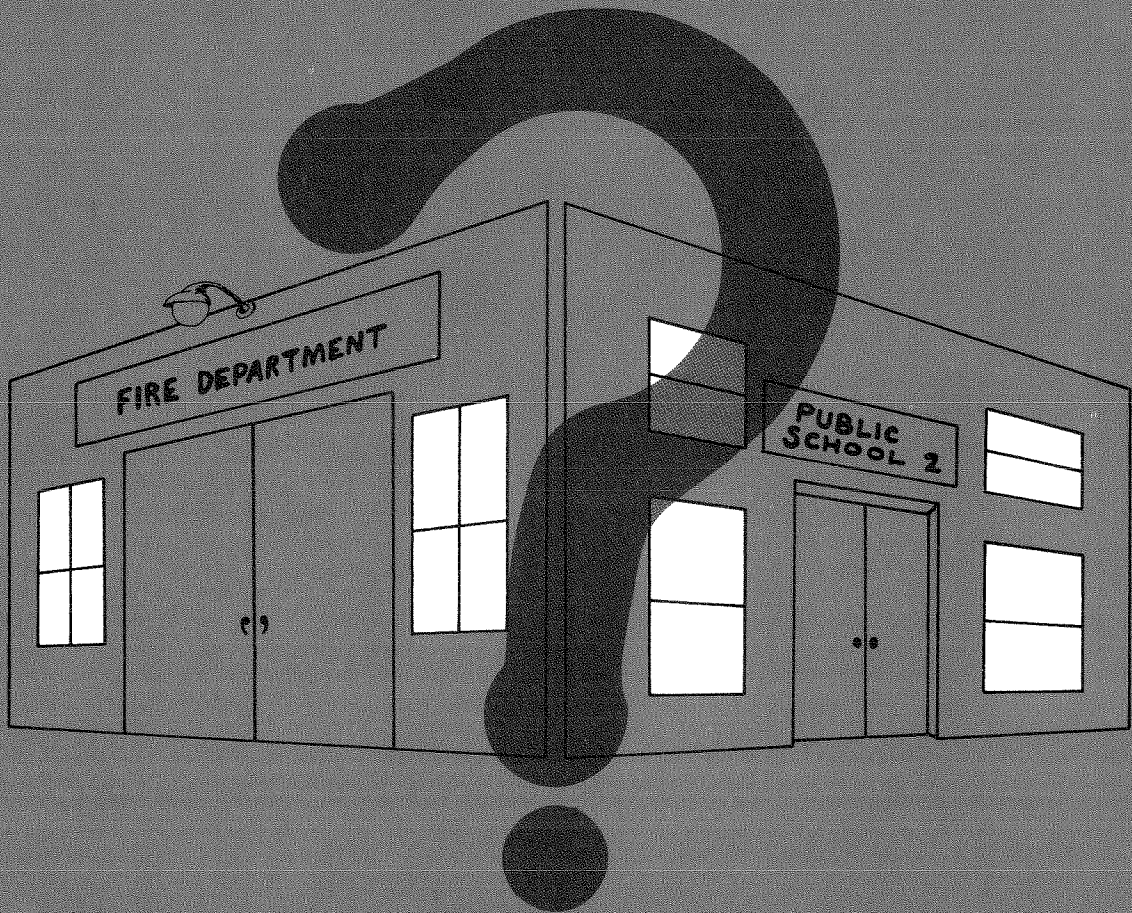# FEDERAL RESERVE BANK OF SAN FRANCISCO

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The Effect of Proposition 13 On California Municipal Debt

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California is at the forefront of a conservative wave throughout the country to limit the size of government. Although California is somewhat unique in that its voters' efforts so far have been directed mostly at reducing property taxes, nationwide grassroots efforts to restrict government spending and taxes have since gained momentum in at least half of the 50 states.

Like many states, California has an initiative process by which voters can petition to place constitutional amendments directly on the state ballot. When the Assembly failed to enact property tax relief in 1977, a number of tax protestors began to circulate tax-limitation petitions, with most of them uniting behind a proposal developed by Howard Jarvis and Paul Gann which called for a dramatic decrease in (and a permanent restriction on) property taxes. By December 29, 1977, the Jarvis-Gann Amendment had gained the needed signatures to qualify as Proposition 13 on the June 1978 state-primary ballot. On June 6, the measure passed by an overwhelming 2-to-1 majority.

Proposition 13 restricts revenue sources, and hence, decreases the expected future income stream of local governments and special districts in California. It also restricts increases in the state's taxing powers, thereby blocking large increases in state taxes as an alternative source of government revenue. Since such restrictions should affect the ability of municipalities to service and retire debt, Proposition 13's passage may adversely affect both the cost of new issues and the value of existing California municipal debt.

Proposition 13 and similar measures that are now sweeping the country may have an important impact on the cost and value of municipal debt. Hence, they have important implications for present and potential holders of municipal debt, for policymakers at all levels of government, and for voters who wish to consider possible side effects of alternative ways to reduce the size of government. This article shows that Proposition 13 affects particular kinds of municipal debt in different ways because of the specific wording of the amendment. For example, debt secured solely by property-tax revenues is severely affected, while other kinds of debt backed by general tax revenues are affected less or not at all. It is concluded, therefore, that restrictions on the size of government need not have dramatic effects on the cost or value of government debt. However, if such restrictions are applied only to certain sources of revenue, they may have large and unintended side effects.

This study examines what has happened to new-issue interest costs for different categories of California municipal bonds since Proposition 13 was placed on the ballot at the end of 1977. Data rarely exist for secondary-market yields because of the thinness of the market, so the interest cost for new issues is used here to represent the yield on existing debt. In this manner, the study also provides estimates of the effects of Proposition 13 on the value of outstanding debt. In Section I, Proposition 13 is described and hypotheses are presented concerning its effects on each category of bond. In Section II an econometric model is developed to explain statistically the interest cost of new issues. The model is estimated for each category of bond, and an estimate is obtained for the overall effect of Proposition 13 as well as for the individual effects of changes in bond ratings and other explanatory factors. In Section III, inferences are drawn regarding the adverse effects on the value of outstanding California municipal debt. In the final section the summary and conclusions are presented.

