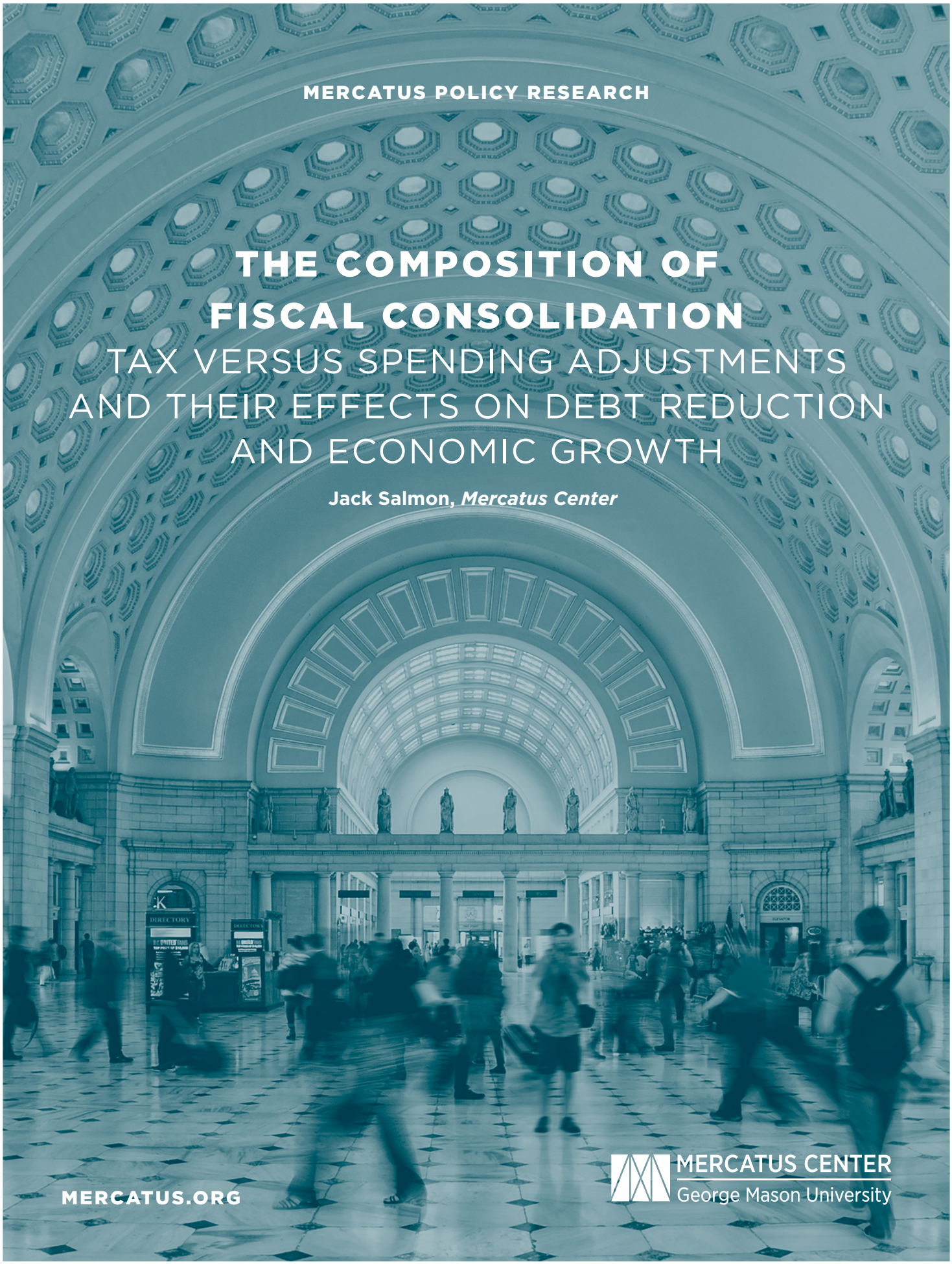


MERCATUS POLICY RESEARCH

THE COMPOSITION OF FISCAL CONSOLIDATION

TAX VERSUS SPENDING ADJUSTMENTS AND THEIR EFFECTS ON DEBT REDUCTION AND ECONOMIC GROWTH

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Abstract

This paper examines the differential effects of tax-based versus spending-based fiscal consolidations on debt sustainability and economic growth using narrative consolidation data for 17 advanced economies from 1978 to 2016. The Adler et al. (2024) dataset, published as International Monetary Fund (IMF) Working Paper 24/210, provides a comprehensive revision of the Alesina et al. (2015, 2019) narrative data, extending coverage to 17 countries including the Netherlands and updating shock magnitudes throughout the sample period. Macroeconomic outcome variables are drawn from World Bank, Organisation of Economic Co-operation and Development (OECD), and IMF primary sources. The narrative shock sample is bounded in 2016 to ensure the three-year debt outcome window remains pre-pandemic; local projections use shocks through 2014 to guarantee all five horizons avoid COVID contamination.

Employing country and year fixed-effects panel regressions with clustered standard errors, local projections methods, and linear probability models, this paper reveals that spending-based consolidations are associated with higher probabilities of debt reduction and more favorable growth outcomes than tax-based consolidations. A one-percentage-point tax-based consolidation reduces GDP growth contemporaneously by 0.59 percentage points, versus 0.29 percentage points for spending-based consolidations. Local projections reveal that tax-based consolidations impose increasingly negative effects over time (reaching −2.94 percentage points cumulatively five years after the event), while spending-based consolidations generate a trajectory that turns positive after two years and reaches +1.81 percentage points after five years. Tax-based consolidations reduce the probability of substantial debt reduction by 9.5 percentage points and of debt stabilization (debt-to-GDP ratio does not increase over three years) by 12.4 percentage points. Spending-based consolidations significantly raise the probability of substantial debt reduction by 11.1 percentage points. These results are robust to heterogeneity by initial debt level.

JEL codes: E62, H62, H63, H50

Keywords: fiscal consolidation, debt reduction, economic growth, fiscal adjustment, public debt

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1. Introduction

The sustainability of public finances has emerged as a central policy concern in advanced economies. Following the Global Financial Crisis of 2008–2009 and the unprecedented fiscal expansion during the COVID-19 pandemic, many countries face debt-to-GDP ratios at or near historical peaks. As governments contemplate strategies to restore fiscal sustainability, a fundamental question arises: When consolidation becomes necessary, should it be achieved primarily through tax increases or spending cuts?

The composition of fiscal adjustment has profound implications for both the likelihood of achieving debt reduction and the economic costs imposed during the adjustment process. Yet despite extensive research on fiscal consolidation, the literature remains divided on whether higher taxation or reduced spending is more effective. Some scholars argue that all consolidations are contractionary, with composition mattering little (Guajardo et al. 2014). Others contend that spending-based consolidations can be less harmful or even expansionary if they signal credible commitment to fiscal discipline and crowd in private investment (Alesina and Ardagna 2010, 2013; Alesina et al. 2015, 2019).

This paper provides comprehensive empirical evidence on how the composition of fiscal consolidation affects two critical outcomes: the probability of achieving debt reduction (fiscal success) and the trajectory of economic growth. Employing narrative consolidation data that identifies policy changes based on legislative records rather than cyclically adjusted budget balances addresses endogeneity concerns that have plagued earlier research. The dataset covers 17 advanced economies from 1978 to 2016, spanning multiple consolidation episodes, including the Maastricht convergence adjustments of the 1990s and the post–financial crisis austerity wave.

