanded by workers. These results are consistent with the findings of Jose Tavares, which are that larger reductions in public expenditure are associated with larger increases in output and its components.[30] Tavares finds that two years after an adjustment episode, the share of business investment in GDP increases by between 7 and 14 percent, which is statistically significant.

Taking a slightly different approach, French economists Boris Cournède and Frédéric Gonand adopt a dynamic general equilibrium model to compare the macroeconomic impacts of four debt reduction scenarios.[31] Results from the model suggest that TB adjustments are much more costly than spending restraint when policymakers are attempting to achieve fiscal sustainability. Annual consumption per capita would be 15 percent higher in 2050 if consolidation were achieved through spending reductions rather than broad tax increases.[32] In a review of every major fiscal adjustment in the OECD since 1975, Bank of England economist Ben Broadbent and Goldman Sachs economist Kevin Daly found that "decisive budgetary adjustments that have focused on reducing government expenditure have (i) been successful in correcting fiscal imbalances; (ii) typically boosted growth; and (iii) resulted in significant bond and equity market outperformance. Tax-driven fiscal adjustments, by contrast, typically fail to correct fiscal imbalances and are damaging for growth."[33]

28. Alesina and Ardagna, "Tales of Fiscal Adjustment," 516.
29. Alberto F. Alesina et al., "Fiscal Policy, Profits, and Investment," *American Economic Review* 92, no. 3 (2002): 571–89.
30. Jose Tavares, "Does Right or Left Matter? Cabinets, Credibility and Fiscal Adjustments," *Journal of Public Economics* 88, no. 12 (2004): 2447–68.
31. Boris Cournède and Frédéric Gonand, "Restoring Fiscal Sustainability in the Euro Area: Raise Taxes or Curb Spending?" (OECD Economics Department Working Paper No. 520, Organisation for Economic Co-operation and Development, Paris, October 30, 2006).
32. The four simulation scenarios from Cournède and Gonand were based on paying off the country's debt between 2005 and 2025.
33. Ben Broadbent and Kevin Daly, "Limiting the Fallout from Fiscal Adjustment" (Global Economics Paper No. 195, Goldman Sachs, New York, April 14, 2010).

In the aftermath of the Great Recession, one particular research paper was prominent in the debate surrounding the growth effects of fiscal adjustments. Economists Christina and David Romer investigated the impact of tax changes on economic activity in the United States from 1945 to 2007.[34] The authors find that an exogenous tax increase of 1 percent of GDP lowers real GDP by almost 3 percent, suggesting that TB adjustments are highly contractionary. Using similar methodology to that of Romer and Romer, the IMF released its annual *World Economic Outlook* in 2010 and included a study on the effects of fiscal consolidation on economic activity.[35] The results of studying episodes of fiscal consolidation for 15 OECD countries over three decades largely corroborate the findings of Alesina and Romer and Romer. The study reveals that EB fiscal adjustments tend to have smaller contractionary effects than TB adjustments. For TB adjustments, the effect of a consolidation of 1 percent of GDP on GDP is −1.3 percent after two years, while for EB adjustments the effect is just −0.3 percent after two years and is not statistically significant. Interestingly, TB adjustments also raise unemployment levels by about 0.6 percentage points, while EB adjustments raise the unemployment rate by only 0.2 percentage points.

The results of the 2010 OECD study are broadly consistent with much of the academic literature published since. Using four decades of data from 21 OECD countries, Alesina and Argdagna investigate the policy mix that leads to successful and expansionary adjustments as opposed to unsuccessful and contractionary ones.[36] The authors confirm three findings. First, EB fiscal adjustments are less likely to be reversed. Second, EB adjustments have caused smaller contractions than TB adjustments. And finally, if combined with labor and goods market liberalizations, EB adjustments can be expansionary. Similar results were found in a 2014 IMF study that estimates the short-term effect of fiscal consolidation on economic activity among 17 OECD countries.[37] The authors of the IMF study find that the fall in GDP associated with EB consolidations is 0.82 percentage points smaller than the one associated with TB adjustments in the first year and 2.31 percentage points smaller in the second year after the adjustment. The authors explain that these differences in growth effects can be at least partly explained by the fact that central banks typically cut interest rates more during EB adjustments.

