

Fiscal Rules and State Borrowing Costs: Evidence from California and Other States

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Foreword

A generation of California voters and legislators has fashioned a unique system for financing government services. In doing so, they have also spawned scores of unintended consequences. Proposition 13, for example, both altered the face of public finance and generated many unforeseen outcomes. Instead of echoing conventional wisdom, several PPIC reports have described those consequences objectively. But whether policy debate trades in clichés, calculations, or some mixture of the two, one point is irrefutable—California has made extensive use of the initiative process to finance and constrain state government, and we are still gauging the effects of that development.

In *Fiscal Rules and State Borrowing Costs*, James Poterba and Kim Rueben show how some of these unintended consequences can be measured. Marshalling evidence from municipal bond markets around the nation, the authors maintain that fiscal constraints on state government affect borrowing costs in ways that are predictable but rarely acknowledged. In particular, they show that borrowing costs are

sensitive not only to overall measures of economic health, such as unemployment rates, but also to a state's fiscal rules and budget forecasts.

Although some of the findings may seem counterintuitive at first, the economic reasoning is sound. Revenue limits and supermajority requirements for new taxes—the latter a legacy of Proposition 13—tend to increase borrowing costs because they hamper the state's perceived ability to pay its long-term debt. In contrast, expenditure limits such as Proposition 4 lower borrowing costs because they make it easier for the state to service its debt. The authors also find that states with unexpected deficits pay more for long-term financing, and they conclude the report by measuring the costs of inaccurate state budget forecasts.

These findings have immediate implications for the fiscal limits movement in California. Although this movement rarely distinguishes between tax and expenditure limits, the bond market has scaled this distinction precisely. The authors calculate that a tax limit costs the state approximately \$2 million more per \$1 billion of debt than a spending limit. This is not a negligible cost, even in a state as rich as California, and it indicates once again that reinventing public finance brings with it more than a few unintended consequences. In this study, however, those consequences are estimated carefully rather than asserted tendentiously.

David W. Lyon
President and CEO
Public Policy Institute of California

Summary

The vast majority of California's spending on capital infrastructure, such as highways, aqueducts, prisons, and related facilities, is financed with long-term debt. Recent projections of such spending over the next decade suggest that the state will need to borrow \$25 billion to \$50 billion during this period. The interest rate on California's debt will be an important factor in determining the overall fiscal burden of this infrastructure spending. That rate, which differs over time and from state to state, is determined by a number of factors, some of which are matters of public policy.

This report investigates interstate differences in borrowing rates on general obligation bonds. It begins by presenting new evidence on how state economic conditions affect borrowing costs. By analyzing yields on tax-exempt bonds issued by different states between 1973 and 1997, the study reveals a clear relationship between a state's general economic health, as measured by unemployment rates, and state borrowing costs. A 1 percent increase in a state's unemployment rate is associated with an

increase of about 0.05 percent, or five basis points, in that state's bond yields. (A basis point is one one-hundredth of 1 percent.) In California, for example, the state's borrowing rate rose when the state economy was weak in the early 1990s and has declined for the last several years as the economy has improved.

More important from a public policy perspective, perhaps, is the finding that states' fiscal rules also play an important role in determining states' borrowing costs. We present three major findings in this regard. First, states with strict fiscal rules on government spending or deficits have faced lower borrowing costs during the last two decades than those with looser fiscal rules. We calculate that a state with a strict anti-deficit fiscal constitution pays about nine basis points less to issue new debt interest.

Second, the bond market reacts in different ways to revenue restrictions and expenditure limits. States with expenditure limits typically borrow at lower rates than other states, but those that restrict tax increases or require supermajorities to increase taxes face higher borrowing costs. States with binding revenue limitation laws are likely to face borrowing rates more than seventeen basis points higher than those in other states. This ratio translates into an extra \$1,750 in interest payments per million dollars of debt issued. Limits on the ability of local governments to increase taxes or issue debt also seem to raise state borrowing costs.

The empirical findings in this study suggest that California's current fiscal rules raise the interest rate on state and possibly local debt. Since the passage of Proposition 13 in 1978, a legislative supermajority—in this case, a two-thirds vote in both houses—has been required to enact new taxes. Although the Gann amendment (Proposition 4) of 1979 does

not restrict state revenues, it limits state and local expenditure growth. More recently, Proposition 218, which was adopted in 1996, provides new mechanisms for voters to restrict local revenues. Although states with supermajority provisions face higher borrowing costs than states without such requirements, explicit limits on state revenues and stronger anti-tax provisions than those in California have an even larger effect on borrowing costs. Thus, California's tax limitation strategy has probably raised interest costs to the state but by less than other tax limitation strategies might have. Our figures indicate that if California had enacted a tax limitation law for state revenues rather than an expenditure limit in 1979, borrowing costs would have been about 20 basis points higher on average during the subsequent two decades. This difference amounts to about \$2,000 extra in interest payments per million dollars of debt issued. This increase represents a small but not trivial fraction of the state budget. In 1997, for example, California had outstanding state debt of \$43.5 billion. If the state had enacted a restrictive revenue limit rather than an expenditure limit, the extra interest on this debt would have been approximately \$90 million.

Our third major finding concerns unexpected state budget surpluses or deficits and how they affect borrowing costs. Not surprisingly, unexpected state budget deficits are correlated with upward revisions in state bond yields. It is more expensive for a state to issue new debt when it is experiencing budget difficulties, but bond markets are especially responsive to the fiscal health of states with large amounts of outstanding debt. This effect is particularly pronounced in California, where an unexpected \$100 per capita increase in the state's deficit has historically been associated with an increase of 14 basis points in borrowing costs. Thus, if California had undertaken new infrastructure projects in 1992,

\$1 billion of new debt would have cost the state \$1.4 million more than it would today. Part of this responsiveness can be explained by differences in fiscal rules; bond yields rise less during periods of financial stress for states with tight anti-deficit rules or restrictive spending rules. In California, state fiscal rules can explain about two-thirds of this effect. This pattern indicates that accurate tax and expenditure forecasts are more important for California than for most other states, which municipal bond analysts follow less closely.

As California begins a new round of infrastructure borrowing and spending, it is especially important to understand how the state's fiscal rules affect the overall costs of repairs and construction. According to our findings, these fiscal rules affect the costs of state tax-exempt debt by the same amount as a significant shift in the unemployment rate.

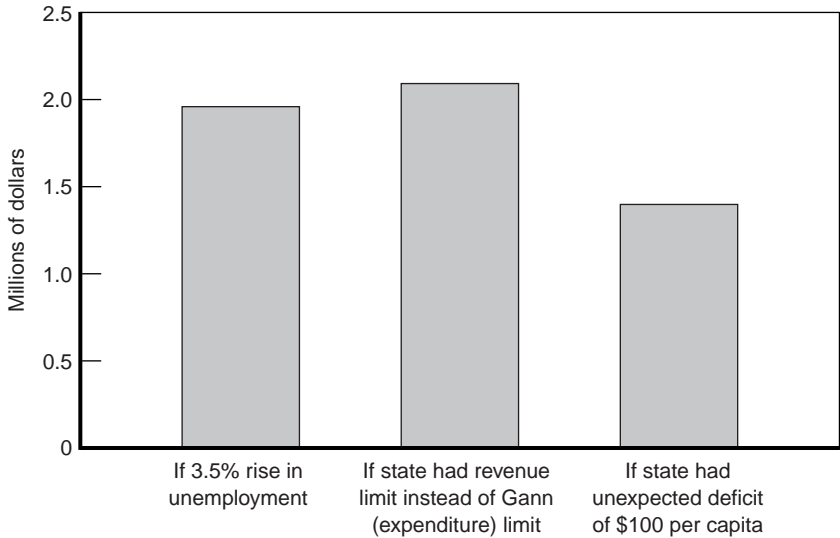


Figure S.1—California’s Predicted Additional Borrowing Cost per \$1 Billion of New Debt

California's interest costs are also very sensitive to unexpected deficits. Our findings indicate that voters and legislators would do well to recognize the long-term effects on borrowing costs when considering tax limits, expenditure limits, or changes to the state's deficit financing rules. In addition, the state should take into account the additional costs of issuing debt during times when economic conditions or other circumstances lead to unexpected deficits.

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1. Introduction

In his proposed 1999–2000 budget, Governor Gray Davis established the Commission on Building for the 21st Century and called attention to the state’s low level of infrastructure spending over the past decade. His remarks to the commission (State of California, 1999) underscored the growing importance of capital spending as a public policy issue in California:

As California moves into the 21st Century we face the dual problem of preserving the schools, highways, bridges, water systems, and housing of today, while also planning and building new facilities for a growing population. There is no choice: we must maintain our current capital investments—“infrastructure”—and make new investments.

Governor Davis charged the commission with determining how much the state should spend on infrastructure repair in the coming years and how this spending should be financed. The California Business Roundtable has also called for substantial increases in state infrastructure spending in the near future. In a special edition of California’s Debt Affordability Report (California State Treasurer, 1999), the state treasurer has also called for a comprehensive evaluation of infrastructure

and investment needs. The prospect of significant increases in future state borrowing suggests that debt policy is an increasingly important issue.