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I. Probable Effects of Proposition 13 on California Municipal Debt

Factors that affect default risk vary widely for municipal bonds, depending principally on each bond's security—that is, the legal and economic constraints affecting the cash flow available for debt service and retirement. At one extreme, a pure revenue bond is secured solely by the revenue generated from the financed project, such as a parking lot. For such a bond, the cash flow of the project, and hence the security of the bond, is completely independent of the cash flow of the issuing municipality. Thus, the risk of the bond depends solely on the risk of the project, and not on the general condition of the government. At the other extreme, a general-obligation bond is secured by the general cash flow of the issuing government, and thus is not tied to a specific project or revenue source. Thus, risk of a general-obligation bond depends on the solvency of the issuing government.

There are many variations of municipal bonds, as we see below. In analyzing the risk of a particular bond, one looks first at the legal provisions for the bond's repayment and second at the economic prospects involved. Since Proposition 13 reduces revenues from property taxes and generally attempts to restrict tax increases at the state-and-local level, it should affect debt whose security is limited principally to property-tax revenue. It might also affect debt whose security depends on the overall cash flow of the state and local governments. For these reasons, we need to consider the legal provisions of Proposition 13, and then its possible consequences for various kinds of municipal debt.[2]

Proposition 13

Proposition 13 rolls back current taxes—both tax rates and assessed values—on *all* property to 1 percent of 1975-76 market value. (State budget analysts originally estimated that this would mean an initial $7-billion, or 57-percent, reduction in California property taxes—one-third attributable to owner-occupied homes and the rest to rental, non-residential, and personal properties, as well as inventories.)[3] Tax rates must then be held at the 1-percent ceiling, while assessed market values may rise no more than the annual percentage increase in the consumer price index or 2 percent per year, whichever is less.

However, properties sold, traded, or newly constructed after 1975-76 may be reassessed at current market values.

Proposition 13 also attempts to prevent other taxes from rising to offset the lost property-tax revenues. First, it requires that State-tax increases be passed by a two-thirds vote of all members (not just those voting) of both houses of the legislature. Second, it states that property taxes cannot be raised beyond the above limits (even by voter approval), and that other local tax increases must gain the approval of two-thirds of all "qualified electors"[4] in the affected municipality.

Proposition 13 specifically exempts tax increases needed to service *prior voter-approved debt*: "The limitation...shall not apply to ad valorem taxes or special assessments to pay interest and redemption charges on any indebtedness approved by the voters prior to the time this section becomes effective." For this reason, payments on debt approved by voters prior to the effective date of Proposition 13 are not subject to the specific tax constraints placed on property. But payments on all new debt approved after that date, and on all prior debt not voter-approved, would be constrained by the tax-limitation provisions of the amendment.

From its first introduction until the June 6 election, Proposition 13's effects on the cost of municipal debt were a function of the probability of passage. Throughout much of the pre-election period, poll results indicated probable passage. However, the landslide victory was not apparent

Table 1
Poll Results Through the Pre-Election Period

Proposition 13	Feb 11-23	Mar 27-Apr 3	May 1-8	May 29-31	June 6 Election Results
Yes	20%	27%	42%	57%	65%
No	10	25	39	34	35
Undecided/ Unaware	70	48	19	9	--

Sources: Field Institute surveys as reported in the San Francisco *Chronicle,* June 2, 1978. Election results as reported in the *California Journal,* July 1978.

until the last several weeks before the election, when voters rallied behind the strong message that Proposition 13 carried to all levels of government (Table 1).

Effects on types of debt[5]

Proposition 13's effects on the municipal-bond market depend very much on the security of each type of bond, as is seen below. In this paper, State bonds are described because of their importance, but they are omitted from the empirical tests because only a few such bonds were issued during the sample period.[6] To aid the reader, Table 2 provides a summary of the hypothesized effects for the various types of bonds.

General-obligation bonds (state and local)

G.O. Bonds, also known as "full faith and

Table 2
Hypothesized Effects of
Proposition 13 on
California Municipal Debt

State General Obligations	Aaa rating would be jeopardized at least in transition period. Longer-term effect depends on whether expenditures are reduced sufficiently.
Local General Obligations	Existing[1] debt not affected because of its exemption from revenue ceiling. New debt adversely affected unless authorized under a non-ad-valorem special tax.
State and Local Revenue	No effect on new or existing "pure" revenue bonds, which constitute the majority of revenue bonds. Small negative effect on hybrid bonds with tax revenue as backup security.
Local Tax Allocation	Severe negative impact on new and existing debt due to restrictions on property tax assessments and rates.
Local Lease-Purchase	Negative effect on non-voter approved existing debt and on new debt because of local government's increased difficulty in meeting lease payments. Extent of effect highly variable depending on whether facility is "essential" and whether it could generate sufficient revenue to sustain debt service if local government failed to meet lease payments.

[1] "Existing" debt comprises bonds that were approved prior to July 1, 1978, while "new" debt comprises issues approved July 1 and thereafter.

credit" or "unlimited tax" bonds, are normally issued by state or local governments only with prior voter approval. Debt service for G.O.'s may be paid out of any available revenue source, with the issuing authority pledging its full faith and credit to meet such payments.

Despite the emergence of Proposition 13 and the reduction of the large state-budget surplus, the State of California throughout 1978 was rated AAA by Standard and Poor's (S&P) and Aaa by Moody's, owing largely to the state government's fiscal conservatism and a rapidly growing tax base. Proposition 13 conceivably might have jeopardized the state's strong credit rating, for several reasons: (1) a drawdown of the state surplus and an increase in state expenditures was required to assist local governments; (2) increases in state tax rates henceforth will require two-thirds favorable vote of both Houses of the legislature; (3) state debt might be increased to finance public-works projects that otherwise would have been financed by local G.O. issues, and (4) analysts may have believed that Proposition 13 would have a depressing effect on the state economy.

Over the near term, it is possible that Proposition 13 would have no adverse effect on the safety of state G.O. bonds, despite the expenses incurred as the state strives to help out local governments. Although a two-thirds vote of the legislature would permit additional taxes to pay off debt, such use of revenues would represent one of many demands for funds. Over the longer term, the effect on state debt would depend largely on how the state elects to run its fiscal operation in response to local-government needs on the one hand and to voter pressures for fiscal conservatism on the other.

Because Proposition 13 singles out ad valorem (property) taxes, local G.O. debt would be affected somewhat differently from state G.O. debt. For "existing" voter-approved bonds (those which received voter approval prior to July 1, 1978, regardless of when they were actually issued), debt service would be exempted from the 1-percent tax-rate ceiling imposed on ad valorem taxes. Thus, property-tax overrides could be employed without special voter approval to meet the payments on "existing" voter-approved debt.