The empirical strategy of this paper combines three complementary approaches. First, baseline fixed-effects panel regressions are estimated to establish the contemporaneous effects of tax versus spending shocks on GDP

growth, unemployment, and interest rates. Second, the local projections method is employed to trace out the dynamic effects of consolidations over a five-year horizon, revealing how short-run and medium-run impacts differ between adjustment types. Third, linear probability models are used to estimate how consolidation composition affects the likelihood of achieving debt stabilization and substantial debt reduction over a three-year period.

The main findings are robust and economically significant across specifications. Tax-based consolidations are associated with larger estimated output losses than spending-based consolidations, both contemporaneously and over the medium run. One percentage point of GDP tax-based consolidation reduces GDP growth by 0.9 percentage points in the year of implementation and by 2.94 percentage points cumulatively over five years. In contrast, spending-based consolidations show an initial, but statistically insignificant, contraction (0.22 percentage points in year zero) but turn positive in the medium run, with cumulative growth of +1.81 percentage points by year five.

More importantly for fiscal sustainability, spending-based consolidations are substantially more likely to achieve actual debt reduction. Using a strict definition of success (debt-to-GDP ratio declining by at least 5 percentage points within three years), a one-percentage-point spending-based consolidation increases the probability of success by 11.1 percentage points, while a tax-based consolidation of equal magnitude reduces the probability by 9.5 percentage points. Similar patterns emerge using a less stringent definition of success (debt stabilization). These are economically large effects: Given a baseline success rate of approximately 24 percent, a typical spending-based consolidation of 2 percent of GDP would raise the success probability to roughly 46 percent, while a tax-based consolidation of the same size would reduce it to just 5 percent probability.

These findings are subjected to extensive robustness checks. The results are stable across different lag specifications, alternative definitions of fiscal success, and controls for time-varying confounders. Importantly, the study finds that the superiority of spending-based consolidations does not depend on initial debt levels. The composition effect is structural rather than regime dependent. This pattern holds in both high-debt and low-debt environments, suggesting that spending cuts are more effective at restoring sustainability regardless of starting conditions.

These findings have important policy implications. They suggest that when fiscal adjustment becomes necessary, policymakers should prioritize spending reforms over tax increases if the goals are to maximize the probability of debt

reduction while minimizing economic costs. The findings do not imply, however, that all spending cuts are equally effective. The literature suggests that reforms targeting entitlements and government consumption are more successful than cuts to public investment.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature and positions my contribution. Section 3 describes the data sources and construction of key variables. Section 4 outlines the empirical methodology. Section 5 presents the main results. Section 6 reports robustness checks and extensions. Section 7 discusses potential mechanisms and policy implications. Section 8 concludes.

2. Literature Review

The literature on fiscal consolidation has evolved considerably over the past three decades, with substantial debate regarding both the macroeconomic effects of austerity and the differential impacts of tax versus spending adjustments.

2.1 Early research and the expansionary austerity hypothesis

The modern fiscal consolidation literature began with the provocative finding by Giavazzi and Pagano (1990, 1996) that fiscal contractions can be expansionary. Analyzing episodes in Denmark and Ireland, they argued that consolidations could boost private demand through wealth effects and expectations of lower future taxes. This "expansionary austerity" hypothesis was formalized and extended by Alesina and Perotti (1995, 1997) and Alesina and Ardagna (1998, 2010), who documented numerous episodes in which countries consolidated their public finances while experiencing accelerated growth.

Crucially, Alesina and colleagues emphasized that composition matters: Spending-based consolidations were more likely to be associated with positive growth outcomes than tax-based adjustments. They proposed several mechanisms for this differential effect. First, spending cuts may signal more credible commitment to fiscal discipline than temporary tax increases, thereby reducing sovereign risk premia and increasing confidence. Second, cuts to government consumption and transfers may crowd in private investment by reducing the size of the public sector and lowering expectations of future taxation. Third, labor-market effects may play a role if cuts to public-sector wages restrain private-sector wage demands, helping to ease cost pressures in the private sector.

2.2 Methodological critique and the narrative approach

The expansionary austerity findings (Alesina and Ardagna 1998) faced substantial methodological criticism. The main concern was that consolidation episodes were typically identified using changes in cyclically adjusted budget balances (CAPB), which are potentially endogenous to economic growth. If governments respond to unexpected growth slowdowns by tightening policy, or if automatic stabilizers are imperfectly captured in cyclical adjustment procedures, the CAPB approach will confound policy choices with economic conditions, leading to biased estimates of fiscal multipliers.

This concern motivated the development of the narrative approach by Romer and Romer (2010) for the United States and its extension to multiple countries by Devries et al. (2011) and the IMF (Adler et al. 2024). The narrative method identifies fiscal consolidations by examining policy documents, budget speeches, and legislative records to determine when governments implemented discretionary tightening measures motivated by deficit reduction rather than cyclical stabilization. This approach yields exogenous variation in fiscal policy, analogous to a natural experiment.

Using narrative data, Guajardo et al. (2014) found that fiscal consolidations are consistently contractionary in the short run, with fiscal multipliers around 0.4 or 0.5. Importantly, they found little evidence that composition matters for growth outcomes, challenging the Alesina findings. Similarly, work by the IMF (2010) and DeLong and Summers (2012) emphasized the contractionary effects of austerity, particularly when implemented during downturns or when monetary policy was constrained by the zero lower bound.

2.3 Reconciliation: The role of composition and persistence

More recent research has sought to reconcile these conflicting findings. Alesina et al. (2015, 2019) argue that the key issue is not whether consolidations are contractionary on impact, but whether spending-based adjustments generate less contraction and better fiscal outcomes than tax-based adjustments, and whether spending-based adjustments can become expansionary in the medium term.

Using updated narrative data with detailed composition information, they show that spending-based consolidations centered on cuts to transfers and government consumption impose smaller output costs and are more likely to be followed by debt reduction. They propose a "confidence channel": Markets view spending reforms as more persistent and credible than tax increases, leading to lower sovereign spreads and positive wealth effects that partially offset the direct contractionary impact.

House et al. (2020) use a micro-founded, multi-sector open-economy model calibrated to disaggregated data to show that fiscal multipliers depend importantly on policy composition. They find that reductions in government consumption and transfers are less contractionary than cuts to public investment or increases in distortionary taxes. Similarly, Born et al. (2020) use Bayesian estimation of dynamic stochastic general equilibrium models to show that fiscal multipliers vary substantially across specifications, with the relative effects of spending and tax changes depending on model assumptions about monetary policy, financing, and economic conditions.

2.4 Fiscal sustainability outcomes

While much of the literature focuses on growth effects, fewer papers directly examine whether consolidations actually succeed in reducing debt (with the exception of Alesina et al). This is a critical gap, as the ultimate goal of consolidation is fiscal sustainability, not merely avoiding short-run contraction. Baldacci et al. (2015) find that successful consolidations—defined as episodes that achieve substantial debt reduction—tend to be spending-based and accompanied by structural reforms. Heylen and Everaert (2000) find that, in European countries, fiscal adjustments based on spending restraint are more likely to stabilize debt ratios than those relying primarily on tax increases.

This paper contributes to this strand by explicitly modeling the probability of fiscal success as a function of consolidation composition, using rigorous definitions (5-percentage-point debt reduction or debt stabilization within three years) and appropriate econometric methods (linear probability models with country fixed effects and clustered standard errors).