The Department of Finance has identified \$82.2 billion of state and state-funded local infrastructure needs over the next decade. About half of this total can be paid for out of existing bond funds and anticipated federal funds, but more than \$40 billion of infrastructure spending will need to be financed with new debt. If the state maintains its current ratio of debt service to general fund revenues, the state's debt capacity over the next ten years will be \$32.5 billion, according to Treasurer report estimates. If spending on debt service increases from a little over 4 percent to 5 percent, the amount of debt issued could increase by \$10 billion and will cover the currently identified needs of the state.

California's interest burden is currently lower than that of the typical state. The Census of Governments reports that although the state's general obligation debt at the end of fiscal year 1997 was \$45.3 billion, the second largest in the nation, per capita indebtedness was \$1,405, or slightly below the national average. The Advisory Council on Intergovernmental Relations (ACIR) (1998) reports that in fiscal year 1995, California's state interest burden was \$76 per capita, compared with a national average of \$82. These differences are not due to a smaller government sector in California than in other states. In fiscal year 1997, for example, per capita state spending in California was \$3,632, compared with a national average of \$3,345.

Borrowing costs on state debt are determined by a variety of factors, the most dramatic of which are repayment problems or other fiscal crises. At the height of the Massachusetts fiscal crisis in 1990, for example, yields on its general obligation bonds were more than 1 percent higher

than California's. Similarly, when New York City appeared to be on the verge of bankruptcy in 1976, yields on New York state bonds were nearly 2 percent higher than California's. Although such crises account for significant differences in interstate borrowing costs, less dramatic factors contribute to these disparities as well. One such factor is the set of fiscal rules that governs a state's ability to raise and spend revenue. In some states, for example, the state constitution requires a prompt tax increase or spending cut to counter a budget deficit. In other states, governors and legislatures may use short-term debt financing to cover revenue shortfalls. Disparities in these fiscal rules affect a state's perceived credit risk and therefore its borrowing costs.

This study explores how these fiscal rules, and the way they interact with state economic conditions, affect the cost of issuing general obligation debt. The results are interpreted with particular reference to California. Chapter 2 describes the fiscal institutions in place in California and the rest of the country that are the primary focus of this study. Chapter 3 reports summary information on state borrowing costs, in California and other states, for the three decades that provide the analytical basis for this study. Chapter 4 summarizes the empirical evidence that links state economic conditions, fiscal rules, and fiscal health to state borrowing costs. More detailed information on the fiscal institutions and the statistical analysis is presented in appendices. Finally, a brief conclusion highlights the findings and their implications for public policy.

2. Current Fiscal Rules Across Different States

Although state fiscal constitutions vary along many dimensions, our analysis of fiscal rules focuses on seven characteristics.¹ The first is the extent to which a state must have a balanced budget at different points in the legislative process. Only Vermont does not have a formal balanced budget requirement. The balanced budget requirements of the other 49 states can be divided into four groups. In 44 states, including California, the governor must submit a balanced budget. This is the weakest of the balanced budget requirements, as it does not actually require that the state enact a budget that matches expenditures and revenues.

In 37 states, including California, the legislature must enact a balanced budget. Even in these states, however, actual revenues and expenditures may diverge if there are unexpected fiscal shocks after the budget is signed into law. When an unexpected deficit develops during

¹Detailed information on state budget rules may be found in the annual reports of the ACIR (for example, 1988 and 1998), or in Briffault (1996).

the fiscal year, six states require that the governor and legislature correct the deficit in the next budget cycle. Because budget cycles in some states are biennial, this requirement permits substantial periods of budget deficits. Twenty-four of the 37 states with balanced budget requirements prohibit the government from carrying deficits into the next budget cycle. This provision represents the strictest anti-deficit rule, as it requires the legislature either to cut spending, or raise taxes in the fiscal year when the deficit emerges, or to float short-term debt that will be retired in the next fiscal year. Previous studies, including Alt and Lowry (1994), Bohn and Inman (1995), and Poterba (1994), find that such anti-deficit rules are generally correlated with lower average deficits and more rapid adjustments to budget shortfalls.

In 1987, the ACIR constructed an index that characterizes fiscal discipline among state governments. This index, which is presented in detail in Appendix A and summarized in Figure 1, ranges from 0 (lax) to 10 (stringent). California receives a score of 6 on this scale, in part because the state constitution permits the use of short-term borrowing to cover a deficit. Because it is difficult to interpret a one-unit change in this index, we have adapted it for the purposes of this study. Our statistical analysis contrasts states for which the index value is 5 or below with those for which the value is 6 or above. States with scores of 5 or below cannot have any stronger anti-deficit rules than a requirement that the governor present a balanced budget. Only eight states receive ACIR scores of 5 or below, whereas 26 receive a score of 10. States in the Northeast and the upper Midwest are less likely to have stringent anti-deficit requirements than states in other regions. Outside of those regions, many states with relatively weak budget rules have other fiscal constraints on state revenue or expenditures; for example, California,

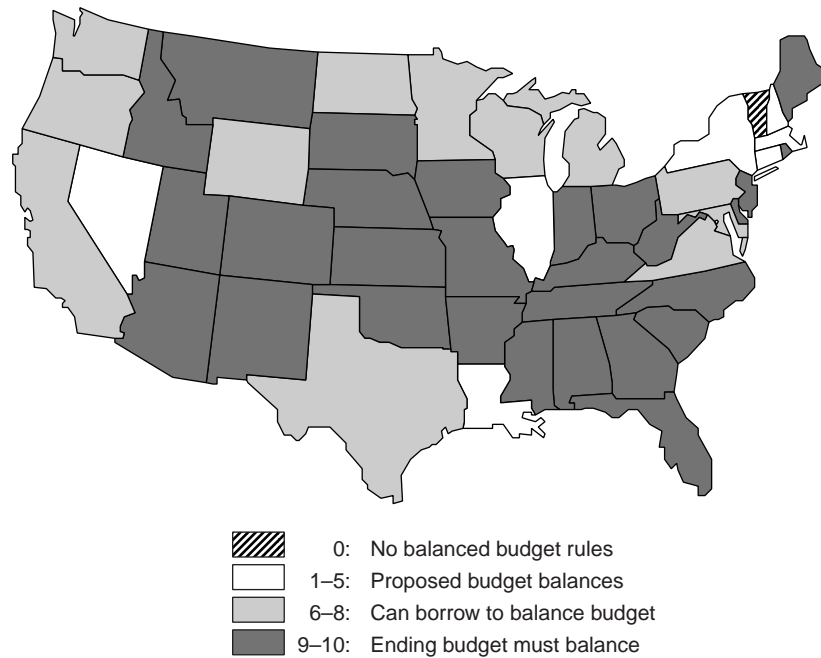
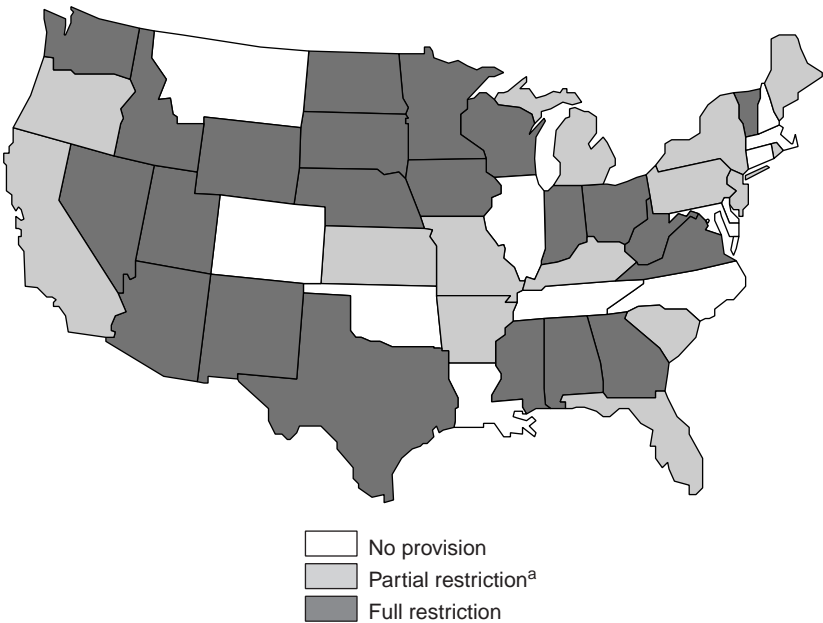


Figure 1—Balanced Budget Requirements

Nevada, and Louisiana have passed limits on how quickly expenditures can grow over time. These revenue and expenditure limits are discussed in more detail below.