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However, "new" G.O. debt (that approved by voters July 1 or thereafter) would have to be paid from available revenues as constrained by Proposition 13. (Any extra tax revenues would have to be passed by a two-thirds vote of "qualified electors," and even then, new taxes could not be levied on property.) As a result of these specific provisions, there should be no significant effect on "existing" local G.O. bonds, but there should be some adverse effect on "new" local G.O. debt.[7]

Revenue bonds (state and local)

Revenue bonds are normally issued to finance revenue-producing facilities, and user fees are generally pledged to pay the debt service. They may be issued by municipalities or special districts (such as sewer or hospital districts). The repayment of "pure" revenue bonds does not depend on the operating budget of the municipality.[8] Thus, Proposition 13 would presumably have no effect on either state or local "pure" revenue bonds.

In some cases, municipalities pledge general (property) tax revenues as backup security in the event that user fees prove inadequate to cover the debt service. In these cases, Proposition 13 would jeopardize the quality of the backup security. Furthermore, revenue bonds are now sometimes used to finance the cost of self-insurance plans such as workers'-compensation and medical-malpractice insurance. Not being tied to a revenue-producing facility, these bonds must be secured by the available revenues of the municipality involved. Despite such exceptions, revenue bonds normally are secured by the revenues of the facility rather than by property taxes or general tax revenues of the municipality. Thus, for revenue bonds in the aggregate, Proposition 13 should have little or no effect on interest cost.

Tax-allocation bonds

These "limited tax" bonds are used extensively to finance redevelopment projects throughout California, but are not in wide use outside the State. They are financed and secured primarily by the "tax increment" revenues on a specific redevelopment project.[9] Under tax-increment financing, property values prior to the project are "fixed" in the year during which the project is approved. Property-tax revenues generated by the fixed base-year assessed value are allocated to existing tax bodies such as a city or county. Then, additional tax revenues from the increase in assessed value over the fixed base-year level—the tax-increment revenues—are allocated to the redevelopment agency. They are used to pay off debt of the agency and to provide internal funds for further project expansion. Redevelopment agencies have commonly used long-term debt to finance improvements that are sold at less than cost. The tax-increment revenues are then used to pay off the debt, and in this manner, they indirectly provide for a subsidy on improvements.

Because it lowers assessed values and property-tax rates, Proposition 13 seriously affects the revenue base for tax-allocation bonds.[10] And because of the heavy debt service of many redevelopment districts,[11] such a severe restriction on revenue could easily result in default in many cases. Increased default risk should result in an increase in interest cost for new issues and a decline in the market value of outstanding bonds.

Lease-purchase bonds

These bonds, also called lease-revenue or lease-rental bonds, are issued by a public, private or nonprofit leaseback corporation which uses the proceeds to construct some facility that is then leased to a municipal government. The municipal government (lessee) makes rental payments to the corporation (lessor) sufficient to pay debt service on the bonds and operating expenses of the corporation. In general, such obligations are not voter approved, and the municipality normally promises to provide for rental payments out of its operating budget.

Lease-purchase bonds are sometimes revenue-supported to the extent that the facility's revenues provide for the debt service. As with revenue bonds, Proposition 13's impact depends largely on the ability of the project, such as a parking lot, to be self-supporting in the event that the municipality reneges on its lease contract. However, many lease-purchase bonds are supported solely by lease payments from the municipality's operating budget. These will be negatively affected to the degree that the munici-

pality's financial condition deteriorates and taxpayers regard the facility to be a non-essential service. Thus, the safety of lease-purchase bonds might decline somewhat under Proposition 13, because the municipalities might lack flexibility to meet payments within their budgets and taxpayers might regard continued lease payments as a non-essential expenditure.

II. Empirical Evidence

The previous discussion suggests that Proposition 13 should have affected the interest cost of some types of new issues as the election results grew more certain. The effects can be measured by an examination of data on new issues of local municipal debt in California sold between January 1, 1977, and October 3, 1978[12]—and specifically by an analysis of the average yield spread between new California issues and Moody's Aaa new-issue index. The time period is divided into three subperiods: all of 1977 (pre-Proposition 13); January 1-June 6, 1978 (the period of Proposition 13's increasingly likely victory); and June 7-October 3, 1978 (post-Proposition 13).

Over the first half of 1978, and possibly beginning as early as December, 1977, interest spreads clearly increased for tax-allocation, lease-purchase, and possibly for revenue bonds (Chart 1). By the time of the election, the interest cost on tax-allocation bonds was almost 300 basis points above the Moody's Aaa rate, compared with an average of roughly 50 basis points in 1977. More important, there were no new tax-allocation issues after the election.[13]

Chart 1 gives an informative, albeit simplistic, picture of Proposition 13's effect on the cost of California debt. In the remainder of this section, statistical models are used to obtain refined measures of the amendment's effect on each kind of bond. In the process, it will be possible to quantify the extent to which Proposition-13-related increases in new-issue interest cost have been associated with changes in bond ratings, number of bids per issue, and other factors that normally help to explain the interest cost.

Chart 1

Spread Between California and National New - Issue Rates[1]
January 1977 - September 1978
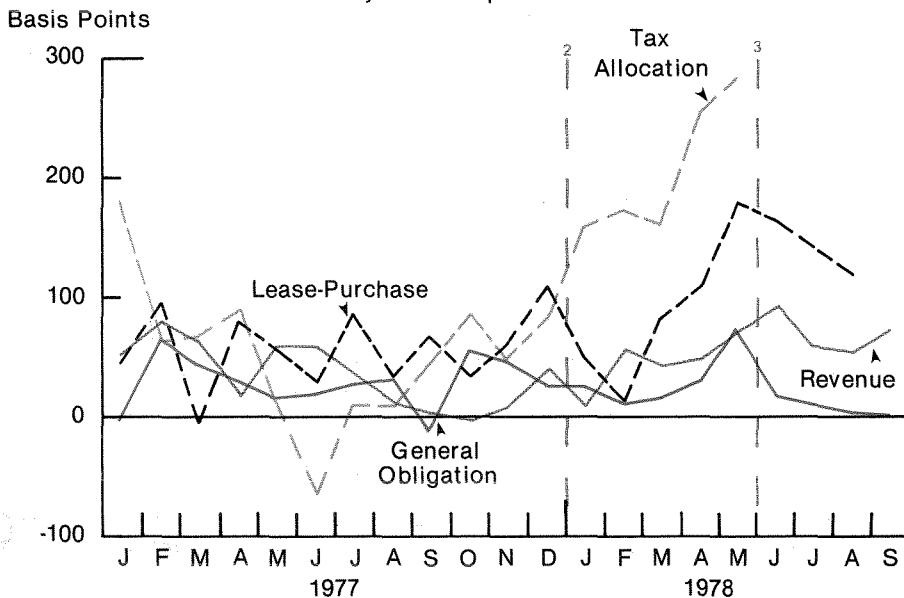
1 California rates are equally-weighted averages of new-issue rates in each month. National rates are the monthly averages of Moody's weekly Aaa new issue municipal bond index.
2 Date at which Proposition 13 was placed on the ballot.
3 Date at which Proposition 13 passed.