2.5 This paper's contribution

This paper makes several contributions to the literature. First, it provides comprehensive evidence on both growth effects and fiscal success probabilities using the same narrative consolidation dataset, allowing an assessment of both dimensions of consolidation performance. Second, local projections methods are employed to trace dynamic effects over five years, revealing how short-run contractionary effects of spending cuts can reverse in the medium term. Third, extensive robustness checks are conducted, including interactions with initial debt levels, addressing concerns that composition effects may be regime dependent. Fourth, by focusing on the 1978–2016 period, the analysis encompasses diverse macroeconomic environments, including the Great Moderation, the

Global Financial Crisis, and the European debt crisis, and avoids the noise of expiring temporary pandemic fiscal stimulus.

The findings support the Alesina et al. view that composition matters substantially for both growth and fiscal outcomes, and this result is grounded in rigorous identification and specification choices consistent with much of the earlier literature. Spending-based consolidations are not merely less contractionary, they are significantly more likely to achieve actual debt reduction, which should be the primary criterion for evaluating consolidation strategies.

3. Data

3.1 Narrative consolidation measures

The primary explanatory variables are narrative measures of fiscal consolidation from the dataset constructed by Alesina et al. (2015, 2019), building on earlier work by Devries et al. (2011). This dataset identifies discretionary fiscal policy changes motivated by deficit reduction by examining contemporaneous policy documents including budget speeches, Budget Bureaus reports, central bank reports, and Stability and Convergence Programs submitted to the European Commission.

The analysis uses IMF Working Paper 24/210 (Adler et al. 2024) for 17 OECD economies over 1978–2016. The Adler et al. (2024) dataset provides a comprehensive revision of the Alesina et al. (2015, 2019) narrative data, extending coverage to 17 countries including the Netherlands and updating shock magnitudes throughout the sample period. The narrative shock sample is bounded at 2016 to ensure that the three-year debt outcome window remains pre-pandemic, while local projections use shocks through 2014 to guarantee that all five horizons avoid contamination from the COVID-19 pandemic and subsequent fiscal response.

The Adler et al. (2024) dataset provides baseline annual measures of consolidation disaggregated by type: tax increases and spending cuts, both measured as percentages of GDP. This disaggregation is crucial in comparing the effectiveness of different consolidation strategies. The total dataset covers 17 OECD countries from 1978 to 2016.

The countries in the sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Portugal, Spain, Sweden, United Kingdom, and United States. These countries experienced varying numbers of consolidation episodes over the sample period, ranging from

small adjustments below 1 percent of GDP to large multiyear programs exceeding cumulative consolidations of 5 percent of GDP.

3.2 Macroeconomic outcome variables

Several outcome variables are constructed to capture the effects of fiscal consolidation on economic activity and fiscal sustainability:

- **GDP Growth:** Annual real GDP growth rates calculated from constant-price GDP data. Using both contemporaneous growth and cumulative growth over horizons of zero to five years for the local projections analysis.
- **Unemployment Rate:** Annual unemployment rate data. Computing changes in the unemployment rate (Δ *Unemployment*) to capture labor market deterioration or improvement following consolidation.
- **Long-Term Interest Rates:** Yields on 10-year government bonds, obtained from OECD Economic Outlook and other macro databases. Examining changes in yields to assess whether consolidations affect sovereign risk premia and borrowing costs.
- **Government Debt:** The key fiscal outcome variable. General government gross debt as a percentage of GDP from the IMF World Economic Outlook database. Using both the level (for control variables) and changes over three-year horizons (for success definitions).

3.3 Sample construction and descriptive statistics

The baseline sample spans 1978 to 2019. The baseline panel is unbalanced in several respects. Unemployment data is unavailable for Germany prior to 1991, and for Ireland prior to 1983, in the harmonized OECD series. Ten-year yield data for Germany and Ireland begins in 1991 and 1990, respectively, in the primary Alesina et al. (2019) source, with gaps filled from the OECD Economic Outlook.

Germany presents an additional structural consideration. The fiscal consolidation episodes coded by Adler et al. (2024) for 1982–1984 reflect West German budgetary policy, while the macroeconomic outcome variables from 1991 onward reflect unified Germany following reunification in October 1990.

This treatment of the German data follows the standard practice in cross-country panel studies by using the World Bank GDP growth series and IMF World Economic Outlook debt series, both of which provide continuous spliced estimates across reunification on a consistent national accounts basis (see, for example, Guajardo et al. [2014], who adopt the same convention). Country fixed

effects absorb level differences in GDP, debt, and unemployment introduced by reunification, and no German fiscal episodes are coded in the 1985–1990 transition period, which limits the scope for the structural break to contaminate the shock-outcome relationship. The main estimation samples range from approximately 589 to 663 country-year observations depending on the outcome variable.

For the fiscal success analysis, the sample is restricted to "tightening years," defined as years in which the total consolidation (tax plus spending) is positive. This restriction yields 221 observations across 17 countries for the probability models. It is appropriate because the underlying research question concerns which type of consolidation is more effective, conditional on the decision to consolidate, not whether to consolidate at all.

Table A1 in the appendix reports summary statistics for all variables. The average consolidation in the sample is 0.39 percent of GDP, with substantial variation (standard deviation of 0.8). Tax increases average 0.15 percent of GDP and spending cuts average 0.23 percent of GDP, indicating that in the aggregate, consolidations tilt slightly more heavily towards spending reductions, though individual episodes may vary in composition. Debt-to-GDP ratios among the sample range from approximately 10 to 236 percent across countries and time, with a sample mean of around 66 percent.

3.4 Variable construction details

Consolidation Shocks: The total impact measures from Alesina et al. (2015, 2019) are used, which represent the estimated fiscal effect in the year of implementation. These measures are expressed as percentages of GDP and can be positive (tightening) or negative (loosening, though rare in this sample). Total consolidation is separated into *ShockTax* (tax increases) and *ShockSpend* (spending cuts).

Success Indicators: Two binary indicators of fiscal success are constructed:

1. **Substantial Debt Reduction:** $Success(i, t) = 1$ *if* $Debt(i, t + 3) - Debt(i, t) \leq -5$ *percentage points*. This captures episodes in which debt falls by at least 5 percentage points of GDP over the three years following consolidation.
2. **Debt Stabilization:** $Success(i, t) = 1$ if $Debt(i, t + 3) - Debt(i, t) \leq 0$. This less stringent criterion requires only that debt does not increase.

Cumulative Growth: For the local projections, cumulative growth is computed over horizons $h = 0, 1, ..., 5$ years as:

$$CumGrowth(i, t, h) = \Sigma(s = 0 \text{ to } h)\ \text{Growth}(i, t + s)$$

This represents the total percentage point increase in log GDP from year t to $t + h$ year .

Regime Indicators: To test heterogeneity by initial debt levels, dummy variables are constructed for high debt (Debt/GDP > 90 percent) and low debt (Debt/GDP < 60 percent), with the intermediate range (60–90 percent) serving as the omitted category.