The second fiscal characteristic we consider is the ease with which states issue long-term general obligation debt. Twelve states do not restrict debt issuance. Thirty-eight states have constitutional restrictions on debt issue, and two have legislative limits. The most common type of restriction limits the amount of debt outstanding. Fourteen states, including California, permit voters to override constitutional restrictions on debt levels to issue additional debt. We do not attempt to distinguish

among the various limits on debt issue; rather, we consider whether a state has any restriction, including requiring voter approval, on issuing general obligation debt. We use this definition to study the effects of borrowing limits on borrowing costs. Figure 2 (and Column 2 in Appendix A) shows the continental states that have borrowing limits. As with anti-deficit rules, the previous literature suggests that limits on long-term debt issues affect fiscal outcomes. Bunche (1991) finds that states with restrictions on general obligation debt are more likely to rely on revenue bonds to finance a range of government projects. Kiewiet and Szakaly (1996) also find that these rules affect state borrowing behavior.



^aDebt limit can be exceeded with voter approval.

Figure 2—States with Debt Restriction Provisions

However, previous studies have not considered the link between these institutions and yields on state general obligation debt.

The third and fourth fiscal characteristics are tax and expenditure limits at the state level. The most common type of limit restricts the growth rate of general fund expenditures or revenues to the growth rate of personal income or to the growth rate of population and inflation. Some of these laws place binding constraints on governors and legislatures. Rueben (1996) provides information on override provisions and indicates which limits cannot be overridden by a simple legislative majority. Tax and expenditure limits have changed since the late 1970s, when most current limits were enacted. Several states enacted new limits or strengthened earlier limits in the early 1990s. In 1979, for example, Louisiana passed a law mandating that the ratio of tax revenue to personal income in any year could not exceed the 1979 ratio; however, a simple legislative majority could override the measure. In 1993, voters passed a referendum that limited the growth in appropriations. Unlike the earlier law, this one required a two-thirds vote to override the limit. Similarly, Colorado's expenditure limit in 1978 was supplemented with Amendment 1, or the Taxpayers Bill of Rights, in 1992. The latter initiative limits increases in state and local spending to the change in population and increases in the Consumer Price Index. In addition, it requires voter approval for the implementation of new taxes. In 1980, California voters approved Proposition 4, the Gann amendment, which limits the growth in both state and local expenditures to changes in the Consumer Price Index and population. As Tables 1 and 2 indicate, 24 states have adopted some form of state tax or expenditure limitation since 1976. Twenty-one states currently have an expenditure limit in place, and 19 states require at least a supermajority of both houses of the

Table 1
History of State Spending Limit Adoptions

1976–1979	1980–1983	1984–1988	1989–1992	1993–1997
Utah	Alaska	Oklahoma	Colorado	Nevada
Nevada	Montana		Rhode Island	Washington
Oregon	South Carolina		Connecticut	Louisiana
California	Missouri		North Carolina	
Texas	Idaho		New Jersey	
Tennessee			Utah	
Hawaii				
Arizona				
Colorado				
Rhode Island				
New Jersey				

NOTES: Binding limits are in bold. Other limits are advisory or can be overridden by a legislative majority. New Jersey's original expenditure limit expired in 1976.

Table 2
History of State Revenue Limit Adoptions

1976–1979	1980–1983	1984–1988	1989–1992	1993–1997
Louisiana	Missouri	Massachusetts	Colorado	Missouri
Washington			Louisiana	Florida
Michigan				

NOTE: Binding limits are in bold. Other limits are advisory or can be overridden by a legislative majority.

legislature to override spending limits. Seven states have passed a limit on revenues, five of which were enacted after 1986.

Because tax and expenditure limits restrain the growth of government spending, they are often classified together. However, the tax-exempt bond market makes a strict distinction between them. Tax limits increase the risk that revenues will not cover future interest payments; they therefore increase the risk of state general obligation debt. In contrast, expenditure limits increase the likelihood that legislatures

will make interest payments. The empirical results presented below support this dichotomy.

The fifth fiscal characteristic we consider is the supermajority requirement to raise specific taxes. Unlike revenue limits, supermajority requirements do not cap existing taxes, such as sales and income taxes, which often rise during economic upswings. Fifteen states, including California, currently have a supermajority requirement for new taxes. Historically, supermajority requirements have been concentrated in the South. More recently, however, other states have passed supermajority requirements as part of initiatives to limit government revenues. California passed a two-thirds majority requirement in 1978 as part of Proposition 13. Montana and Missouri have even stricter provisions concerning new taxes. In a budgetary emergency, the legislature in each state can pass new temporary taxes with a supermajority. However, voter approval is required to make these emergency taxes permanent. Table 3 presents information on states with supermajority requirements. Because supermajority requirements and revenue limits restrict the government's ability to raise revenue, we expect these constraints to affect bond yields in similar ways.

The last two fiscal characteristics considered here are limits on local governments, specifically, the extent to which states restrict the ability of these governments to raise revenues and issue new debt. Although local restrictions do not directly affect a state government's fiscal health, they can have indirect effects insofar as they lead state governments to take over traditional local government functions. Rueben (1996) shows that states with local limits raise a higher percentage of revenues centrally than states without such limits. For example, Proposition 1A, which was enacted in California in November 1998, permits the state to borrow

Table 3
Supermajority Requirements and Other Constitutional Restrictions
on Legislative Tax Power

State	Adopted	Referendum or Voter Initiative	Legislative Majority Required	Applies To
Arizona	1992	Initiative	2/3	All taxes
Arkansas	1934	Referendum	3/4	All taxes except sales and alcohol
California	1978	Initiative	2/3	All taxes
Colorado	1992	Initiative	2/3	All taxes
Delaware	1980	Referendum	3/5	All taxes
Florida	1971	Referendum	3/5	Corporate income tax
Florida	1996	Initiative	2/3	New taxes
Louisiana	1966	Referendum	2/3	All taxes
Mississippi	1970	Referendum	3/5	All taxes
Missouri	1996	Referendum	2/3	Emergency taxes
Montana	1998	Initiative	3/4	Emergency taxes
Nevada	1996	Initiative	2/3	All taxes
Oklahoma	1992	Initiative	3/4	All taxes
Oregon	1996	Referendum	3/5	All taxes
South Dakota	1996	Referendum	2/3	All taxes
Washington	1993	Initiative	2/3	All taxes

NOTES: Missouri and Montana can pass temporary new taxes in an emergency. However, if either state wants to make emergency tax increases permanent, it must get voter approval.

\$9.2 billion for local education facilities, providing a means of financing school construction in districts that are unable to gain the supermajority required in local elections.

Figure 3 shows which states have local revenue limits. Many states restrict local tax rates or assessments. California's Proposition 13 is perhaps the best known of such restrictions. Our analysis considers both state-imposed limits on local revenue levels and state restrictions on both the assessed valuation of local property and the tax rate that can be

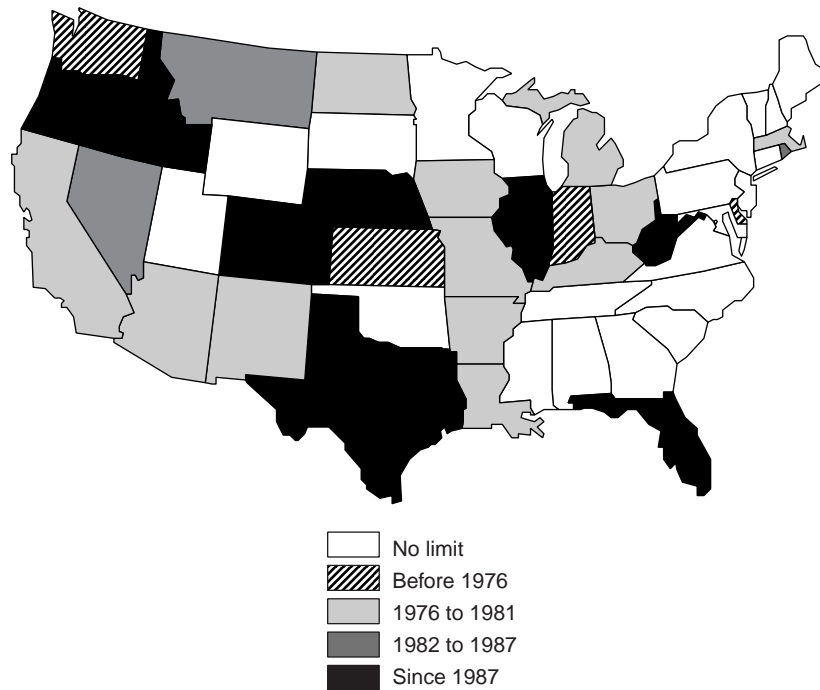


Figure 3—Year Local Tax Limit Passed

imposed. In addition to Proposition 13 (and Proposition 4, which limits expenditures), California has two other restrictions on local government finance: Proposition 62, which limits general taxes at the local level, and Proposition 218, which confirms the limit on general taxes and also limits local fees and assessments.