Interest-cost model

According to earlier statistical studies, the most important factors explaining the interest cost of new issues of a given category of bond are the average level of municipal-bond yields nationwide, and factors specific to new issues such as quality rating, size of issue, number of competitive bids, and type of placement.[14] (The alternatives to competitive bidding are negotiated sale or private placement.) A regression relating all of these variables to new-issue interest cost explains a significant portion of the variation in interest cost from issue to issue.

Theoretically, the effects of Proposition 13 may have been transmitted through two distinct channels. First, the amendment may have influenced ratings, bids, and other characteristics, thereby leading to a rise in interest cost. Second, it may also have directly increased the interest cost of new issues without necessarily changing these other characteristics. These alternative channels can be sorted out by fitting different models to the data. The alternative models developed in this section will enable us to distinguish between the different possible channels of influence.

For a typical period, such as the pre-Proposition 13 period, a model of the following specification can be used to explain the interest cost for new issues of California bonds:

$$NIC = a + b_1 TERMST + d_1 DTERMST +$$
$$d_2 Aaa + d_3 Aa + d_4 A + d_5(Baa-B) +$$
$$b_2 LSIZE + b_3 LBIDS + d_6 NEGOT$$
$$(1)$$

where

NIC	= "net interest cost" (interest rate) for the new issue;[15]
TERMST	= variable reflecting the nationwide interest rate for bonds of high quality and comparable maturity (see explanation below);
DTERMST	= dummy variable used when the average maturity of the new issue is unknown (see explanation below);
Aaa	= zero-one dummy variable equal to one for Moody's Aaa (S&P AAA) rating;[16]
Aa	= zero-one dummy variable equal to one for Moody's Aa (S&P AA) rating;
A	= zero-one dummy variable equal to one for Moody's A (S&P A) rating;
(Baa-B)	= zero-one dummy variable equal to one for Moody's Baa to B (S&P BAA to B) rating (no bonds were rated below B; nonrated bonds are the omitted class);
LSIZE	= natural logarithm of the size of the total serial issue in thousands of dollars;
LBIDS	= natural logarithm of the number of bids received in competitive bidding;
NEGOT	= dummy variable equal to zero for competitive bidding and equal to one for negotiated sale or private placement.

The variable TERMST represents the national interest rate on a typical municipal bond of high quality and comparable maturity during the week that the new issue is sold. For the jth new-issue, the value of TERMST can be calculated according to the formula:

$$TERMST_j = i_{1t} + (i_{30t} - i_{1t}) \frac{\ln MAT_j}{\ln 30}$$

where i_{1t} = yield on Salomon Brothers index for prime one-year general obligation municipal bonds during the week that the jth issue is sold;

i_{30t} = yield on Salomon Brothers index for prime general obligation municipal bonds of 30-year maturity;

MAT_j = average maturity of the jth issue.[17]

This specification of interest cost captures the desirable logarithmic shape of a term-structure model. In particular, it not only allows the entire term structure to shift up and down, but also allows the term structure to twist as short- and long-term rates change relative to one another.[18] $TERMST_j$ is then a single interest rate taken from the term structure for week t and maturity, MAT_j. An hypothesis on the coefficient, b_1, of TERMST is that $b_1 = 1$, so that NIC rises and falls with TERMST.[19] For some serial issues in the following analysis, TERMST cannot be used

because it requires information on average maturity, which is not available from published sources. To compensate for this, the regression sets TERMST equal to i_{1t} and adds another variable DTERMST, equal to $(i_{30t} - i_{1t})$.[20]

The following hypotheses suggest how the other variables would affect interest cost. The rating variables measure the increase in interest cost over that of a comparable non-rated bond. The higher the quality rating, the lower the expected interest cost. Thus, the rating coefficients should have negative signs, although it is not clear that a rating of (Baa–B) would carry a lower interest cost than no rating. The effect of issue size is ambiguous. Bond traders state that both very small and very large issues pay a premium—small issues because of a tendency for underwriters to bid high due to the small potential payoff from obtaining detailed information, and large issues because of "supply effects," that is, the difficulty of reselling a large number of bonds in large serial issues in a short span of time. It is normally hypothesized that the number of bids reflects the degree of competition in underwriting and the importance of imperfect information (Kessel [11]). Interest cost should be higher the fewer the bids under competitive bidding, and should be higher still under negotiated sale or private placement.

Adding time shifts

Aside from Proposition 13's effects on ratings and other variables, it probably also has had a significant effect on interest cost distinct from that felt through the other variables. It is reasonable to hypothesize that as the amendment's prospects became increasingly strong with the approach of the election (Table 1), its effect on interest cost would have increased. Then, the certainty after June 6 should have had a constant effect.

Given data limitations, it is best to hypothesize a linear trend for the pre-election 1978 period. In addition, a linear trend for 1977 and an intercept shift for the first week in January, 1978, are introduced to test whether or not the shift in 1977 was zero as hypothesized, and whether there was any intercept shift in 1978. The full model with structural time shift now becomes (see Chart 2):

$$
\begin{aligned}
NIC = \; & a + b_1 TERMST + d_1 DTERMST + \\
& d_2 Aaa + d_3 Aa + d_4 A + d_5 (Baa-B) + \\
& b_2 LSIZE + b_3 LBIDS + d_6 NEGOT + \\
& b_4 WEEK77 + d_7 DJAN78 + \\
& b_5 WEEK78 + d_8 DJUN78
\end{aligned} \tag{2}
$$

where
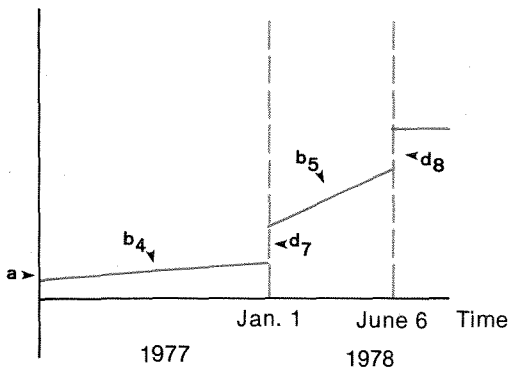WEEK77 = linear time trend for the weeks in 1977;

DJAN78 = intercept shift dummy, dated January 1, 1978 (week 53);

WEEK * 8 = linear time trend for the period January 1-June 6, 1978 (weeks 53-74);

DJUN78 = intercept shift dummy, dated June 6, 1978 (week 75).