4. Empirical Methodology

4.1 Baseline fixed-effects panel regressions

The baseline specification estimates the contemporaneous effects of fiscal consolidation shocks on macroeconomic outcomes using a standard two-way fixed-effects framework. Two lags of debt changes are included to control for prior fiscal dynamics. The framework is expressed as follows:

$$\begin{aligned} y(it) = {} & \alpha(i) + \gamma(t) + \beta(T)ShockTax(it) + \beta(S)ShockSpend(it) + \Phi_1 y(i, t-1) \\ & + \Phi_2 y(i, t-2) + \delta_1 Debt(i, t-1) + \delta_2 \Delta Debt(i, t-1) \\ & + \delta_3 \Delta Debt(i, t-2) + \varepsilon(it) \end{aligned}$$

where:

- $y(it)$ is the outcome variable for country in year (GDP growth, change in unemployment, or change in 10-year yield)
- $\alpha(i)$ are country fixed effects, capturing time-invariant country characteristics
- $\gamma(t)$ are year fixed effects, absorbing common shocks and trends
- $ShockTax(it)$ and $ShockSpend(it)$ are the narrative consolidation measures
- Φ_1 and Φ_2 are coefficients on the first and second lags of the dependent variable, capturing its persistence over time
- $y(i, t-1)$ and $y(i, t-2)$ are lags of the dependent variable, controlling for persistence
- $Debt(i, t-1)$ is lagged government debt-to-GDP ratio, controlling for initial fiscal conditions
- $\Delta Debt(i, t-1)$ and $\Delta Debt(i, t-2)$ are lags of changes in the debt-to-GDP ratio, capturing prior fiscal dynamics
- $\varepsilon(it)$ is the error term

The coefficients of interest are $\beta(T)$ and $\beta(S)$, which capture the differential effects of tax versus spending consolidations on outcomes. This specification is estimated separately for each outcome variable.

Standard errors are clustered at the country level to account for arbitrary serial correlation and heteroskedasticity within countries. This clustering is conservative and appropriate given that consolidation episodes may occur in waves within countries and outcomes may be persistent.

The inclusion of two lags of the dependent variable serves two purposes. First, it controls for mean reversion and persistence in the outcomes, improving precision. Second, for growth regressions, it helps account for the fact that consolidations may be endogenous to recent growth performance (though the narrative identification strategy substantially mitigates this concern). The lagged debt control captures the fact that consolidation effects may differ depending on initial fiscal stress.

4.2 Local projections method

To trace out the dynamic effects of consolidations over time, the local projections method introduced by Jordà (2005) is employed. This approach directly estimates impulse responses without imposing the restrictions inherent in vector autoregression models, making it particularly suitable for a setting where the functional form of dynamics is uncertain.

For each horizon $h = 0, 1, 2, ..., 5$, I estimate the following local projections specification:

$$\begin{aligned} CumGrowth(i, t, h) = \alpha(i) + \beta(h, T)ShockTax(it) + \beta(h, S)ShockSpend(it) \\ + \delta_1 \Delta Debt(i, t-1) + \delta_2 \Delta Debt(i, t-2) + \varepsilon(i, t, h) \end{aligned}$$

where $CumGrowth(i, t, h)$ is cumulative GDP growth from year t through year $t + h$. The coefficients $\beta(h, T)$ and $\beta(h, S)$ represent the cumulative effect of a one-percentage-point tax-based or spending-based consolidation shock on GDP growth at horizon h. Estimating a separate regression for each horizon yields a flexible, nonparametric estimate of the impulse response function. Two lags of changes in the debt-to-GDP ratio are included to account for prior fiscal dynamics. Standard errors are clustered at the country level.

An important practical consideration is that the sample size declines as h increases, since the analysis requires h years of forward data.

4.3 Probability of fiscal success

To assess whether tax and spending consolidations differ in their ability to achieve debt reduction, linear probability models are estimated of the form:

$$Success(it) = \alpha(i) + \beta(T)ShockTax(it) + \beta(S)ShockSpend(it) + \gamma\, Debt(i, t-1) + \Phi_1\, \Delta Debt(i, t-1) + \Phi_2\, \Delta Debt(i, t-2) + \varepsilon(it)$$

where $Success(it)$ is a binary indicator equal to one if country i achieves fiscal success in year t (as defined in section 3.4). This specification is estimated on the subsample of tightening years (total consolidation > 0), since the effectiveness of consolidation conditional on the decision to tighten is the variable of interest.

Only country fixed effects, not year fixed effects, are included in this specification because the sample of tightening years is substantially smaller and year effects would absorb much of the relevant variation. The lagged debt level controls for initial fiscal position, while the two lags of debt changes control for debt dynamics prior to consolidation (which may reflect previous consolidation efforts or growth shocks).

The coefficients $\beta(T)$ and $\beta(S)$ have a direct interpretation as marginal effects: They represent the change in probability of success associated with a one-percentage-point increase in the respective type of consolidation. The coefficients are reported alongside baseline success rates to facilitate interpretation of economic magnitudes.

Linear probability models are used rather than logit or probit for two reasons. First, with country fixed effects, logit and probit models may suffer from the incidental-parameters problem in finite samples, whereas the linear probability model remains consistent. Second, marginal effects in the linear probability model are constant and directly reported by the coefficients, whereas in nonlinear models they vary with covariate values and require additional calculation. Unreported results verify that probit models with country random effects yield similar marginal effects.

4.4 Robustness: Heterogeneity by initial debt

To examine whether consolidation composition effects depend on the level of fiscal stress, the success probability model is augmented with interaction terms:

$$\begin{aligned} Success(it) = {} & \alpha(i) + \beta(T)\, ShockTax(it) + \beta(S)\, ShockSpend(it) \\ & + \beta(T, High)\, ShockTax(it)\, HighDebt(it) \\ & + \beta(S, High)\, ShockSpend(it)\, HighDebt(it) \\ & + \beta(T, Low)\, ShockTax(it)\, LowDebt(it) \\ & + \beta(S, Low)\, ShockSpend(it)\, LowDebt(it) + \gamma\, Debt(i, t-1) \\ & + \Phi_1\, \Delta Debt(i, t-1) + \Phi_2\, \Delta Debt(i, t-2) + \varepsilon(it) \end{aligned}$$

where $HighDebt(it) = 1$ if $Debt(i, t-1) > 90\%$ and $LowDebt(it) = 1$ if $Debt(i, t-1) < 60\%$. The intermediate debt range (60–90%) is the omitted category, so the main effects $\beta(T)$ and $\beta(S)$ represent the composition effects in this "normal" debt range. The interaction coefficients show how these effects differ in high- and low-debt environments.

If consolidation composition matters more when debt is elevated—perhaps because credibility concerns are more severe—positive interactions for spending cuts (making them more effective) and negative interactions for tax increases (making them less effective) in high-debt states would be expected. Alternatively, if composition matters less when fiscal stress is acute because any consolidation is viewed as credible, then insignificant interactions might be observed.

5. Results

5.1 Baseline effects on growth and unemployment

Table 1 reports results from the baseline fixed-effects panel regressions using the total consolidation shock (tax plus spending combined) as the key regressor. These specifications serve as a benchmark, replicating the standard finding in the literature that narrative consolidations are contractionary.

The first row shows that one percentage point of GDP consolidation reduces GDP growth by 0.42 percentage points contemporaneously, confirming the contractionary effect documented by Guajardo et al. (2014) and others. The second row indicates that consolidations increase unemployment by 0.19 percentage points, consistent with output contraction. Interestingly, no significant contemporaneous effect on 10-year government bond yields (coefficient 0.027, $p = 0.673$) is observed, suggesting that consolidations do not immediately reduce

TABLE 1. Baseline panel regression: Total consolidation effects

Outcome Variable	*N*	β (Shock)	Cluster SE	*p*-value
GDP Growth (pp)	612	−0.416***	0.099	0.003
Δ Unemployment (pp)	592	+0.186***	0.050	0.001
Δ 10-year Yield (pp)	612	+0.027	0.065	0.673

Notes: Effects are based on a 1pp consolidation (tax plus spending). The abbreviation "pp" means percentage points. Two-way fixed effects (country and year), one lag of dependent variable, lagged debt control. Standard errors (SE) clustered by country. 17 OECD countries, shocks 1978–2016.
Source: Adler et al. (2024). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

borrowing costs in this simple specification—a finding revisited in the success analysis.