Virtually all states limit localities' ability to issue municipal debt. According to a 1993 ACIR report, only Florida and Tennessee do not place any debt limits on cities, but these states require voter approval for debt over a certain amount. The most typical requirement calls for voter approval before municipalities can issue new debt. Forty states also limit counties in this regard as well. Because all states restrict the issuance of

local bonds, we focus on the eight states that require a supermajority to authorize new local debt.

Appendix A presents information on the seven state fiscal institutions described above. It reports the actual ACIR index for each state's anti-deficit program, indicates which states limit the amount of outstanding debt, and shows whether this limit can be overridden with consent of the voters. It also gives the year of passage for the more recent fiscal constraints passed and information on the kind of supermajority required.

California has a unique combination of fiscal rules. The actual state budget need not be balanced, but there are limits on the amount of state debt that can be issued without voter approval. California also has a state expenditure limit and requires supermajorities to introduce new taxes or to increase existing ones. Finally, California's local governments are more fiscally constrained than those in other states. Using the initiative system, California's voters have enacted a number of restrictions on local governments; indeed, only Oregon's voters have used the initiative system more. Property taxes are limited and local governments are required to receive voter approval for most other revenue sources. Finally, California is one of only eight states that require a supermajority of voters to issue local general obligation debt. The supermajority requirement for local debt is the only limit that was not passed recently using the initiative system.

3. State Borrowing Costs in the Last Two Decades

The market value of outstanding tax-exempt bonds is roughly 40 percent as large as that of corporate bonds and roughly one-fifth the value of U.S. Treasury bonds. Although the bond market is well organized, there are three practical obstacles to obtaining information on the borrowing costs that different states pay at a given time or on those paid by a given state over time. First, there is limited trading in most tax-exempt bond issues. Second, tax-exempt bonds differ widely in their call provisions and in other detailed provisions. Finally, many tax-exempt bonds are sold in bundles, making it difficult to identify the price and yield to maturity of any single bond. For these reasons, it is not generally possible to obtain price quotes for a large and comparable sample of state general obligation bonds over any substantial period of time.

In the absence of market data on state government borrowing costs, we have turned to the Chubb Insurance Company “Relative Value

Survey.” This survey, which has been carried out every six months since 1973, asks approximately 25 traders of tax-exempt bonds to estimate the current yields on general obligation bonds from 40 states. (Ten states with little borrowing activity are excluded.) Chubb survey respondents are asked to estimate the current yield on “hypothetical” 20-year general obligation (GO) bonds. By asking about hypothetical bonds, the survey avoids problems related to call protection and other specific details associated with individual bonds traded in the marketplace. The Chubb survey collects information on the *relative* yields on the GO bonds issued by various states and by New Jersey, which serves as the comparison state of the study.

The Chubb survey data show differences in borrowing costs in two ways: across states at a given point in time and over time for a given pair of states. Figure 4 presents summary information on the differences in borrowing costs across states, as well as on relative borrowing costs in California and other states. The top line represents the highest yield and the bottom line represents the lowest yield at each date. A state with a higher required yield pays more in interest payments to issue a given amount of debt. The spread between the maximum and minimum yield was less than 30 basis points in 1997; as recently as 1988, however, the yield spread between the highest yield and lowest yield borrowers was more than 120 basis points.

The bold line in Figure 4 represents the relative yield on California’s general obligation bonds in comparison to similar bonds issued by New Jersey. The last line represents the average required yield for all other states (compared to New Jersey) in the Chubb survey. California’s borrowing costs follow the state’s economic fortunes; these costs were below the national average in the late 1980s, when the California

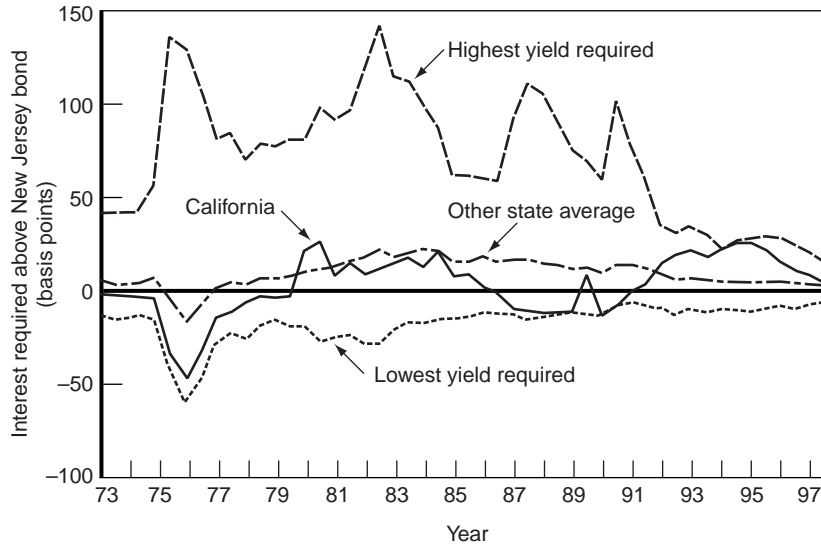


Figure 4—Relative Bond Yield Required on California State Debt

economy boomed, and rose above the national average during the 1990s. In fact, California’s borrowing costs were among the highest in the nation in the mid 1990s.

Figure 5 shows the relative yields on the general obligation bonds of California, Massachusetts, New York, and Texas between 1974 and 1997. The figure shows the historical volatility in each state’s bond yield. During the New York City fiscal crisis in 1976, Chubb survey respondents estimated that bonds issued by New York or Massachusetts would yield roughly 150 basis points (one and one-half percentage points) more than bonds issued by California or Texas. This yield spread declined throughout the 1980s and widened once again around 1990, another period of fiscal stress for Northeastern states. Recent economic

strength in all of the states shown in Figure 5 contributes to the relatively small yield disparities at the end of the data sample.

To help illustrate the relative differences in borrowing costs, consider the relative costs of issuing \$1 million of debt in California, New Jersey, and New York. In 1976, California would have paid \$4,700 dollars less than New Jersey and \$17,000 less than New York in interest costs for every \$1 million of debt. These differences reflect the effects of the New York City fiscal crisis of 1976. In July 1995, following the Orange County bankruptcy in December 1994, California would have paid \$2,570 more than New Jersey and only \$870 more than New York to issue the same amount of debt.

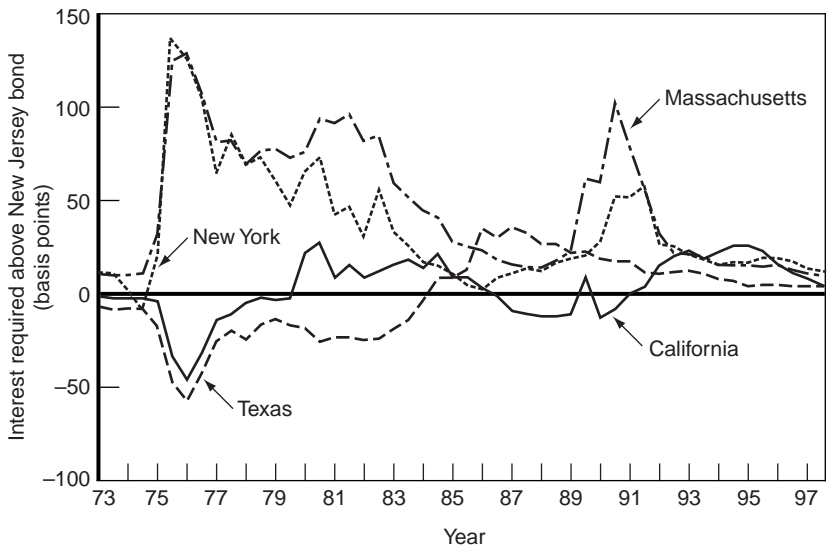


Figure 5—Relative Bond Yield Required for Various States' 20 Year General Obligation Bonds

To evaluate the accuracy of the estimates in the Chubb survey, we compared the reported relative yields from the survey with those of bonds for states that make up the Bond Buyer General Obligation Bond Index. The results are encouraging. The index measures the yields on GO bonds maturing in 20 years, and it is supposed to have a rating roughly equivalent to Moody's A1. Bonds issued by California and New York are among those included in the 20 bond index. From December 1, 1988, through August 13, 1992, California's average bond yield was 38 basis points lower than New York's. The average yield differential in the Chubb survey was 36.5 basis points.

4. Borrowing Costs, Economic Conditions, and Fiscal Rules

The substantial variation in tax-exempt bond yields across states and over time indicates that bond prices are sensitive to repayment prospects. This pattern suggests the viability of using data like those in the Chubb survey to determine how borrowing costs are affected by differences in state economic conditions as well as state fiscal rules. This chapter reports three sets of results along these lines. It begins with a discussion of how economic conditions and fiscal rules are correlated with the level of borrowing costs. It then examines how unexpected budget deficits and surpluses affect changes in borrowing costs and how the effects of budget surprises are amplified or cushioned by the presence or absence of various fiscal rules. The chapter closes with a discussion of the different ways bond markets react to fiscal news.