The hypothesized signs for the effects on each type of bond are:

	General Obligation	Revenue	Tax Allocation	Lease Purchase
WEEK77	0	0	0	0
DJAN78	0	0	0	0
WEEK78	0	0	+	+
DJUN78	0[22]	0	+	+

Because ratings and other issue descriptors might have been affected by Proposition 13, equation (2) should also be estimated with right-hand variables that are not subject to possible endogeneity. For this purpose, the following model serves as an alternate measure of Proposition 13's effects:

Chart 2

Model for Structural Shift in Interest Cost

$$NIC = a + b_1 TERMST + d_1 DTERMST + b_4 WEEK77 + d_7 DJAN78 + b_5 WEEK78 + d_8 DJUN78 \qquad (3)$$

This equation would attribute entirely to Proposition 13 those changes in 1978 net interest cost which are not related to changes in open-market rates. Equation (3) would essentially estimate the time-shifts apparent in Chart 1.

Changes in issue descriptors

Although ratings, size of issue, number of bids, and type of offering cannot be considered exogenous to Proposition 13 on *a priori* grounds, in fact, significant shifts in values were found *ex post* only for tax-allocation bonds. Between 1977 and 1978, there were no significant shifts in ratings for general-obligation, revenue, and lease-purchase bonds, but there were shifts for tax-allocation bonds significant at the 5-percent level.[23] The following distribution of ratings for tax-allocation bonds indicates that the ratings deteriorated.

	1977		1978	
	Number	Percent	Number	Percent
Aaa	3	6%	0	0%
Aa	2	4	0	0
A	14	27	3*	9
Baa–B	15	29	15	43
Not Rated	18	34	17	48

*Two in January and one on March 6.

On April 11, 1978, Moody's suspended its ratings on all previously-rated California tax-allocation bonds (64 outstanding issues, of which 31 had been rated A and 33 Baa or Baa-1).[24] During the same week, Standard and Poor's said that, in the event of Proposition 13's passage, it would assess the impact on existing ratings of all California bonds.[25]

There was also a significant shift to fewer bids and to larger size per issue for tax-allocation bonds, but no significant changes for other categories. As the June 6 election approached, tax-allocation issues generally received only one bid, and during the six weeks immediately prior to that date, several issues received no bids and were retracted. Since June 6, no tax allocation bonds have been issued.

Regression results[26]

General-obligation bonds. Although no Proposition-13 effects were hypothesized for G.O. bonds, the results in Table 3 suggest that there might have been a slight impact prior to the June election. (Chart 1 suggests the same result, with some increase in rates in the month of May.) Equation (2) in Table 3 shows a significant downward shift in interest cost in January 1978 of 38 basis points, and an insignificant increase of 1.6 basis points per week until the June election. When ratings and other descriptors are excluded (equation (3)), the time effects and the t-statistics are larger. However, the net effect of the 57 basis-point decline in January and the 3.5 basis-point rise per week thereafter was still only 20 basis points by the time of the election.[27] These effects may have been the result of Proposition 13, but they appear to have been small and short-lived. As yet, there has been no post-election effect on general-obligation issues.[28]

Revenue bonds. These bonds experienced a significant downward drift in interest cost of 1.1 basis points per week in 1977. This unexplainable anomaly appears to be unrelated to Proposition 13 and to have ended well before the end of 1977 (see Chart 1). Otherwise there were no significant time-shift effects, with the exception of a significant upward shift of 71 basis points in equation (3) at the time of the June 6 election. There was also an upward shift in June using equation (2), although it was smaller and insignificant. Detailed examination of the residuals and of the underlying data suggests that the market began distinguishing "pure" revenue bonds from those of a hybrid nature (as discussed earlier), and that higher rates on some hybrid bonds in the sample may have resulted in a post-election upward shift of perhaps 70 basis points.[29] However, without more data and greater detail on each issue, this result cannot be demonstrated rigorously.

Tax-allocation bonds. The time shifts for tax-allocation bonds are large and highly significant. Interest costs rose at a rate of 13.5 to 14.2 basis points per week over the early 1978 period. They were 263 to 308 basis points higher by the week of the election as a result of the amendment. However, because of the unexpected negative coefficient on the term-structure variable, TERMST,

Table 3
Regressions for Net Interest Cost

	General Obligation		Revenue		Tax Allocation		Lease-Purchase	
	Eq. (2)	Eq. (3)	Eq. (2)	Eq. (3)	Eq. (2)	Eq. (3)	Eq. (2)	Eq. (3)
CONSTANT	.00	.66	1.71	1.27	6.46	7.34	2.32	2.17
	(.00)	(1.09)	(2.67)*	(1.80)*	(7.15)*	(7.83)*	(1.67)*	(1.29)
TERMST	1.19	.99	.94	.92	$-.34^1$	$-.25^1$	.74	.66
	(1.71)*	(−.05)	(−.50)	(−.60)	(−7.06)*	(−6.40)*	(−.96)	(−1.01)
DTERMST	.87	.86	.74	.79	−.40	−.35	.58	.78
	$(.09)^2$	$(.10)^2$	$(.11)^2$	$(.13)^2$	$(.14)^2$	$(.16)^2$	$(.23)^2$	$(.28)^2$
Aaa	−.60	--	−.97	--	$-.22^3$	--	−1.39	--
	(−3.25)*		(−2.32)*		(−.59)		(−4.77)*	
Aa	−53	--	−.27	--	-05^4	--	−1.34	--
	(−3.00)*		(−1.22)		(−.11)		(−4.69)*	
A	−.48	--	−.19	--	−.37	--	−.99	--
	(−5.15)*		(−1.14)		(−1.82)*		(−4.32)*	
Baa-B	−.01	--	.12	--	−.25	--	−.51	--
	(−.13)		(.65)		(−1.41)		(−2.18)*	
LSIZE	.026	--	−.028	--	.250	--	.062	--
	(.93)		(−.71)		(4.53)*		(.97)	
LBIDS	−.14	--	−.16	--	−.44	--	−.11	--
	(−2.62)*		(−1.87)*		(−4.02)*		(−.87)	
NEGOT	5	--	.28	--	.10	--	.18	--
			(.96)		(.17)		(.67)	
WEEK77	−.000	.001	−.011	−.011	−.008	−.006	.007	.007
	(−.08)	(.27)	(−2.36)*	(−1.97)*	(−1.40)	(−.97)	(1.42)	(1.20)
DJAN78	−.38	−.57	.28	.31	−.34	−.04	−.39	−.77
	(−2.18)*	(−2.81)*	(.98)	(.98)	(−1.05)	(−.10)	(−1.60)	(−2.47)*
WEEK78	.016	.035	.001	−.009	.135	.142	.037	.083
	(1.52)	(2.89)*	(.02)	(−.37)	(7.58)*	(7.00)*	(2.01)*	(3.61)*
DJUN78	−.19	−.20	.43	.71	5	5	$.34^4$	$-.33^4$
	(−1.22)	(−1.12)	(1.26)	(1.85)*			(.92)	(−.69)
R-Squared	.56	.40	.70	.59	.79	.71	.66	.40
Standard Error	.42	.50	.35	.42	.57	.67	.40	.53
Number of Observations								
(Total)	158	158	58	58	88	88	63	63
(Jan-June 6, 1978)	48	48	11	11	35	35	19	19
(June 7-Sept 1978)	22	22	13	13	0	0	2	2