These results establish that fiscal consolidation is indeed contractionary on average, setting the stage for the main question: Does composition matter?

5.2 Composition effects: Tax versus spending

Table 2 presents the main baseline results, separating consolidation shocks into tax increases and spending cuts. This table is central to the analysis, as it reveals striking differences in the effects of the two consolidation types.

For GDP growth, tax-based consolidations are associated with larger estimated output losses than spending-based consolidations. A one-percentage-point increase in taxes reduces GDP growth by 0.59 percentage points contemporaneously ($p = 0.003$), roughly double the spending cut coefficient of −0.29 percentage points ($p = 0.037$). A Wald test does not reject the null hypothesis that the two coefficients are equal, however ($p = 0.19$). Both coefficients are economically and statistically significant.

For unemployment, tax increases raise unemployment by 0.18 percentage points ($p = 0.004$), while spending cuts raise unemployment by 0.21 percentage points. Both are contractionary and impose labor market costs. A Wald test does not reject equality of the two coefficients ($p = 0.73$), indicating that the labor market effects of the two types of consolidation are statistically indistinguishable. Neither type of consolidation has a statistically significant effect on long-term yields in these contemporaneous specifications.

These findings provide clear evidence that composition matters for short-run macroeconomic outcomes. Tax-based consolidations are more contractionary than spending-based consolidations when measured by GDP growth effects.

TABLE 2. Baseline composition effects: Tax versus spending consolidations

Outcome Variable	*N*	β_Tax	SE	*p*	β_Spend	SE	*p*
GDP Growth (pp)	612	−0.593***	0.173	0.003	−0.285**	0.125	0.037
Δ Unemployment (pp)	589	+0.183**	0.054	0.004	+0.210***	0.076	0.006
Δ 10-year Yield (pp)	612	+0.126	0.118	0.294	−0.031	0.101	0.625

Notes: The abbreviation "pp" means percentage points. Two-way fixed effects with two lags of dependent variable and lagged debt control. Standard errors (SE) clustered by country. β_Tax: effect of 1pp tax increase. β_Spend: effect of 1pp spending cut. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This differential effect is economically meaningful: For a typical 2 percent of GDP consolidation, choosing a tax-based approach would reduce growth by approximately 1.2 percentage points, compared with 0.6 percentage points for a spending-based approach—a difference of 0.6 percentage points of GDP.

5.3 Dynamic effects: Local projections results

While the baseline results establish differential contemporaneous effects, policy decisions require understanding medium-run dynamics. Do spending-based consolidations remain less harmful over time, or do the effects converge? And do tax-based consolidations have persistent contractionary effects, or do economies recover quickly?

Table 3 reports local projections results, showing cumulative growth effects over horizons of 0 to 5 years. These estimates reveal a striking divergence between tax and spending consolidations as time passes.

At horizon $h = 0$ (the year of consolidation), a significant negative coefficient for tax shocks (−0.9) and a small, statistically insignificant negative coefficient for spending shocks (−0.22) is observed. This initial pattern likely reflects timing issues and mean reversion, as consolidations may be implemented in the latter part of the year and often follow periods of weak growth.

A placebo test examining whether future consolidation shocks predict past GDP growth reveals significant negative coefficients, indicating that consolidations tend to occur following periods of weak economic performance. This finding suggests that some degree of endogenous policy timing may be present.

TABLE 3. Local projections: Cumulative growth effects over five years

Horizon (*h*)	*N*	β_Tax	*p*_Tax	β_Spend	*p*_Spend
0	578	−0.895***	0.000	−0.215	0.275
1	578	−1.778***	0.000	−0.142	0.781
2	578	−2.313***	0.000	+0.267	0.636
3	578	−2.557***	0.000	+0.671	0.257
4	578	−2.882***	0.000	+1.293	0.123
5	578	−2.941**	0.000	+1.814*	0.086

Notes: Each row is a separate regression of cumulative GDP growth from t to $t + h$. Shocks restricted to 1978–2014 (all horizons pre-pandemic). Country fixed effects, two lags of debt changes. Standard errors clustered by country. $N = 578$ for all horizons due to balanced local projections sample. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The more informative results emerge at horizons $h = 1$ through $h = 5$. Tax-based consolidations become increasingly contractionary over time. By year 2, the cumulative effect reaches −2.31 percentage points, growing to −2.88 by year 4 and −2.94 percentage points by year 5. These results indicate that tax-based consolidations are associated with sustained cumulative output losses approaching 3 percentage points over 5 years.

In sharp contrast, spending-based consolidations show initial, yet insignificant, contraction followed by recovery and eventual expansion. After the negative effect at $h = 0$, the cumulative impact becomes slightly positive at $h = 2$, reaching +1.8 after 5 years, although the effect at $h = 5$ is only marginally significant ($p = 0.086$).

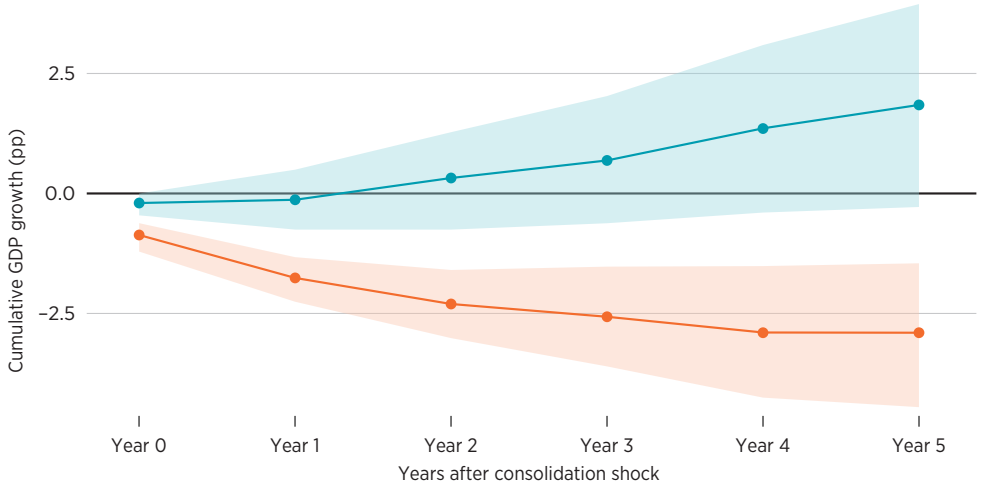
The divergence between tax and spending effects is dramatic: By year 5, the difference is approximately 4.8 percentage points of cumulative growth (1.8 − (−2.9) = 4.7). This finding represents a substantial difference in medium-run economic performance depending on consolidation composition.

Figure 1 shows the dynamics effects of spending versus tax-based consolidations on GDP growth over the 5-year horizon.

These results strongly support the Alesina et al. (2015, 2019) hypothesis that spending-based consolidations can be less contractionary—or even

FIGURE 1. Dynamic effects of fiscal consolidation on GDP growth

Cumulative percentage point change in GDP, 90% confidence bands



Notes: Local projections, country fixed effects, shocks 1978–2014. One-percentage-point consolidation shock. Clustered SEs (country).

expansionary—in the medium run, while tax-based consolidations impose persistent output losses. The mechanism likely involves confidence effects, credibility of commitment, and crowding in of private investment, which I discuss further in section 7.