How Economic Conditions and Fiscal Rules Affect the Level of Borrowing Costs

Our first empirical strategy tests whether borrowing costs are higher, on average, in states with weaker economies or with less-stringent fiscal rules. Because bond yields are influenced by state economic circumstances and other factors that affect the perceived risk of state debt, we use multivariate regression techniques. Our measured effect of fiscal rules controls for several economic variables: outstanding debt level as a percentage of personal income, state unemployment rates, real state per capita income, state general fund revenues as a fraction of per capita income, and the top state marginal tax rate on interest income.¹ As a proxy for changes in political preferences among voters for state spending and state deficits, we also include an index of the liberalness of the congressional delegation of each state as calculated by Americans for Democratic Action. These controls are discussed at more length in Poterba and Rueben (1999).

Before analyzing the effect of fiscal rules on borrowing costs, we consider the effects of state economic conditions on these costs. The regression equation shown in Appendix Table B.1 indicates that a 1 percent increase in a state's unemployment rate raises the state's borrowing costs by five and one-half basis points. Three percent differences in unemployment rates across states are not uncommon, and the statistical results indicate that these economic differences are clearly an important factor in state borrowing costs. Because our regression equation also includes the level of state per capita income as an

¹Goldstein and Woglom (1992) investigate the role that economic variables play in setting the price of new municipal bonds.

explanatory variable, and because higher state per capita income is associated with lower borrowing costs, this analysis may understate the importance of economic conditions in affecting bond yields. In 1993, for example, the California unemployment rate was 9.4 percent. By 1998, the unemployment rate had declined to 5.9 percent. Our estimates suggest that the state's borrowing cost has declined by 20 basis points as a result of this improvement in economic conditions.

We now turn to the effects of our seven fiscal variables on state borrowing costs. Unlike economic conditions, fiscal rules are determined by legislators and voters, who may wish to consider the potential effects of new limits. Our econometric results provide clear support for an influence of fiscal rules on borrowing costs. Table 4 summarizes the key findings. The indicator variables for expenditure and revenue limits affect borrowing costs in different, but substantively important, ways. States with binding revenue limits pay, on average, 17.5 basis points more on their general obligation debt than states without such limits. By comparison, states with binding expenditure limits pay four basis points less than states without such limits. Although states with supermajority requirements also face higher costs, the estimate is too imprecise to permit strong conclusions. A limit on local revenues increases borrowing costs by about five basis points.

The findings on the link between borrowing costs, anti-deficit rules, and limits on a legislature's power to issue long-term debt are less conclusive. States with scores of 5 or lower on the ACIR index pay nine basis points more than states with higher index values, but we cannot reject the null hypothesis that anti-deficit rules do not affect borrowing costs. The coefficient on the indicator for limits on issuing debt is negative, indicating that debt limits on average reduce borrowing costs,

Table 4
Effect of Fiscal Institutions on State Borrowing Costs

Fiscal Institution	Estimated Coefficient	Current California Policy	Effect of Change in Fiscal Variable on Per Capita Interest Costs for California
Weak anti-deficit rules	8.99 (6.58)	“Strong” rules	\$1.26
Limit on legislature’s power to issue long-term debt	-4.72 (5.51)	Limit	-\$0.66
Binding expenditure limit	-3.65 (2.12)	Limit since 1979	-\$0.51
Binding revenue limit	17.45 (5.33)	No limit	\$2.45
Supermajority required to pass new taxes	3.15 (3.94)	Limit	\$0.44
Limit on local revenues (Proposition-13-type limits)	4.56 (2.54)	Limit since 1978	\$0.64
Supermajority required to pass local bonds	-4.04 (3.00)	2/3 majority required	-\$0.57

NOTES: Values in parentheses are standard errors. Estimates are from regression results presented in Appendix Table B.1. California had \$45.3 billion or \$1,405 per capita of outstanding state debt at the end of fiscal year 1997 according to the Census of Governments (1999). The entries in the last column assume that the borrowing cost of this entire debt stock changes by the number of basis points indicated in the second column.

but again, the figures do not permit precise conclusions. This result partly reflects the difficulty of making distinct estimates of the effect of many different fiscal rules, many of which are found together in various states. Poterba and Rueben (1999) estimate the effect of each fiscal rule separately and find significant effects of weak anti-deficit rules, expenditure limits, revenue limits, and supermajority taxes. If we

estimate separate effects for the last decade, we also find that supermajority rules are becoming increasingly important.

Table 4 also describes the implications of our results for a state with an outstanding debt level comparable to California's. The third column in Table 4 reports the change in per capita interest costs that would be associated with a change in fiscal rules. The two changes with the largest effects on per capita borrowing costs are the adoption of a tax limitation law and the lack of strong balanced budget rules. We estimate that if California had adopted a revenue limit at the state level, the state's borrowing rate would have increased by more than 17 basis points. If we also assume that this higher borrowing cost would apply to all state debt, then this difference would translate to an increase in state borrowing costs of \$2.45 per person, or an additional \$79 million.

Fiscal Shocks, Fiscal Rules, and the Bond Market Reaction to Fiscal News

Our second empirical strategy considers how a state's borrowing costs change in reaction to fiscal news. If fiscal rules are an important determinant of market interest rates, and if some rules are thought to reduce risk for bondholders, then such rules will have a larger effect on borrowing costs in some circumstances than in others. In particular, the economic effect of tight fiscal rules may be greatest when states are experiencing fiscal stress.

The last decade provides a valuable opportunity to study bond market reactions to fiscal stress. Although states' revenues have exceeded expectations recently, and some states have built up "rainy day funds" or enacted tax cuts, many states experienced sharp declines in their revenues during the recession of the early 1990s. This recession was especially

long lasting and deep in California. Poterba (1994) shows that in states with stringent anti-deficit rules, these fiscal events triggered corrective tax increases or expenditure reductions. In states with weaker anti-deficit rules, adjustments occurred more slowly. In California, the recession resulted in unexpected budget deficits in certain years. California's state government reacted to the recession and the resulting budget shortfall in various ways. These reactions included increasing fees and assessments (in higher education, for example) and reallocating property tax revenues from cities and counties to school districts. The latter action allowed the state government to lower the amount of general fund revenues spent on school finance.

We examine how unexpected deficits affected the bond market yields of different states. In particular, we are interested in how the tax-exempt bond market reacts to news concerning state surpluses and deficits, and how these reactions are affected by a state's fiscal rules. We study the *change* in the Chubb survey's yield spread between bonds issued by a given state and bonds issued by New Jersey over a 12 month period. After relating this change to the unexpected budget deficit or budget surplus in the intervening fiscal year, we allow the change in borrowing costs for a given fiscal shock to depend on the state's fiscal rules. Thus, we are estimating how much interest rates have changed over a given fiscal year as a function of the fiscal health of the state during that time period. In addition, we are allowing the different fiscal rules to affect this relationship. Appendix B presents the details of this regression specification.

Our analysis is based on annual measures of state fiscal shocks that are constructed from information collected by the National Association of State Budget Officers, which collects information on budgeted and

actual revenues and expenditures for each state. Each year's unexpected budget deficit is defined as the deficit that would have developed, given actual economic conditions and other factors, with the tax and expenditure system that was in effect at the beginning of the fiscal year, less the forecast deficit at the beginning of the fiscal year. Poterba (1994) describes this measure in greater detail.

Figure 6 graphs the unexpected deficit experienced by California relative to the average deficit experienced by other states. It also shows the largest deficit and the largest surplus of any state over the last decade. Unexpected deficits and surpluses are represented as a percentage of each state's general fund revenues. Throughout this period, there were always states with either surpluses or deficits. California's deficits have followed its economic health, with deficits during the recession and surpluses

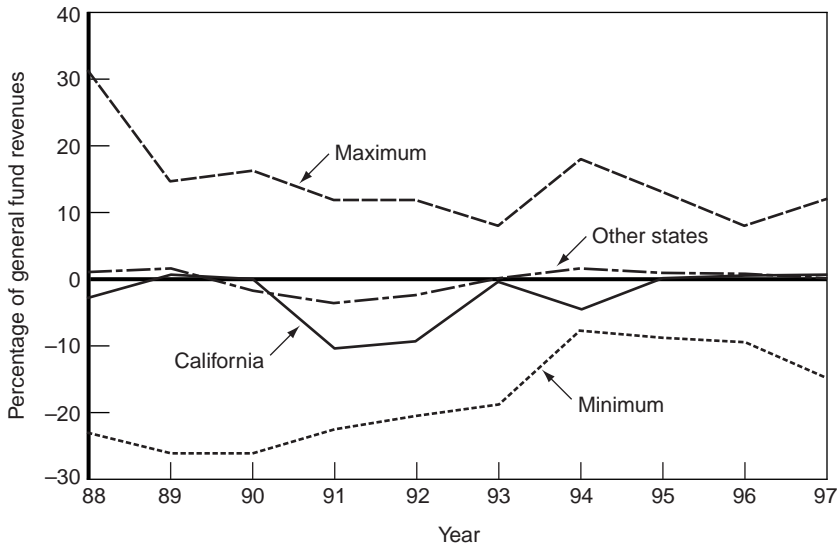


Figure 6—Unexpected State Deficits as a Percentage of General Revenue, 1988–1997

more recently. Its fiscal health, however, has lagged behind that of other states. While other states experienced deficits in 1990, California's budget was virtually balanced. In 1991 and 1992, however, unexpected deficits for California averaged nearly 10 percent of revenues, or approximately \$90 per person. In more recent years, state finances have grown stronger, with unexpected budget surpluses on average.