* Significant at the 5 percent level for one-tailed test. Numbers in parentheses are t-statistics against a null hypothesis of zero except for the coefficient of TERMST for which the null hypothesis is one.
[1] t-statistics for TERMST against $H_O:0$ are −1.30 and −1.81 respectively.   [4] Estimated based on only two observations.
[2] For DTERMST, the figure in parenthesis is the standard error.   [5] Insufficient data for estimation.
[3] Estimate based on only three observations.

the time shift may be overstated.[30] Adjusting for the contradictory term-structure relationship, it is reasonable to conclude that the effect on tax allocation bonds was at least 250 basis points by the time of election. Indeed, this figure may be highly conservative, because (1) several issues were retracted when unsold prior to the election; (2) other issues probably carried high yields, but were not reported in the *Bond Buyer* because they were sold through negotiation or private placement; and (3) no new issues have come to market since the election.

Lease-purchase bonds. As hypothesized, lease-purchase bonds were also adversely affected by Proposition 13. In equation (2), the time-shift accounted for a 43 to 81 basis-point increase in interest cost by the time of the election, depending on whether or not the insignificant dummy for January 1978 is included. In equation (3), the pre-election shift amounted to 106 basis points. A comparison of the coefficients in equations (2) and (3) indicates that some of Proposition 13's effect was experienced through changes in ratings, despite the fact that the tests described earlier did not find any such rating change. The large negative coefficients for higher ratings in equation (2) would help to explain a rise in net interest cost even with a minor downgrading of ratings. Since the election, there have been only two lease-purchase issues (rated A-1 and A by Moody's), and net interest costs have declined from their peak in May 1978 (see Chart 1). According to one bond trader, rates on these issues should decline further because most city-and-county governments have been able to adjust more smoothly to Proposition 13 than was initially thought possible. Overall, the rate on lease-purchase bonds was affected by more than 75 basis points by the time of the election, with some subsequent decline.

Channels of effects

The effects of Proposition 13 can be quantified further by using equation (2) in Table 3 to trace through the various channels that account for the change in net interest cost between 1977 and the "post-election" period.[31] Table 4 decomposes the shifts in net interest cost for each bond category into those related to changes in right-hand variables. It does not tell us which channels are statistically significant, but indicates how much of the change in net interest cost was channeled through the 1978 time-shift parameters and how much was channeled through changes in ratings and other descriptors.

The change in net interest cost for general-obligation bonds, which is only 16 basis points, can be related to term-structure variables. The change for revenue bonds is greater (79 basis points) and is matched by a 1978 time shift almost as great. The rise in interest cost for tax-allocation bonds (262 basis points) is more than explained by the combined 286 basis-point effect of 1978 time shift and changes in ratings, issue size, and number of bids. Of the 139 basis-point rise for lease-purchase bonds, 49 basis points were felt through the 1978 time shift and 15

Table 4
Shift in Mean of Dependent Variable Attributable to Changes in Right-Hand Variables Between 1977 and Post-Election[1] Period (Expressed in basis points)

	General Obligation	Revenue	Tax Allocation	Lease-Purchase
Net Interest Cost				
Change in Actual Means	16	79	262	139
Change in Means of Estimates	15	81	255	120
Right-Hand Variables				
Term Structure	20	33	-10	39
Time Shift 1977[2]	0	-36	-21	15
Time Shift 1978[3]	-22	73	235	49
Ratings	9	1	8	15
Other Descriptors	8	10	'43[4]	2

[1] For general obligation and revenue bonds, the post-election period is used (i.e., all issues after June 6). Because there were no issues of tax allocation bonds and only 2 issues of lease-purchase bonds in the post-election period, all issues after May 1, 1978, were used as the "post-election" period for these categories.

[2] Effect of WEEK77 only.

[3] Combined effects of intercept shift variables and WEEK78.

[4] Larger issue size accounts for 20 basis points and fewer bids per issue for 23 basis points.

Source: Calculated using estimates for equation (2) in Table 3 and means of right-hand variables for the two sub-periods. In order for the components to sum to totals, both significant and insignificant variables were included.

through changes in ratings.[32] Altogether, changes in ratings accounted for only a small portion of the increase in net interest cost for those bonds significantly affected.

III. Implications for the Value of Outstanding Debt

Inferences regarding Proposition 13's impact on the value of existing state-and-local debt ideally should be derived from secondary-market yield data for actively traded issues. However, such data are not available, so that inferences are drawn here from the effect on new-issue yield cost. Most existing California debt is in the form of general-obligation and revenue bonds (Table 5). On the basis of our findings in the empirical section, we can presume that Proposition 13 has had no effect on the $7.3 billion of existing local general-obligation bonds, perhaps some effect on the $5.5 billion in revenue bonds, and a definite effect on the $576 million of tax-allocation and $2.2 billion of lease-purchase bonds.

To measure the effect on the present value of outstanding debt, we can calculate the impact of the rise in new-issue interest cost on the present value of a bond of comparable maturity. In the post-election period, the average net interest cost of new revenue-bond issues was 7.07 percent, with perhaps 70 basis points of the interest-cost rise due to Proposition 13. For tax-allocation bonds in May 1978 (the last date any were issued), average interest cost was 8.45 percent and at least 250 basis points of the rise was due to Proposition 13. For lease-purchase bonds, the average rate (May-September 1978) was 7.17 percent, with at least 75 basis points resulting from Proposition 13.

