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Rational Reactions to Temporary Sales Tax Legislation: An Idaho Case Study

Lower than expected retail sales in the first half of fiscal year 1986 (July 1985-June 1986) forced the Idaho State Legislature to reconsider its previous year's budget and revenue plans. Two steps were taken toward reducing the $27 million projected short-fall. Agency appropriation cuts totaling $7 million were enacted in February of 1986. To eliminate the balance and also permit additional funding of new projects in 1987, a one cent increase in the sales tax was put into effect from 1 April 1986 to 30 June 1987.

Budget problems in Idaho have resembled those of other states during the 1980s.[1] These problems have been recurrent, and funding cutbacks have been made in five of the last six fiscal years.[2,3] Nineteen eighty-six was not the first time the legislature enacted a temporary sales tax increase to generate additional revenues. Similar problems led to a temporary rate change from three to four percent in March 1983. Continued revenue weakness then induced the legislature to raise that rate to four and one half percent effective 1 July 1983. The second rate was also scheduled to end prior to fiscal year 1985. Legislation in April of1984 amended the Idaho Code such that the base rate became four percent instead of three percent.[4]

Material in this article reviews the impacts of the rate decrement in 1984 and examines the potential effects of the current law on revenue accruals to the state in 1987. Subsequent sections of the paper include a brief discussion of the rational expectations hypothesis and its implications for state government financing, empirical tests conducted on the sales tax data, and concluding remarks. The questions asked are whether or not Idahoans change their consumption patterns in response to actions of the legislature and how these changes can affect state budget plans.

CONSUMER BEHAVIOR AND PUBLIC FINANCE

The rational expectations hypothesis presupposes that consumers (taxpayers) will utilize as much available information as is profitable in making their purchase decisions.[5] This implies that people will react to legislation that affects their incomes. In the case of a well-publicized change in the retail sales tax rate, this seems almost intuitive in nature.

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Business Proprietors in Boise have noticed consumption patterns change in response to legislative action in previous years.[6]

Numerous studies at the national level have investigated the effects of consumer behavior on attaining the goals of federal fiscal and monetary policies.[7] Surprisingly though, there have been very few research efforts at the state and local levels that examine the reactions of the citizenry with respect to changes in tax laws. Results of a study dealing with Proposition 13 indicate that California residents responded rationally to that change in legislation. Proposition 13, which reduced the rate of property taxation and restricted the rate of increase in real property assessment values, lowered California income deductions for property taxes by approximately $7 billion. In anticipation of the resulting higher income taxes, individuals and corporations increased their estimated tax prepayments accordingly.[8] From a budgeting standpoint, this was important because the timing of cash flows changed due to taxpayer reaction to the new law.

If Idaho taxpayers are rational, then their purchasing behavior should change in response to changes in excise tax rates. More specifically, they can be expected to shift purchases to the period in which their sales tax burdens will be lower. If this change is of sufficient magnitude, it could significantly impact state budget plans.

Given the problems many states face in terms of revenue needs, analysts should be aware of the implications of taxpayer behavior when calculating the likely fiscal impacts of legislative proposals.

EMPIRICAL ANALYSIS

To answer the question of whether Idaho consumers delayed second quarter purchases in expectation of the sales tax rate reduction in 1984, a variety of data was gathered. Three different approaches were then used to empirically examine the evidence. First, tests were conducted to determine if retail sales for important categories were significantly different in 1984 as compared to other years in the 1970-1985 period. Second, an econometric model was built for quarterly sales tax receipts to see if the levels recorded in the third quarter of 1984 could be adequately explained. Finally, a time series model of sales tax receipts was estimated to test for the same effects as those examined in the second step of the empirical analysis.

To test whether consumers delayed purchases normally made during the second quarter until the third quarter of 1984, taxable sales data were collected for twenty-one important retail categories from the third quarter of 1966 through the third quarter of 1985.9 The categories include building materials, dry goods, mail order purchases, groceries, motor vehicles, vehicle parts, mobile homes, boats and aircraft, clothing, shoes, furniture, household appliances, restaurants, bars, eye glasses, antiques, books, sporting goods, jewelry, unclassified retail sales, and total taxable sales. Seasonal factors such as the start of the school year and harvest activities cause third quarter retail sales to exceed those of any other quarter. Similar factors cause second quarter sales to be higher than first quarter levels, but lower than those of the fourth quarter each year.