Table 5 presents information on the average unexpected deficit in selected states. It also presents data on the first and second halves of our data sample. In many states, the first half of the sample was a time of fiscal stress, with most states recovering during the second half. For California, the unexpected deficit averages 2.5 percent of revenue. This figure is somewhat larger than that in other large states. For New York,

Table 5
Average State Deficit Shock, Selected States, 1988–1997

State	Average Deficit Shock, 1988–1997	Average Deficit Shock, 1988–1992	Average Deficit Shock, 1993–1997
Alaska	3.67%	5.81	1.53
Arizona	0.63	-3.31	4.57
California	-2.52	-4.29	-0.76
Colorado	1.21	0.37	2.06
Illinois	-0.80	-2.42	0.82
Massachusetts	-4.68	-11.06	1.70
New Jersey	0.30	-1.16	1.76
New York	-1.84	-3.35	-0.34
Oregon	3.12	2.84	3.46
Pennsylvania	-0.19	-1.50	1.13
Texas	-1.23	-7.66	5.20
Utah	2.30	3.00	1.59
Washington	1.21	1.76	0.66
Average for all states	-0.13	-0.89	1.16

NOTES: Authors' tabulations are based on information reported by the National Association of State Budget Officers. Deficit shocks are reported as a share of state revenues. A negative number indicates a deficit and a positive number is a surplus. The last row is an equal weighted average for all states.

this average is 1.8 percent; for Texas, 1.2 percent; and for Illinois, 0.8 percent. Unlike California, other Pacific states averaged fiscal windfalls over this period. In Oregon, the average surplus was 3.2 percent of revenue. In Washington, the analogous surplus was 1.2 percent of revenue. Alaska had the largest fiscal windfalls, averaging 3.7 percent of revenue. Figure 7 presents deficit patterns for selected states. Notice that both New York and Texas experienced much more volatility in their budgets over this period.

Table 6 presents the main findings from our regression analysis of how bond yields react to unexpected deficits and how state fiscal institutions affect these reactions. It presents the change in interest rate required to issue new debt if a state has a given fiscal rule in place *and* experiences an unexpected \$100 per capita deficit. The results further

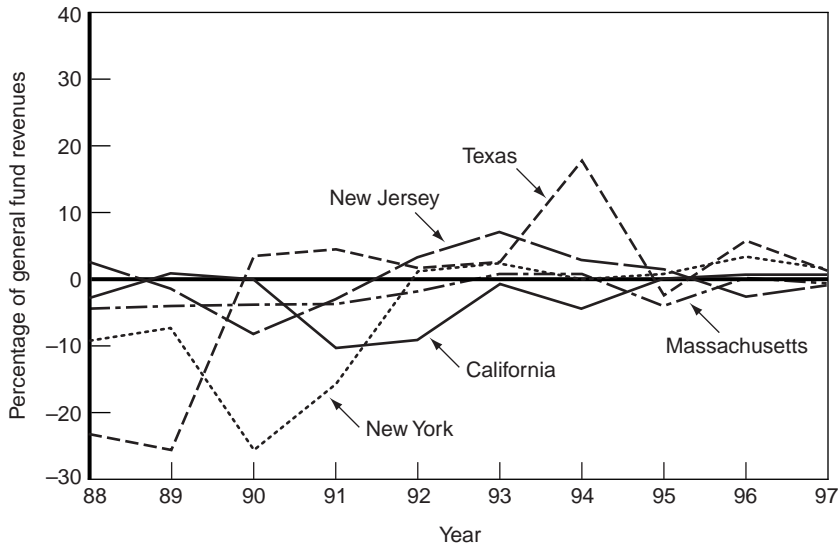


Figure 7—Unexpected State Deficits as a Percentage of General Revenue, Selected States, 1988–1997

Table 6
Effect of State Fiscal Rules on the Bond Market's Reaction to Unexpected Budget Deficits and Budget Surpluses

Fiscal Institution	Current California Policy	Effect of Fiscal Institution on Bond Market Reaction to a \$100 Per Capita Deficit Shock (Basis Points)
Weak anti-deficit rules	"Strong" rules	6.1
Limit on legislature's power to issue long-term debt	Limit	3.0
Binding expenditure limit	Limit since 1979	-0.0
Binding revenue limit	No limit	5.2
Supermajority required to pass new taxes	Limit since 1978	5.6
Limit on local revenues (Proposition-13-type limits)	Limit since 1978	-1.0
Supermajority required to pass local bonds	2/3 majority required	1.6
Predicted effect on bond costs of deficit given current California rules		9.2

NOTES: Estimates are based on regression coefficients reported in Table B.2. See the text for further details. The last row represents the additional cost of issuing new debt while experiencing a \$100 unexpected per capita deficit and having California's rules in place.

support our conclusion that fiscal institutions have real effects on state borrowing costs. In states with weak anti-deficit rules, required bond yields increased more in reaction to a given deficit than in states with stricter rules. A \$100 per capita increase in a state's budget deficit, about the size of the California unexpected deficits in 1991 and 1992, raises

borrowing costs by 6.1 basis points more in states with weak anti-deficit rules than in states with stricter rules.

The next entry in Table 6 shows the estimated effect of having a limit on issuing long-term debt and experiencing a deficit. Restricting a state's ability to issue debt appears to make a state's bond yield more responsive to changes in the state's fiscal health, although once again it is difficult to draw precise conclusions. This result partly reflects the difficulty of making distinct estimates of the effect of many different fiscal rules, many of which are found together in various states.

The next two rows report the effect of the interactions between expenditure limits, tax limits, and unexpected deficits. The results suggest that an unexpected increase in the state deficit has a much larger effect on bond yields in states with binding revenue limits than in those with binding expenditure limits. Although the effect of an expenditure limit is virtually zero, there is a positive and statistically significant effect of a revenue limit on the bond market reaction to an unexpected deficit. A \$100 per capita deficit shock raises borrowing costs by 5.2 basis points more in states with tax limitation laws than in states without such limits. Thus, California's debt costs would have been higher in the recession of the early 1990s if revenue limits had been in place instead of the Gann amendment. This would translate into an additional \$520,000 in interest costs per billion dollars of debt issued.

Supermajority rules that limit a state's ability to raise taxes also increase borrowing costs. A \$100 per capita deficit shock increases borrowing costs by 5.6 basis points. This result indicates that borrowing costs during the California recession of the early 1990s would have been higher than now; specifically, an additional billion dollars of debt would have cost an extra \$560,000.

The next two rows in Table 6 present our findings on the interaction between local fiscal limits and the effect of fiscal news on state borrowing costs. The effects associated with these variables are small. So, although there was a direct effect of local tax limits on the total cost of debt (see Table 4), it appears that local fiscal limits do not affect the relationship between fiscal news and bond costs. Finally, the last row of Table 6 presents the cumulative results of California's fiscal rules. Our estimates suggest that if California had issued new debt in 1992, when the state was running a deficit, California would have had to pay an additional 9.2 basis points to issue new debt. Thus, the interaction of California's deficit and its fiscal rules would have meant an additional \$920,000 in interest costs per billion dollars of debt. The results in Tables 6 and B.2 provide clear support for our earlier claim that bond market participants view revenue limits and expenditure limits quite differently. They also set the stage for our analysis in the next section of the sensitivity of state borrowing costs to news about state fiscal conditions.

Interstate Differences in Bond Market Reactions to Fiscal News

The analysis underlying our results in Table 6 assumes that different states exhibit different bond yield sensitivities to deficit shocks only because they have different fiscal rules. This is likely to be a substantial oversimplification. To study this issue, we related the change in bond yields to the unexpected state deficit for all states and then included an indicator for specific states. We discovered substantial differences across states in the effect of fiscal news on bond yields.

Table 7 reports the effect on bond yields of changes in fiscal health, as measured by unexpected deficit shocks, in specific states. We have

Table 7
Interstate Variability in Effect of Fiscal News on
Borrowing Costs (in Basis Points)

State	Effect of \$100 Per Capita Deficit Shock on Bond Yield for Large States
California	14.1 (3.6)
Texas	-2.2 (1.9)
New York	14.1 (4.7)
Florida	-4.2 (7.8)
Pennsylvania	18.3 (6.9)
Illinois	2.1 (6.5)
Ohio	-3.0 (5.6)
Michigan	0.7 (5.7)
Georgia	3.6 (5.1)
Massachusetts	8.5 (1.2)
Connecticut	3.0 (1.3)

NOTES: Estimates are based on regressions relating the change in bond yields from one year to the next to the unexpected fiscal deficit reported within the year. Larger deficits are reported as positive values. States are included in the sample if they are large in population terms or have a large outstanding stock of debt. Standard errors are reported in parentheses

chosen the largest states, as well as those states with the largest amount of outstanding debt, because these states are most responsive to such changes. California is the most populous state and also had the second largest amount of outstanding debt in 1995.