For these three categories of bonds, average maturities (the averages of the "average maturities" of the serial issues) ranged from 12 to 15 years. If we assume 14-year bonds with equal payments at the end of each year, the Proposition 13 reductions in present value are 9 percent, 28 percent, and 9 percent for revenue, tax-allocation, and lease-purchase bonds respectively.[33] If we apply these figures to the outstanding debt shown in Table 5, bond values are reduced by $500 million for revenue bonds, $160 million for tax-allocation bonds and $195 million for

lease-purchase bonds. It should be stressed, however, that (1) the effect (if any) on revenue bonds is probably concentrated among those bonds that are not fully user-fee supported, (2) the effect on revenue bonds and lease-purchase bonds may diminish with time as local governments adjust more fully to the post-Proposition 13 environment, and (3) the effect on tax-allocation bonds may definitely be understated.

Table 5
California State and
Local Debt Outstanding[1]
(millions of dollars)

	General Obligation	Revenue	Tax Allocation	Lease-Purchase	Other
City	$1,097	$2,757	$ 0	$ 826	$ 593[2]
County	109	8	0	1,143	148[2]
School District	2,235	253	0	N.A.	2,103[3]
Special District	3,852	2,519	576	194	1,106[4]
Total Local	$7,293	$5,537	$ 576	$2,163	$3,950
State	$5,589	$1,148	0	N.A.	N.A.

[1] Figures for local debt are of the fiscal year ending June 30, 1977.
Figures for State debt are as of December 31, 1977.

[2] Mostly special assessment and improvement district debt.

[3] Loans from the State and Public School Building Funds.

[4] $566 related to construction financed by the State and U.S. Government, $11 in time warrants, and $529 in "other long-term indebtedness."

Sources: Staff of the Assembly Committees on Local Government and Revenue and Taxation, [3], p. 347, Legislative Analyst [2], and annual reports of the California State Controller on financial transactions concerning cities, counties, and school districts, 1976-77.

IV. Summary and Conclusions

Proposition 13 brought on a sudden and severe reduction in local-government revenues in California, with all of the reduction in the form of property-tax relief. Although the State has provided substantial assistance to local governments, restrictions on new taxes have reduced their expected income, thereby reducing the revenue flows needed to pay off their existing debt. This study has shown the resulting effects on the cost of new debt and the implications for existing debt.

Proposition 13 apparently has had no significant effect on local general-obligation bonds approved prior to July 1, 1978, except for perhaps some minor impact on new issues sold just prior to the election. The effect apparently has been nil for "pure" revenue bonds but significant for hybrid revenue bonds, so that the average cost of all such bonds issued since the election increased by approximately 70 basis points. There has also been an adverse effect of at least 75 basis points on lease-purchase bonds. For both the hybrid revenue and lease-purchase categories, however, the rise in the risk premium may now be declining, in view of the existence of state-government aid and the adaptation of local governments to the post-Proposition 13 environ-ment. In contrast, tax-allocation issues have suffered an increase in risk premium of at least 250 basis points, and there is no indication that this premium will necessarily decline. Redevelopment agencies, the principal issuers of such bonds, thus appear to have been the principal debt-market casualties of Proposition 13. At this point, the constraints on property-tax revenues have ended tax-allocation bonds as a viable source of funding for redevelopment agencies.

The findings of this study imply that restrictions on the size of government, if properly structured, need not increase the cost of new debt or decrease the value of existing debt to any significant extent. Funds needed to pay off all existing debt could be exempted from revenue ceilings (as was voter-approved debt under Proposition 13), thereby lessening the effect on existing debt. Alternatively, restrictions could be placed on government expenditures rather than revenues, thereby protecting all debt. Voters and government officials may wish to consider such alternatives in structuring ways to restrict government. In the meantime, municipal-bond investors should keep a wary eye on what the voters are saying.

FOOTNOTES

1. As used throughout the paper, the term municipality includes the state, all levels of local government, and special districts.

2. On the ballot of June 6, 1978, there were actually two competing tax-reduction alternatives—Propositions 13 and 8. Defeat of Proposition 13 and passage of Proposition 8 would have put in force a legislative act known as the Behr Bill. This author previously hypothesized the effects of both Proposition 13 and the Behr Bill on California municipal debt. In all cases, hypothesized effects were directionally the same for the two measures, although those of the Behr Bill were much weaker. Because of the eventual passage of Proposition 13, discussion of the Behr Bill has been omitted from this paper.

3. The $7-billion reduction has turned out to be an overstatement, because of subsequent upward reassessments of market values for the 1975-76 year. See the article by William Oakland* in this issue of the **Review.**

4. The meaning of the term "qualified electors" has yet to be determined in the courts. It is not known whether it will be interpreted as those voting or as those qualified to vote.

5. This section draws heavily from the Legislative Analyst [2], California Assembly Staff Report [3] and Friedlander [4] and [5].

6. Because there were very few new issues, local assessment bonds have also been excluded from the discussion. There should be no effect on 1911 Act assessment bonds and only minor effects on 1915 Act assessment bonds, for which municipal revenues provide backup security.

7. In the opinion of legislative analysts [2, p. 338], it would be possible for the state legislature to authorize a new category of non-ad valorem "special tax" for the purpose of financing capital expenditures. In this instance local governments could issue, with a two-thirds approval of "qualified electors," G.O. bonds to be repaid from the special tax which would fall outside the revenue limitation of Proposition 13.

8. Although not legally obligated, local governments have sometimes subsidized pure revenue bonds in order to avoid default, since such action would strengthen the government's ability to float future issues. In such cases, pure revenue bonds could be affected by Proposition 13.

9. In many cases, government loans and grants, as well as fees from facilities such as parking garages, provide additional revenue.

10. Property that changes hands or is newly constructed after 1975-76 would be assessed at current market value. An unresolved question is whether the fixed base-year assessed value for a project approved after 1975-76 would be rolled back as well. If so, Proposition 13 would lower the base-year assessed value, which would reduce revenue to the local taxing bodies and increase tax-increment revenues. By itself, this effect would strengthen tax-allocation bonds, although it would surely be outweighed by the negative effects of the Proposition's constraints.

11. There are a few exceptions where the redevelopment district has little debt and considerable non-property-tax income.

12. Secondary-market yield data for municipal bonds are too scant for statistical analysis. New-issue data for January 1, 1977, through March 31, 1978, were obtained through the Public Securities Association in New York City and the Municipal Finance Study Group at State University of New York at Albany. They are derived principally from the **Bond Buyer New Issue Worksheets** and the **Daily Bond Buyer.** Data after March 31, 1978, were taken directly from the **Daily Bond Buyer.** Issues that did not report net interest cost were deleted. These were usually negotiated or private-placement issues.