TABLE 1
Shifting Consumption Patterns in 1984

Industry Category	Level of Significance (in percent)
Building materials	1
Dry goods	1
Mail order houses	1
Grocery stores	1
Motor vehicles	5
Vehicle parts and accessories	1
Mobile homes	NS
Marine and aircraft sales	NS
Clothing	5
Shoe stores	1
Furniture stores	NS
Household appliances	5
Eating places	1
Drinking places	NS
Optical stores	NS
Antique stores	1
Books and stationery	NS
Sporting goods and bicycles	1
Jewelry stores	NS
Retail stores, not classified	1
Total sales	1

NS indicates that sales patterns in 1984 were not significantly different from other years in the sample set.
Computed from data published in Idaho State Tax Commission, Quarterly Sales Tax Report, various issues, 1966-1985

After controlling for economic growth and inflation, the differences between quarterly taxable sales are relatively constant on a year to year basis.

The observations on taxable sales were scaled by Idaho personal income and the personal consumption implicit price deflator. The base year chosen was 1982.[10] Sample period means and standard deviations were calculated for the differences between the adjusted quarterly data from each calendar year. Confidence intervals were then built at the one and five percent significance levels. If consumers correctly anticipated the decline in the sales tax rate, they would have shifted purchases normally made during the second quarter to after 1 July 1984. This would cause the adjusted differences in taxable sales to fall outside the confidence interval test bound.

Table 1 presents the results from the one-tailed tests. In general, retail sales in 1984 differ significantly from other years in the sample period. At the industry level, evidence of the shift is interesting in that it is spread among durable, nondurable, and perishable goods categories. To some extent this is because many businesses sell various types of goods, but it also reflects the degree to which consumers responded to the rate reduction. In all, fourteen of the twenty-one categories for which the tests were per- formed exhibited statistically significant differences in 1984.

One methodology utilized to forecast sales tax revenues in Idaho is econometric modeling. To accomplish this, an equation relating sales tax receipts to economic and other variables is estimated using ordinary least squares regression:

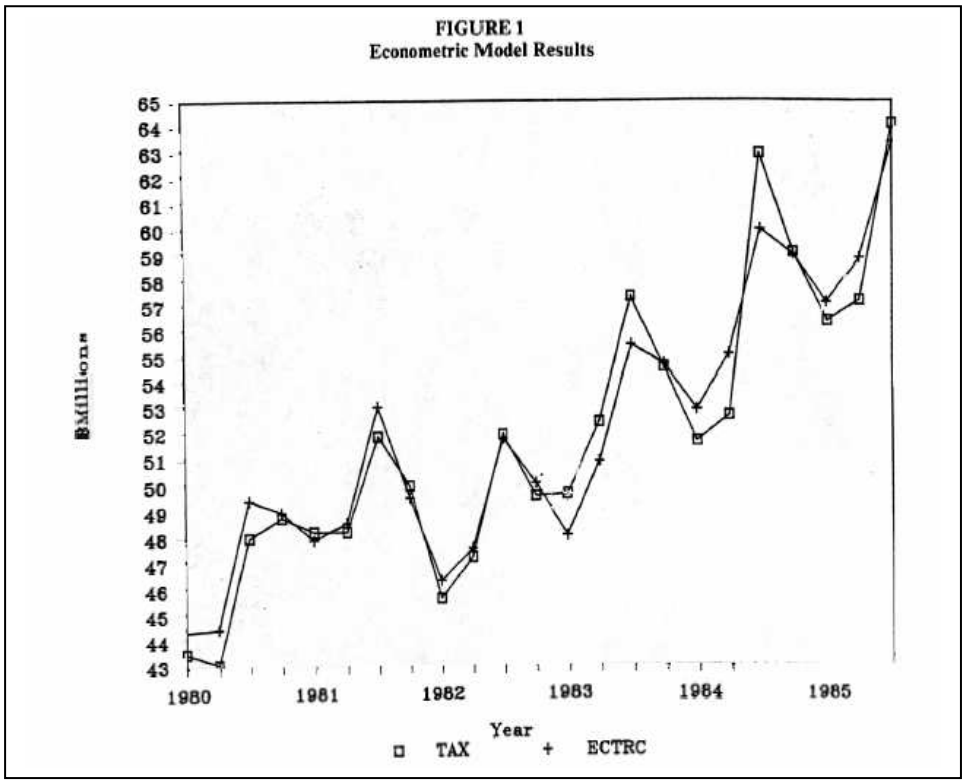
$$TAX = 8.43 + 14.22 * WDS - 13.16 * PC - 2.82 * Q1 + 1.82 * Q2 + 2.27 * Q3,$$
$$(8.88) \quad (19.07) \qquad (-6.01) \quad (-6.84) \quad (-4.42) \qquad (5.50)$$