California's borrowing costs are more responsive to unexpected budget deficits than are the borrowing costs of most other large states. Given the size of the state's municipal bond market and the Orange County bankruptcy at the end of 1994, it is not surprising that California is more responsive to fiscal shocks. A \$100 per capita unexpected increase in California's budget deficit is predicted to raise borrowing costs by 14 basis points. The only other large states with comparable estimates are New York (14 basis points) and Pennsylvania (18 basis points). Our earlier analysis in Table 6 suggests that if municipal bond markets were only responding to fiscal rules in place, California should have to pay nine basis points more during periods of fiscal stress. We investigated whether the apparently large "California effect" could be explained by differences in fiscal rules and found that these rules seem to explain a little less than two-thirds of the California effect. We modified the regression equation that generated the estimates in Table 6 to allow for a separate California effect. The resulting estimates, which are shown in the second column of Table B.2, confirm that the California effect is not simply the result of the state's fiscal rules. The effects of the fiscal variable interactions are not substantively affected by allowing for a California interaction.

These results indicate that the bond market is particularly sensitive to deficit news about California and other large states. One possible explanation is that bond market participants pay closer attention to fiscal developments in states with relatively large quantities of outstanding tax-

exempt debt than to similar developments in states with limited debt markets. This explanation implies that deficit news has a larger effect in these states because it is more visible and it affects more investors.

A second possibility is that the political circumstances in California and several other large states make it more difficult for the states to return to fiscal balance in the years immediately following an unexpected deficit. Unexpected deficits would therefore have a larger effect in these states because they provide more information about the future of state fiscal conditions. Both of these explanations are likely to contribute to our empirical findings.

5. Conclusions and Implications

This study finds that there is a clear link between state economic circumstances and the interest rate at which a state borrows when it sells general obligation debt. Because lenders expect states with more robust economies to have less difficulty servicing their debt, states with lower unemployment rates face lower interest rates in the capital market. Changes in state economic conditions explain some of the variation over time in the relative borrowing costs of different states.

State fiscal institutions, such as California's Gann amendment or Proposition 218, also affect borrowing costs. Whether and how the state's constitution limits the discretion of policymakers to run fiscal deficits, and whether the state has a tax limit or an expenditure limit in place, are strongly correlated with borrowing costs. These findings suggest that policymakers need to recognize that changes in fiscal policies, and in the budget process more generally, affect these costs. In California, policymakers and citizen groups have historically paid little

attention to the effects new fiscal restrictions can have on borrowing costs. Nor has the topic received much research attention. Rosenblum (1999) remarks that one effect of Proposition 218 and its predecessors is that California's bond rating has not returned to AAA, the highest possible level. Davey (1995) describes how Ohio legislators and others who opposed a revenue limit argued that adopting it might raise the state's borrowing cost.

Beyond the finding that fiscal rules matter for borrowing costs, two more specific conclusions emerge from our study. First, the bond market reacts very differently to revenue limits and expenditure limits. Expenditure limits have small effects and probably reduce borrowing costs, but states with tax limitation laws face substantially higher borrowing costs than other states. States that require legislative supermajorities to pass new taxes also face higher borrowing costs. Our estimates suggest that if California had enacted a tax limitation law for state revenues instead of an expenditure limit, the state's borrowing costs would be about 20 basis points higher than they currently are. That difference translates into approximately \$3 of additional annual state expenditures per capita, or \$95.6 million, if we assume that the level of state indebtedness was not affected by such policies.

Second, there are substantial differences across states in the sensitivity of general obligation bond yields to fiscal news. The borrowing costs of states with relatively lax fiscal rules are more sensitive to budget news than are the borrowing costs of states with tighter fiscal rules. Although its fiscal rules are relatively tight, California is among the group of states with the highest responsiveness. It may be that municipal bond analysts and other credit market participants pay more attention to fiscal news in large states with many outstanding bonds than to

comparable news in smaller states. Our results suggest that accurate budget projections are more important in California than in many other states, because unfavorable budget news has a substantial and adverse effect on the state's borrowing cost. The need for accurate budgeting is especially important over the next few years as California increasingly turns to the municipal bond market to pay for new infrastructure spending.

Appendix A

State Fiscal Institutions

State	Balanced Budget	Debt Restrict	State Spending Limit	State Revenue Limit	Supermajority Tax Year Passed	Vote Required	Local Tax Limit	Local Debt Vote
Alabama	10	Yes						Maj
Alaska	6	Yes	1982				1972	Maj
Arizona	10	Yes	1978		1992	2/3	1980	Maj
Arkansas	9	Yes*			1934	3/4	1981	Maj
California	6	Yes*	1979		1978	2/3	1978	2/3
Colorado	10	No	1992 ^a	1992	1992	2/3	1992	Maj
Connecticut	5	No	1991					
Delaware	10	No			1980	3/5		
Florida	10	Yes*		1994	1971	3/5	1995	Maj
Georgia	10	Yes						Maj
Hawaii	10	Yes	1978					
Idaho	10	Yes	1980				1992	3/5
Illinois	4	No					1991	Maj
Indiana	10	Yes					1973	
Iowa	10	Yes					1978	3/5
Kansas	10	Yes*					1970	Maj
Kentucky	10	Yes*					1979	Maj
Louisiana	4	No	1993	1991 ^b	1966	2/3	1978	Maj
Maine	9	Yes*						Maj
Maryland	6	No						
Massachusetts	3	No		1986			1980	

State	Balanced Budget	Debt Restrict	State Spending Limit	State Revenue Limit	Supermajority Year Passed	Tax Vote Required	Local Tax Limit	Local Debt Vote
Michigan	6	Yes*		1978			1978	Maj
Minnesota	8	Yes						Maj
Mississippi	9	Yes			1970	3/5		Maj
Missouri	10	Yes*	1980	1996 ^c	1996	2/3	1980	2/3
Montana	10	No	1981		1998	3/4	1987	Maj
Nebraska	10	Yes					1990	Maj
Nevada	4	Yes	1994 ^d		1996	2/3	1983	Maj
New Hamp.	2	No						Maj
New Jersey	10	Yes*	1990 ^e					
New Mexico	10	Yes					1979	Maj
New York	3	Yes*						Maj
North Carolina	10	No	1991					Maj
North Dakota	8	Yes					1981	2/3
Ohio	10	Yes					1976	Maj
Oklahoma	10	No	1985		1992	3/4		3/5
Oregon	8	Yes*	1979		1996	3/5	1991	Maj
Pennsylvania	6	Yes*						Maj
Rhode Island	10	Yes*	1992 ^f				1985	
South Carolina	10	Yes*	1980					Maj
South Dakota	10	Yes			1996	2/3		Maj
Tennessee	10	No	1978 ^g					Maj
Texas	8	Yes	1978 ^g				1982	Maj
Utah	10	Yes	1989					Maj
Vermont	0	Yes						
Virginia	8	Yes						Maj
Washington	8	Yes	1993	1979	1993	2/3	1971	3/5
West Virginia	10	Yes					1990	3/5
Wisconsin	6	Yes						Maj
Wyoming	8	Yes						Maj

NOTES: Data on budget stringency rules and state and local debt restrictions are from ACIR (1987a) and Rafool (1997). Data on revenue and expenditure limits are from Rueben (1996). Data on local limits are from ACIR (1997). * denotes states that require a popular vote to approve debt issue. In states with nonbinding limits, limits can be overridden by simple legislative majorities.

^aColorado passed a nonbinding spending limit in 1977.

^bLouisiana adopted a nonbinding revenue limit in 1979 and a binding one in 1991.

^cMissouri adopted a nonbinding revenue limit in 1980.

^dNevada passed a nonbinding spending limit in 1979.

^eNew Jersey also passed a spending limit in 1976 that expired in 1983.

^fRhode Island adopted a nonbinding limit in 1977, but it was replaced with a binding limit in 1992.

^gTennessee and Texas have limits that are not binding.

Appendix B

Detailed Description of Regression Results

The empirical findings summarized in the text are based on two sets of regression equations. The first analyzes the relationship between the level of general obligation bond yields and the structure of state fiscal rules; the second relates the change in the bond yield for a state to the unexpected budget deficit, or surplus, in a given year. Poterba and Rueben (1999, 1998) investigate each of these statistical relationships and present a range of different regression models that are broadly supportive of the general findings reported here. In this appendix, we describe the regression equations that underlie our core findings.