13. This author has not been able to determine the effect of legal restrictions on interest-rate ceilings. The figure of 8 percent is often cited as a rate limit for California debt, but this limit must not be effective for many redevelopment districts, as 15 of the 18 tax-allocation issues after April 18, 1978, had rates in excess of 8 percent. Three were as high as 9.7 percent.

14. See in particular, Hendershott and Kidwell [7], Kessel [11], Kidwell [13], Tanner [16]. Variables are omitted from this analysis, as they are in other empirical analyses. Differences in coupon patterns would affect the interest differential, as would the whole term structure of interest rates, because coupons are expected to provide future reinvestment income at rates implied by the whole term structure. Tax effects should also be included, even for municipal bonds, because capital gains/losses have tax effects. Also, probability functions for default and call should be included. The state of the art and limitations of the data preclude much headway in including these variables. For evidence on call privileges, see Kidwell [13].

15. In the municipal-bond market, bonds are almost always sold to underwriters in a package known as a serial issue. A serial issue will have many bonds with different coupons and maturities, and for the package an "average maturity" and "net interest cost" (average interest rate) will be calculated. Average maturity, is a simple weighted-average of the maturities of the individual bonds in the issue. Net interest cost is a weighted-average of coupon yields of the different bonds in the issue without regard to when the coupons are paid. Thus, future coupons are implicitly discounted at a zero rate of interest, and coupons in the first year are given the same weight as those in the last year. If the coupons imply rates on the par-value bonds that differ markedly from the rates in the reoffer yields or in the

municipal-bond term structure, then net interest cost can differ markedly from the true economic interest cost. In California, constraints placed on the underwriters by the municipalities keep the coupon yields fairly well in line with the term structure. Thus, net interest cost used in this study is a fairly close approximation to true interest cost. For a full discussion, see Hopewell and Kaufman [8], [9], and [10], and Mendelowitz and Rockoff [14].

16. A single rating was used for each bond. Either Moody's or Standard and Poor's was used if only one of the two organizations rated the bond. If both did and there was a discrepancy, Moody's rating was used.

17. It is necessary that $MAT_j \geq 1$, which holds for the sample in this paper.

18. The specification grew out of a use of term structure in a paper by Hendershott and Kidwell [7]. Their specification was different, as it was designed to pick up a different effect of term structure on NIC.

19. The risk differential is assumed to be independent of the level of rates. This assumption is commonly accepted, although there may be some reason to believe that the risk premium is positively related to rates. For this argument, see Kessel's development of Hicks' theory [11], pp. 724 and 731.

20. When average maturity is known, DTERMST is zero. When average maturity is not known, TERMST is set equal to i_{1t} and DTERMST is set equal to $(i_{30t}-i_{1t})$. The coefficient of DTERMST, d_1, is

$$d_1 = b_1 \text{x} \ \frac{\overline{\ln MAT}}{\ln 30}$$

where $\overline{\ln MAT}$ is an estimate of the average of the log average maturities for the missing data. Using $\overline{\ln MAT}$ for the data with known values and b_1 from the regression, one can calculate an hypothesized value for d_1. The hypothesis would merely test whether or not the average maturity of the data with missing values was the same as that for data with known maturities.

21. There is considerable random variation in NIC across issues, and they are not issued uniformly over time.

22. There is some ambiguity about general-obligation bonds issued after July 1, 1978. Proposition 13 states that G.O.'s *approved* after its implementation (July 1) would be subject to property-tax ceilings. However, in those few cases where the author was able to check, the bonds issued were all approved prior to July 1 (one as early as 1973).

23. The Chi-Square test was used to test whether or not the 1977 and 1978 distributions came from the same underlying population.

24. **Los Angeles Times,** April 12, 1978, and **Moody's Bond Survey,** Vol. 70, No. 16, April 13, 1978, pp. 1339-1341.

25. On June 8, S&P suspended ratings on all but voter-approved, full faith and credit general obligations, insured bonds, revenue bonds 100-percent enterprise supported, pre-refunded bonds fully secured by U.S. government obligations, and institutionally-supported

revenue bonds. In all, ratings on 248 existing lease-purchase, tax-allocation, special-assessment, and hybrid-revenue issues were suspended "due to lack of sufficient information regarding the action to be taken by the various levels of California government in response to the passage of the Jarvis-Gann Initiative." (Standard and Poor's release, June 8, 1978). Moody's continued to rate lease-purchase bonds, and the two post-election issues were rated A and A-1.

26. As a test for stability of coefficient values and model structure, equation (1)—including a time trend for WEEK77—was fitted for 1977, and the results were tested against those of equation (2) for 1977-78. The coefficients and the standard errors were generally found to be robust with respect to the time period tested. Also, predictions were made for the post-election period using equation (1) fitted to 1977 data. The post-election prediction errors were close to the time-shift estimates of equations (2) and (3) fitted to 1977-78 data.

27. The figure of 20 basis points is calculated, using the coefficients in Table 3a and allowing for the fact that WEEK78 had a duration of 22 weeks:

$3.5 \times 22 - 57 = 20.$

28. In a previous section of the paper, an effect on general-obligation bonds approved after July 1, 1978, was hypothesized. It appears that the G.O. bonds in the sample either were approved prior to July 1, 1978, or were one-year tax anticipation notes that did not require specific voter approval.

29. Redevelopment districts began to issue mortgage-backed revenue bonds after the election, whereas none were issued prior to the election. (Tax allocation debt was issued instead.) These bonds have had net interest costs somewhat higher than the average for post-election revenue bonds.

30. The coefficient on TERMST should be approximately equal to one. This result holds for the other three categories of bonds. However, for all regressions run on tax allocation bonds, the coefficient was zero or slightly negative. This result occurred even for equation (1) fitted to 1977 data.

31. Because of lack of sufficient data, issues dated May 1, 1978, and thereafter are used to represent the post-election period for tax-allocation and lease-purchase bonds.

32. For lease-purchase bonds, equation (2) understates the effect of Proposition 13. As mentioned earlier, equation (3) gives a more accurate estimate. Using equation (1) estimated on 1977 data, the predicted effect of Proposition 13 in the "post-election" period (after May 1) was found to be 77 basis points.

33. The effect on present value of an individual bond would differ from these figures, depending on the maturity of the bond and the probability function for expected default.

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