where TAX stands for sales tax' receipts normalized to a four percent collection rate, WSD for Idaho wage and salary disbursements, PC the implicit price deflator for personal consumption expenditures, and Q the dummy variables for quarters one through three. Numbers in parentheses represent the computed t-statistics for the model parameters. The coefficient of determination, R^2, is 0.99 and the Durbin-Watson statistic is 1.89, indicating that first order serial correlations is not present in the residuals.[11]

When developing a regression model, it is known *a priori* that a certain amount of variation in the dependent variable will not be captured. If the modeling effort is successful, then the unexplained movements in that variable will be small and random. Large residuals, or outliers, should be looked at carefully and explained if possible.

Figure 1 shows actual sales tax collections and predicted collections from the econometric equation. The largest prediction errors occur in the second and third quarters of

FIGURE 1
Econometric Model Results



1984. In the second quarter, when the tax rate was 4.5 percent, the model overpredicts collections by $2.35 million. In the third quarter, when the rate dropped to 4.0 percent, the model underpredicts collections by $2.95 million. Both residuals fall outside of confidence intervals constructed at the one percent level.

An alternative forecasting technique is provided by univariate time series modeling.[12] This method projects tax revenues based on past observations alone without taking into account the values of other variables such as prices or wages. The autoregressive integrated moving average (ARIMA) equation is estimated for a working series that is logarithmically transformed and differenced at lags one and four to induce stationarity. The equation has a moving average term at lag one, an autoregressive term at lag two, and a seasonal moving average term at lag four. Parameters are the following:

$$LT14 = \underset{(-1.918)}{-0.182 * E_{t-1}} - \underset{(-3.262)}{0.329 * LT14_{t-2}} - \underset{(-6.541)}{0.782 * E_{t-4}}$$

where LT14 stands for the working series and E the model residuals. Numbers in parentheses are the calculated t-statistics. The Box-Pierce Q-statistic calculated for 14 lags is 11.731, indicating that only insignificant differences are present in the residual string.

Figure 2 illustrates the same problem as that encountered with the econometric equation. Second quarter taxes are overestimated by $1.31 million. Third quarter receipts are underestimated by $4.03 million, significant at the one percent level. Aside from the change in the tax rate, there is no apparent reason why the model would exhibit that level of prediction error.

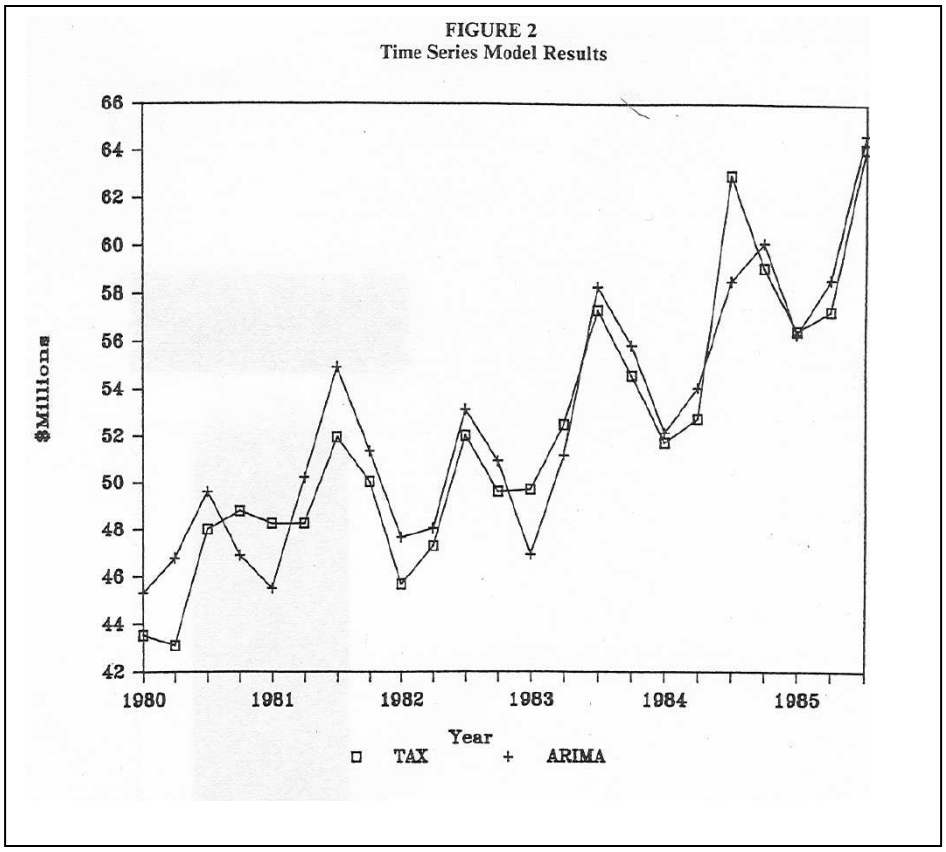
Because of the sizes and directions of the residuals, it appears that consumers did shift a significant portion of their second quarter purchases to the third quarter in 1984. Both models exhibit large residuals in those periods. The distinct natures of the methodologies make it unlikely that the errors were due to misspecified model structures or other shortcomings. As a result, the forecast model evidence also supports the hypothesis that Idaho retail sales are affected by changes in the sales tax rate.