Fiscal Rules and the Level of General Obligation Yields

The basic regression model that we estimate to test for a relationship between the level of borrowing costs, and the structure of state fiscal institutions, is

$$R_{it} - R_{jt} = (X_{it} - X_{jt}) * \alpha + (Z_{it} - Z_{jt}) * \beta + \theta_t + \kappa_i + (\varepsilon_{it} - \varepsilon_{jt}) \quad (1)$$

where R_{it} denotes the nominal interest rate on bonds issued by state i at time t , X_{it} denotes the set of state-specific economic conditions that may affect borrowing costs, and Z_{it} represents the set of state fiscal institutions that we are interested in studying. We estimate models for the cross-state differences in yields because the Chubb survey data are collected in this way. To make the explanatory variables consistent with the dependent variables, they must be computed as differences relative to the corresponding values for New Jersey.

The variables that we include as control variables for borrowing costs are state outstanding general obligation debt per capita, the state unemployment rate, the level of real per capita income in the state, state general fund revenues as a fraction of per capita income, and the top state marginal tax rate on interest income. The first three variables are drawn from publications of the Bureau of Labor Statistics, the National Income and Product Accounts, and the Census of Governments. The marginal tax rate variable was computed using the State Tax Module of the National Bureau of Economic Research TAXSIM program and augmented through downloaded information on state income tax forms.

We also include variables that proxy for the political climate in the state, on the grounds that such variables may provide information on the future evolution of state deficits and therefore on the creditworthiness of

the state. Our principal variable of this type is the Americans for Democratic Action (ADA) score for the state's senate delegation; this should provide a general indication of the political ideology of the state.

We include seven variables (Z_{it}) to measure the fiscal institutions in each state. The first is an indicator variable for states with weak anti-deficit rules, defined as a score of 5 or less on the ACIR index of fiscal stringency. The second is an indicator variable for legislative or constitutional limits on the legislature's power to issue long-term debt. The third and fourth variables are indicator variables for binding tax limits, and binding expenditure limits, respectively. The fifth variable indicates whether a supermajority is required to enact a new revenue source. The sixth and seventh variables measure restrictions on local government's ability to raise revenues or to issue debt.

Previous studies have related bond yields as reported in the Chubb survey to various state fiscal rules, although none of the previous studies have considered as broad a range of fiscal institutions, or as long a time span of bond yields, as the analysis reported here. Eichengreen (1992) and Goldstein and Woglom (1992) focus on single cross-sections of bond yields. Even with much smaller datasets than the panel dataset that underlies our study, they present evidence that borrowing costs are higher for states with weak anti-deficit fiscal rules. Bayoumi, Goldstein, and Woglom (1995) is most similar to our analysis. It is based on panel data for a period that ends before the state fiscal crises of the early 1990s, and it develops a careful model of how the outstanding stock of state debt affects borrowing costs. That study is also limited to anti-deficit rules, and it does not consider the effect of tax or expenditure limits. Our results are consistent with theirs.

We estimate regression equation (1) for the 40 states covered in the Chubb survey over the 1973–1995 period. The dependent variable is measured in basis points, which permits easy interpretation of the coefficients on the indicator variables for different fiscal rules. The coefficient estimates are reported in Table B.1.

Unexpected Fiscal News and the Reaction of Bond Market Yields

In our second specification, we compute the fiscal “surprise” that bond market participants learned about between two Chubb surveys 12 months apart. We label this variable DEFSHOCK, for deficit shock, but it can take positive or negative values depending on whether the fiscal news is unfavorable (higher deficit) or favorable (lower deficit).

DEFSHOCK is measured in dollars, but we scale this variable to per capita terms and deflate to constant dollars for our regression analysis.

We then compute the difference between the reported yields on a given state’s bonds in the two surveys. Given the way the survey data are collected, this is actually a “difference in differences.” Since each survey reports the difference between the yield on a state’s bonds and the yield on New Jersey’s bonds, the difference between responses in two surveys is the change in the yield on a state’s bonds, minus the change in the yield on New Jersey’s bonds. The dependent variable is therefore $\Delta(R_{it} - R_{jt})$.

DEFSHOCK is differenced from New Jersey’s unexpected per capita deficit. In addition to DEFSHOCK, we include the change in the state’s unemployment rate between the two Chubb surveys relative to the change in New Jersey’s unemployment rate, and the change in each state’s per capita outstanding debt relative to the change in New Jersey’s

Table B.1
Regression Estimates of How Fiscal Institutions Affect
State Borrowing Costs, 1973–1995

Explanatory Variable	1973– 1995 Sample
Outstanding debt to personal income	1.93 (1.20)
Unemployment rate	5.60 (0.57)
Per capita income	1.21 (0.52)
State revenue/personal income	–0.23 (0.12)
Top marginal tax rate on interest income	0.47 (0.38)
ADA score	4.41 (4.96)
Weak anti-deficit rules	8.99 (6.58)
Limit on legislature’s power to issue long-term debt	–4.72 (5.51)
Binding expenditure limit	–3.65 (2.12)
Binding revenue limit	17.45 (5.33)
Supermajority required to pass new taxes	3.15 (3.94)
Limit on local revenues (Proposition-13-type limits)	4.56 (2.54)
Supermajority required to pass local bonds	–4.04 (3.00)
Adjusted R2	0.42

NOTE: Values in parentheses are standard errors.

debt level. These variables should capture the fact that state economic conditions are an important determinant of general obligation bond yields. Our principal hypothesis is that the effect of unexpected fiscal news on bond yields is mediated by the structure of the state's fiscal institutions. In addition to the actual DEFSHOCK variable, we therefore include interactions between DEFSHOCK and the seven fiscal institutions described above. The coefficients on the interaction terms measure the effect of a state's fiscal institution on the way its borrowing costs respond to fiscal news, normalized by how similar fiscal rules in New Jersey affect the response of that state's bond yield to similar news.

The actual estimating equation is therefore:

$$\begin{aligned} \Delta(R_{it} - R_{jt}) = & (\Delta\text{DEBTSTOCK}_{it} - \Delta\text{DEBTSTOCK}_{jt}) * \alpha_1 \\ & + (\Delta\text{UNEMP}_{it} - \Delta\text{UNEMP}_{jt}) * \alpha_2 + (\text{DEFSHOCK}_{it} \\ & - \text{DEFSHOCK}_{jt}) * \alpha_3 + (\text{DEFSHOCK}_{it} * Z_{it} \\ & - \text{DEFSHOCK}_{jt} * Z_{jt}) * \alpha_4 + \alpha_5 + \Delta\varepsilon_{it} - \Delta\varepsilon_{jt} \end{aligned} \quad (2)$$

In this case, α_4 is a vector consisting of seven distinct coefficients on the seven fiscal institutions. Conventional F-tests allow us to reject the null hypothesis that these coefficients are jointly zero at very high confidence levels.

Equation (2) is estimated on annual data for 1988–1997. Although we have nearly 15 years of prior data on the dependent variable, we cannot construct the DEFSHOCK variable before 1988, because that is when the National Association of State Budget Officers began collecting the full range of fiscal data that our DEFSHOCK calculations require. Table B.2 reports our estimates of equation (2).

Table B.2
Regression Estimates of How Fiscal Institutions Affect Bond
Market Reaction to State Fiscal News, 1988–1997

Explanatory Variable	Estimated Coefficients	
Change in outstanding debt	0.0024 (0.0014)	0.0022 (0.0014)
Change in unemployment rate	1.4870 (0.3057)	1.4754 (0.3148)
DEFSHOCK	-0.0210 (0.0178)	-0.0096 (0.0168)
DEFSHOCK*(weak anti-deficit rules)	0.0608 (0.0214)	0.0521 (0.0224)
DEFSHOCK*(limit on legislature's power to issue long-term debt)	0.0299 (0.0186)	0.0215 (0.0176)
DEFSHOCK*(binding expenditure limit)	-0.0006 (0.0062)	-0.0033 (0.0062)
DEFSHOCK*(binding revenue limit)	0.0518 (0.0222)	0.0501 (0.0226)
DEFSHOCK* (supermajority required to pass new taxes)	0.0557 (0.0220)	0.0357 (0.0224)
DEFSHOCK* (limit on local revenues) (Proposition-13-type limits)	-0.0101 (0.0076)	-0.0095 (0.0079)
DEFSHOCK* (supermajority required to pass local bonds)	0.0161 (0.0193)	-0.0052 (0.0123)
DEFSHOCK* (California)	—	0.1165 (0.0276)
Adjusted R2	0.2963	0.3089

NOTES: Values in parentheses are standard errors. All equations are estimated for 1988–1997 using data for the 40 states included in the Chubb survey. Estimates are given for a state response to a per capita deficit. Unexpected deficits are expressed as positive values in the regression results.

Unlike equation (1), which resembles the estimating equations in several previous studies, only one study has explored how bond yields change in reaction to fiscal developments. Lowry and Alt (1997) find that actual deficits have a larger positive effect on borrowing costs when states have weaker anti-deficit rules. Our findings based on fiscal “news” rather than the level of fiscal variables are consistent with this result.

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