5.4 Fiscal success: Probability of debt reduction

The previous subsections establish that spending-based consolidations impose smaller output costs and generate better growth outcomes over the medium run. But do they also succeed at the fundamental goal of consolidation—reducing government debt?

Table 4 reports results from linear probability models estimating the likelihood of achieving substantial debt reduction (at least 5 percentage points over three years) as a function of consolidation composition. The sample is restricted to tightening years (total consolidation > 0) and includes 221 observations across 17 countries with a baseline success rate of 23.5 percent.

A one-percentage-point spending-based consolidation increases the probability of success by 11.1 percentage points ($p = 0.013$), while a one-percentage-point tax-based consolidation decreases the probability by 9.5 percentage points ($p = 0.007$). Both effects are highly statistically significant and economically large relative to the baseline success rate.

To interpret these magnitudes, consider a typical consolidation of 2 percent of GDP. If implemented entirely through spending cuts, the model predicts a success probability of approximately 23.5% + 2*11.1% = 45.7%. *If implemented entirely through tax increases, the predicted success probability is 23.5% + 2*(−9.5%) = 4.5%.*

These findings directly address the policy question motivating this paper. Not only are spending-based consolidations less harmful for growth, but they are also more effective at achieving fiscal sustainability. The superior growth

TABLE 4. Probability of fiscal success: Substantial debt reduction

Term	Coefficient	Cluster SE	*p*-value
ShockTax (% GDP)	−0.095***	0.035	0.007
ShockSpend (% GDP)	+0.111**	0.044	0.013

Notes: Linear probability model with country fixed effects. Dependent variable = 1 if debt/GDP falls by ≥ 5pp over next 3 years. Sample restricted to tightening years (ShockTotal > 0), shocks 1978–2016 (3-year window ends at latest in 2019, pre-pandemic). $N = 221$, 17 countries. Baseline success rate = 23.5%. Controls include lagged debt and two lags of debt changes. Standard errors clustered by country. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

performance of spending-based consolidations likely contributes to their fiscal success, as stronger denominator growth mechanically reduces debt-to-GDP ratios. Additionally, credible spending reforms may reduce sovereign risk premia and interest payments, creating a virtuous cycle of debt reduction.

5.5 Debt stabilization as alternative success measure

Table 5 reports results using a less stringent definition of success: debt stabilization (debt-to-GDP ratio does not increase over three years). This criterion is easier to satisfy and has a higher baseline success rate of 38.9 percent in our sample. The question is whether the composition effects persist under this alternative definition.

The results largely confirm the main findings for debt reduction probabilities. A one-percentage-point spending-based consolidation increases the probability of debt stabilization by 6.7 percentage points, but the coefficient is statistically insignificant, while a tax-based consolidation reduces it by 12.4 percentage points ($p = 0.002$). These negative tax effects are stronger than those for the stricter success definition, but the spending effects are smaller and not significant.

The control variables are informative. Higher lagged debt is associated with higher stabilization probability (coefficient 0.006, $p = 0.013$), likely because high-debt countries face greater pressure to consolidate and may benefit from larger credibility effects. The first lag of debt changes is also statistically significant and negative ($p = 0.008$), indicating that countries with rapidly rising debt levels are less likely to stabilize, even conditional on current consolidation effort.

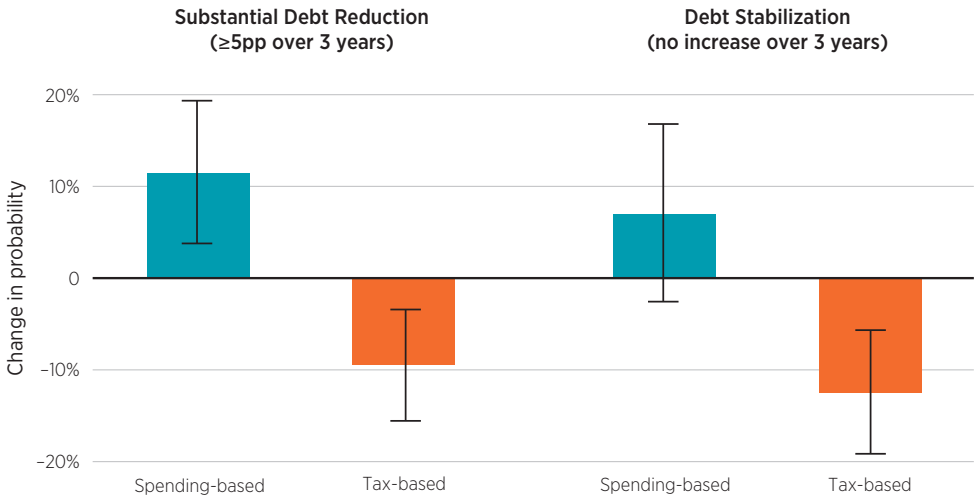
TABLE 5. Probability of fiscal success: Debt stabilization

Term	Coefficient	Cluster SE	*p*-value
ShockTax (% GDP)	−0.124***	0.039	0.002
ShockSpend (% GDP)	+0.067	0.056	0.236
L1.Debt	+0.006**	0.003	0.013
L1.ΔDebt	−0.023***	0.009	0.008
L2.ΔDebt	−0.005	0.005	0.527

Notes: Linear probability model with country fixed effects. Dependent variable = 1 if debt/GDP does not increase over next 3 years. Sample restricted to tightening years, shocks 1978–2016. N = 221, 17 countries. Baseline stabilization rate = 38.9%. Standard errors clustered by country. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

FIGURE 2. Effect of consolidation composition on fiscal success

Change in probability of success per 1pp of GDP consolidation; 90% confidence intervals



Notes: Linear probability models with country fixed effects. Sample restricted to tightening years (ShockTotal > 0), shocks 1978–2016. N = 221, 17 countries.

Figure 2 shows the effects of consolidation composition on measures of fiscal success from tables 4 and 5.

6. Robustness and Extensions

6.1 Heterogeneity by initial debt levels

A natural question is whether the superiority of spending-based consolidations depends on initial fiscal conditions. One might hypothesize that composition matters more when debt is elevated and credibility concerns are paramount, or conversely that composition matters less in crises when any consolidation signals commitment.

To test this question, consolidation shocks are interacted with indicators for high debt (>90 percent of GDP) and low debt (<60 percent of GDP), with the intermediate range (60–90 percent) as the reference category. Table 6 reports the results.

The main effects (which apply to the 60–90 percent debt range) show that tax-based consolidations reduce stabilization probability by 15.8 percentage points, whereas spending-based consolidations, while marginally significant,

TABLE 6. Heterogeneity by initial debt levels

Term	Coefficient	Cluster SE	*p*-value
ShockTax	−0.158**	0.063	0.013
ShockSpend	+0.105*	0.063	0.095
ShockTax × HighDebt	+0.075	0.121	0.534
ShockSpend × HighDebt	−0.028	0.094	0.767
ShockTax × LowDebt	+0.010	0.092	0.916
ShockSpend × LowDebt	−0.094	0.074	0.204

Notes: Linear probability model with country fixed effects. HighDebt = 1 if debt/GDP > 90%; LowDebt = 1 if debt/GDP < 60%. $N = 221$, standard errors clustered by country. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

increase it by 10.5 percentage points ($p = 0.095$). These effects are actually larger than in the baseline specification without interactions, suggesting that the middle debt range exhibits the strongest composition effects.