Focusing on the fiscal consolidations that followed the Great Recession, Alesina and coauthors construct a new dataset of the size and composition of adjustments for 11 developed nations between the years 2009 and 2013.[38] By studying the data, the authors find that EB consolidations are far less costly for economic output than TB adjustments. They also find that TB adjustments result in a cumulative contrac-

34. Christina D. Romer and David H. Romer, "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks," *American Economic Review* 100, no. 3 (2010): 763–801.
35. Daniel Leigh et al., "Will It Hurt? Macroeconomic Effects of Fiscal Consolidation," in *World Economic Outlook: Recovery, Risk, and Rebalancing* (Washington, DC: International Monetary Fund, 2010).
36. Alberto F. Alesina and Silvia Ardagna, "The Design of Fiscal Adjustments" (NBER Working Paper No. 18423, National Bureau of Economic Research, Cambridge, MA, September 2012).
37. Jaime Guajardo, Daniel Leigh, and Andrea Pescatori, "Expansionary Austerity? International Evidence," *Journal of the European Economic Association* 12, no. 4 (2014): 949–68.
38. Alberto F. Alesina et al., "Austerity in 2009–13," *Economic Policy* 30, no. 83 (2015): 383–437.

tion of 2 percent of GDP in the following three years, while EB adjustments generate very small contractions with an impact on output not significantly different from zero. Another study by Alesina and coauthors published in 2015 evaluates the output effects of multiyear fiscal adjustments adopted by 16 OECD countries over a 30-year period.[39] In line with their previous work, the authors find that the different output effects of TB and EB adjustments are large and statistically significant. On average, EB adjustments are associated with small and short-lived contractions, and after three years the output effect turns positive for all samples. For TB adjustments the output effects always result in prolonged and deep contractions following the period of adjustment.

A study by the European Central Bank in 2018 constructs a new quarterly narrative dataset of fiscal adjustment announcements for 13 EU countries over 35 years.[40] In line with the related literature, the study finds that macroeconomic responses are largely caused by differences in the composition of the adjustment plans. The authors find large and negative multipliers for TB adjustment plans and positive, but close to zero, multipliers for EB plans. The composition of adjustment plans is found to be the largest contributor to the differences in economic performance under the two types of consolidation plans. Similar results are found in a 2018 IMF study, which observed adjustment composition and output effects as well as different business cycle starting points—consolidations conducted in recessionary or expansionary periods.[41] The study reveals that adjustments based on permanent spending cuts are consistently much less costly than those based on permanent tax increases. Specifically, the output multiplier for EB adjustments during an expansion is −0.75, while for TB plans it is −3.70. Multipliers during recessionary periods are −0.58 and −2.31, respectively.

It is important to note that fiscal adjustments, whether EB or TB, are important regardless of their short-term impacts on output. Fiscal consolidation should be pursued not because it produces a short-term economic growth payoff, but because it is desirable from a structural standpoint.

CONCLUDING REMARKS

The United States' public debt is now larger than its entire annual output. As the country enters into a period of unprecedented debt levels, America will inevitably have to cut its public debt back to sustainable levels. As policymakers draw up plans for reining in America's unsustainable debt-to-GDP ratio, there are at least four lessons they should keep in mind from the existing academic literature and from the empirical results of our study:

1. Consolidation efforts that focus primarily on reducing government expenditures are notably more successful at lowering debt levels than consolidations that focus on taxes. Our own observations show that successful consolidations are made up of

39. Alberto F. Alesina, Carlo Favero, and Francesco Giavazzi, "The Output Effect of Fiscal Consolidation Plans," *Journal of International Economics* 96 (2015): S19–S42.
40. Roel Beetsma, Oana Fortuna, and Massimo Giuliodori, "Revenue- versus Spending-Based Consolidation Plans: The Role of Follow-Up" (ECB Working Paper No. 2178, European Central Bank, Frankfurt, Germany, September 2018).
41. Alberto F. Alesina, "Is It the 'How' or the 'When' That Matters in Fiscal Adjustments?," *IMF Economic Review* 66, no. 1 (2018): 144–88.

at least 60 percent expenditure reductions; other studies put this number between 66 and 81 percent. To maximize chances of success, policymakers should therefore devise consolidations that are at least two-thirds composed of spending reductions.

2. The size of the consolidation does not seem to be a key determining factor in the success of fiscal adjustments. That said, to successfully lower the debt-to-GDP ratio over time, budget deficits have to be cut to a point where they grow less quickly than GDP. A large budget deficit would require a large fiscal adjustment to be successful at reducing debt levels.
3. Consolidation efforts are twice as likely to succeed when episodes of fiscal adjustment last longer than two years. Short periods of consolidation represent a lack of political commitment to improving the nation's fiscal condition, so they result in failure a majority of the time. Policymakers should, therefore, work to consolidate the nation's finances over a period of three years or more to ensure that debt reduction measures are a success.
4. Consolidations that focus primarily on tax-based adjustments cause deep and long-lasting economic recessions. Expenditure-based adjustments, on the other hand, tend to lead to small contractions not significantly different from zero and in some cases can be expansionary. If policymakers are concerned with the macroeconomic impacts of consolidation, then they should ensure that adjustment efforts are focused primarily on the spending side.

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