Critically, the interaction terms are all small and statistically insignificant. This indicates that the tax versus spending differential does not meaningfully vary across debt regimes.

This finding has important policy implications. It suggests that spending-based consolidations are superior regardless of whether debt is low, moderate, or high. The composition effect appears to be structural rather than regime dependent. Policymakers in both low-debt countries seeking preventive adjustment and high-debt countries facing fiscal stress should prioritize spending reforms over tax increases.

6.2 Alternative specifications and samples

In unreported robustness checks, the main findings are verified to be stable across several alternative specifications:

Alternative lag structures: Baseline regression are reestimated with zero, one, and three lags of the dependent variable. The composition effects remain negative for taxes and positive for spending across all specifications, with similar magnitudes.

Winsorizing extreme consolidations: Consolidation shocks are winsorized at the 95th percentile to reduce the influence of extreme outliers (some episodes

exceed 4 percent of GDP). Results are nearly identical, indicating that extreme episodes are not driving the findings.

Excluding the financial crisis: The period 2008–2010 is dropped to ensure that the extraordinary circumstances of the Global Financial Crisis do not confound estimates. The composition effects remain significant and of similar magnitude, though the sample reduction affects precision.

Alternative clustering: Standard errors are reestimated clustered by year (to account for common shocks) or two-way clustered by country and year. The tax and spending coefficients remain statistically significant in both cases.

Probit models: For the success probability analysis, probit models are estimated with country random effects and compute average marginal effects. These effects are very similar to the linear probability model coefficients, validating the choice of specification.

These robustness checks increase confidence that findings reflect genuine differences in consolidation effectiveness rather than specification choices or sample peculiarities.

7. Discussion

7.1 Mechanisms

These empirical findings raise an important question: Why are spending-based consolidations more successful than tax-based consolidations at both reducing debt and minimizing output losses? The literature suggests several potential mechanisms.

Credibility and persistence: Markets and households may view spending reforms as more credible and permanent than tax increases, which can be reversed more easily by future governments. If spending cuts signal a genuine commitment to fiscal discipline, they may reduce sovereign risk premia, lower interest rates on government debt, and generate positive wealth effects that partially offset contractionary impacts (Alesina et al. 2015, 2019). The finding that spending-based consolidations exhibit positive point estimates at longer horizons is consistent with this confidence channel.

Crowding-in of private investment: Reductions in government consumption and transfers may crowd in private-sector activity by reducing the size of

government in the economy and lowering expectations of future taxation. If government spending has low marginal productivity or displaces more productive private investment, spending cuts can raise potential output. The positive medium-run growth effects documented are consistent with crowding in.

Labor market effects: Cuts to public-sector employment and wages may moderate private-sector wage demands, improving competitiveness and supporting employment in the traded sector. This mechanism is particularly relevant for small open economies with fixed exchange rates or currency unions. Evidence from European austerity episodes suggests this channel may operate in some cases.

Composition within spending: Not all spending cuts are equally effective. The literature emphasizes that reforms targeting entitlement programs, government consumption, and public-sector wages are more successful than cuts to public investment, which may actually reduce potential growth (Biggs et al. 2010; Alesina et al. 2019; House et al. 2020). This analysis did not attempt to fully disaggregate spending cuts, but future research should examine this dimension.

Tax distortions: Tax increases, particularly on labor and capital income, may impose deadweight losses that reduce potential output. Higher marginal tax rates discourage work effort and investment, potentially generating persistent growth losses. This effect could explain why, in local projections, tax-based consolidations show cumulative output losses that grow over time.

Denominator effects: To the extent that spending-based consolidations are associated with stronger GDP growth, they improve debt dynamics by increasing the denominator of the debt-to-GDP ratio. Even if the level of debt evolves similarly under tax- and spending-based adjustments, faster growth raises GDP and thereby reduces the debt ratio mechanically. The finding that spending cuts are associated with higher medium-run growth therefore supports debt reduction through this channel.

While the data in this analysis does not allow for definitively testing these mechanisms, the pattern of results—initial contraction, medium-run expansion, and improved fiscal outcomes for spending-based consolidations—is most consistent with credibility, confidence, and crowding-in channels. Future research with more granular data on interest rate spreads, private investment, and within-spending composition could shed further light on the operative mechanisms.

7.2 Policy Implications

The findings have direct implications for policymakers facing fiscal consolidation decisions.

Prioritize spending reforms: When consolidation becomes necessary to restore fiscal sustainability, governments should focus primarily on spending reforms rather than tax increases. Spending-based consolidations are more likely to achieve debt reduction, impose smaller output costs, and possibly generate medium-run growth benefits.

Composition within spending matters: While subcategories within the data cannot be fully analyzed, the literature suggests that effectiveness varies across types of spending cuts. Reforms targeting entitlement programs (pension systems, healthcare), government consumption, and public-sector compensation are more effective than across-the-board cuts or reductions in public investment. Well-designed spending-based consolidations should preserve growth-enhancing public investment while restraining consumption and transfers.

Debt levels do not alter the prescription: Robustness analysis shows that spending-based consolidations are superior in both high-debt and low-debt environments. This result implies that the composition prescription applies whether countries face acute fiscal stress or are pursuing preventive adjustment. High debt does not justify shifting toward tax increases.

Have a medium-run perspective: Local projections reveal that the full benefits of spending-based consolidations emerge over several years. Policymakers should maintain commitment to spending reforms even if short-run effects are contractionary, as the medium-run payoff in terms of growth and debt reduction is substantial. Conversely, tax-based consolidations that appear less harmful initially may generate cumulative losses over time.

Implement complementary policies: While this research is focused on fiscal composition, consolidations should be accompanied by complementary policies to maximize effectiveness. Structural reforms to product and labor markets can enhance the supply-side response to consolidation. Accommodative monetary policy, where available, can offset demand contraction, though this option is limited for countries at the zero lower bound or in currency unions. To avoid the contractionary effects of tax increases, spending-restraint policies could be combined with tax base broadening by reducing the number and scale

of distortionary tax expenditures in the tax code. Clear communication of consolidation plans can strengthen credibility effects.

7.3 Limitations and Future Research

Several limitations of the analysis suggest directions for future research.

Sample period and external validity: The analysis covers 1978–2019, avoiding the COVID-19 pandemic and associated fiscal responses. Future research should examine whether consolidation composition effects persist further into the post-pandemic period (perhaps 2023 onward), as many countries face elevated debt but also different monetary and fiscal environments.

Composition detail: While this paper distinguishes between tax and spending consolidations, finer disaggregation would be valuable. Within spending, cuts to transfers, public investment, government consumption, and public wages likely have different effects. Within taxes, increases in income taxes, consumption taxes, and social-welfare contributions may differ in their growth and debt impacts. Data limitations prevented fully exploring these distinctions.

Nonlinearities: Consolidation effects are modeled as linear, but effects may vary with consolidation size. Very large adjustments (exceeding 3–4 percent of GDP) may trigger confidence effects not present in small adjustments or, conversely, may be more contractionary due to overwhelming demand effects. Exploring nonlinearities would require more flexible specifications and larger samples.

Political economy: The analysis treats consolidation composition as exogenous, but in practice governments choose between taxes and spending based on political considerations. Left-leaning governments may prefer tax increases while right-leaning governments favor spending cuts. Understanding the political-economy determinants of consolidation composition and controlling for government characteristics could strengthen causal inference.

Monetary-fiscal interactions: Consolidation effects likely depend on monetary policy stance and exchange rate regimes. Countries at the zero lower bound or in currency unions may experience larger fiscal multipliers, potentially altering the relative effectiveness of tax versus spending adjustments. Systematic exploration of these interactions would enhance policy relevance.

Long-run effects: Local projections extend to five years, but even longer horizons may be relevant for assessing sustainability. Do spending-based consolidations generate permanently higher output levels, or do effects eventually dissipate? Panel data with longer post-consolidation periods would allow tracing out very long-run dynamics.

Despite these limitations, comprehensive analysis provides robust evidence that the composition of fiscal consolidation matters critically for both macroeconomic outcomes and fiscal sustainability. The superiority of spending-based adjustments is consistent across multiple specifications and outcome measures, suggesting that this finding should inform policy design in the post-pandemic era of elevated debt.

8. Conclusion

This paper provides comprehensive empirical evidence on the differential effects of tax-based versus spending-based fiscal consolidations in advanced economies. Using narrative consolidation data that addresses endogeneity concerns, I estimate the effects of consolidation composition on GDP growth, unemployment, and the probability of achieving debt reduction over 1978–2019.

The main findings are clear and consistent. Tax-based consolidations are associated with larger estimated output losses than spending-based consolidations, both contemporaneously and over a five-year horizon. A tax increase of one percentage point of GDP reduces GDP growth by 0.9 percentage points initially and by 2.94 percentage points cumulatively over five years. Spending-based consolidations show smaller and insignificant initial contraction and exhibit positive point estimates at longer horizons, with cumulative growth effects of approximately +1.81 percentage points by year five.

More importantly for fiscal sustainability, spending-based consolidations are substantially more likely to succeed at reducing government debt. Using rigorous definitions of success—debt reduction of at least 5 percentage points or debt stabilization over three years—a one-percentage-point spending-based consolidation increases success probability by approximately 11 percentage points, while a tax-based consolidation of equal size reduces it by roughly 10–12 percentage points. Given baseline success rates around 24–39 percent, these effects are economically large. A typical 2 percent of GDP consolidation implemented through spending cuts would achieve success in almost half of cases, while a tax-based approach of the same size would succeed in less than 10 percent of cases.

These findings are robust to alternative specifications, different success definitions, and interactions with initial debt levels. The superiority of spending-based consolidations does not depend on whether debt is high or low, suggesting that this is a structural feature of consolidation dynamics rather than a regime-dependent phenomenon.

The results have clear policy implications. When consolidation becomes necessary to restore fiscal sustainability, the results suggest that prioritizing spending-based adjustments may improve the likelihood of success. This prescription applies regardless of initial debt levels and across diverse macroeconomic environments. While political economy constraints may limit the feasibility of spending-based consolidations in some contexts, the main findings indicate that this approach maximizes the probability of achieving debt reduction while minimizing output costs.

The mechanisms underlying these effects likely involve credibility and confidence channels, crowding-in of private investment, and differences in distortionary effects between taxes and spending. Spending reforms may signal more credible commitment to fiscal discipline, reduce sovereign risk premia, and support private-sector activity, generating virtuous cycles of growth and debt reduction. Tax increases, by contrast, may impose deadweight losses and signal weaker commitment, leading to persistent output losses without delivering fiscal sustainability.

As advanced economies navigate the post-pandemic fiscal landscape with elevated debt levels and constrained policy space, understanding the composition of fiscal adjustment becomes increasingly important. Well-designed spending reforms offer the best path to fiscal sustainability with minimal sacrifice of economic growth. Future research should explore the mechanisms in greater detail, examine heterogeneity across consolidation types and country characteristics, and assess whether these relationships persist in the post-pandemic era.

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Appendix

A. Data sources and variable definitions

Narrative Consolidation Measures

- Source: Adler et al. (2024)
- Variables: *Tax Impact* (*Tot*), *Spending Impact* (*Tot*)
- Units: Percentage of GDP
- Coverage: 17 OECD countries, 1978–2016
- Construction: Based on examination of policy documents identifying discretionary fiscal measures motivated by deficit reduction

GDP and Growth

- Source: OECD (2026a), IMF (2026)
- Variable: Real GDP in constant prices
- Transformation: $Annual\ growth\ rate = log(GDP_t) - log(GDP_t - 1)$
- Cumulative growth: Sum of annual growth rates over horizon h

Unemployment Rate

- Source: OECD (2026b)
- Variable: Standardized unemployment rate (% of labor force)
- Transformation: First difference (percentage point change)

Government Debt

- Source: IMF (2026)
- Variable: General government gross debt (% of GDP)
- Coverage: Annual data, 1978–2019

Long-term Interest Rates

- Source: OECD (2026a), national sources
- Variable: Yield on 10-year government bonds (%)
- Transformation: First difference (percentage-point change)

B. Summary statistics

TABLE A1. Descriptive statistics

Variable	*N*	Mean	Std Dev	Min	Max
Total Consolidation (% GDP)	663	0.39	0.80	−0.75	5.23
Tax Shock (% GDP)	663	0.15	0.42	−0.75	3.01
Spending Shock (% GDP)	663	0.23	0.53	−0.29	3.76
GDP Growth (%)	663	2.32	2.41	−8.08	24.62
Unemployment Rate (%)	649	7.87	3.72	1.54	26.10
10-year Yield (%)	663	7.20	4.62	−0.25	29.74
Debt/GDP (%)	663	65.76	34.81	9.67	236.38

Notes: Summary statistics for full sample of 17 countries, 1978–2019. Consolidation variables can be negative (expansionary episodes), but most observations are zero or positive.

C. List of countries

The following 17 countries are included in the main estimation sample:

1. Australia
2. Austria
3. Belgium
4. Canada
5. Denmark
6. Finland
7. France
8. Germany
9. Ireland
10. Italy
11. Japan
12. Netherlands
13. Portugal
14. Spain
15. Sweden
16. United Kingdom
17. United States

D. Consolidation episodes by country

TABLE A2. Number of consolidation years by country

Country	*N* (Years)	Total Episodes	Avg. Size (% GDP)
Australia	39	10	0.4
Austria	39	11	1.2
Belgium	39	16	1.5
Canada	39	19	0.6
Denmark	39	7	1.2
Finland	39	12	1.5
France	39	11	0.7
Germany	39	17	0.6
Ireland	39	13	2.4
Italy	39	17	2.1
Japan	39	14	0.5
Netherlands	39	16	1.4
Portugal	39	11	2.2
Spain	39	14	1.4
Sweden	39	7	1.8
United Kingdom	39	16	0.7
United States	39	18	0.4

Notes: Episodes defined as years with total consolidation > 0 per Adler et al. (2024), "Table A1. Average size computed over positive-shock years within 1978–2016."

About the Author

Jack Salmon is a Gibbs Scholar and research fellow at the Mercatus Center at George Mason University, where he focuses on economic and fiscal policy, with an emphasis on federal budgets, taxation, economic growth, and institutional analysis. His research and commentary have been featured in a variety of outlets, including *The Hill*, *Business Insider*, *RealClearPolicy*, *National Review*, the American Institute for Economic Research, and *Reason* magazine. Salmon has provided expert analysis on fiscal and economic issues in various policy forums, including testimony before Congress on the risks of debt accumulation, deficit spending, and inflation.