IMPLICATIONS FOR FISCAL YEAR 1987

Revenue projections adopted by the Idaho legislature in 1986 call for $316 million in gross sales tax collections, $61 million of which are to be generated by the temporary rate increase.[13] The fiscal impacts calculated for the rate increase did not assume any dynamic reaction on the part of the public with respect to the rate reduction in July 1987. In 1984 the rollback was only one half of one percent. The rollback in 1987 is to be twice that amount, so it is likely that consumers will again adjust their behavior in anticipation of that event.

Second quarter 1984 sales taxes were overpredicted by an average amount of $1.83 million in the forecast results discussed above. That implies that taxable sales were $45.75 million less than they would have been in the absence of the rate decrement. With a 5.0 percent sales tax, the loss of that many dollars in taxable sales would cause an unanticipated revenue decline of$2.29 million. Given the steeper rate decline scheduled to take place on

FIGURE 2
Time Series Model Results



1 July 1987, the actual shift in purchases from the second quarter to the third could easily be much larger than that experienced in 1984.

General account appropriations in fiscal year 1987 total $600.9 million.[14] Because revenue projections total only $606.2 million and Idaho has no budget reserve account, even a temporal shift in consumption at the end of the second quarter can create serious problems. More importantly, because the state faces a constitutional debt limitation of $2 million, a sales tax shortfall of the magnitude described above combined with other revenue weakness could require special action by either the governor or the legislature.[15] Typically, this would be through agency funding cutbacks and/or public school transfer delays.[16]

CONCLUSION

Budget difficulties led the Idaho State Legislature to enact a temporary sales tax increase of one percent scheduled to terminate on 1 July 1987. In 1983 the legislature approved similar legislation to address funding shortfalls. In

1984 the sales tax rate dropped from 4.5 percent to 4.0 percent. Evidence from three separate statistical tests indicates that consumers altered their purchasing patterns in response to the actions of the legislature and took advantage of the rate decline

Because the rate decrement is to be twice as large as it was in 1984, and very well publicized, it is likely that consumption behavior will again shift the timing of purchases normally made in the second quarter to the third quarter. The transfer of revenues expected to be realized in fiscal year 1987 to fiscal year 1988 will probably reduce cash flows by an amount sufficient to require special measures by the governor or the legislature.

While there have been numerous studies of this nature dealing with national fiscal and monetary policies, there have been few efforts at the state and local levels to examine the response to similar legislative actions. In the case of Idaho, it appears that consumers rationally anticipated a sales tax change in 1984. It is likely the same type of reaction will partially neutralize the intended revenue raising abilities of the current temporary rate increase scheduled to sunset at the end of fiscal year 1987. In times of budgetary uncertainty, the reactions to this type of event can be important in determining the fiscal impacts and cash flow effects of proposed legislation.

NOTES

Helpful comments on earlier versions of this paper were provided by Marty Peterson, Mike Ferguson, James Kee, and an anonymous referee. The author retains sole responsibility for any errors or omissions.

1. See Naomi Caiden, "Public Budgeting Amidst Uncertainty and Instability," *Public Budgeting and Finance* I (Spring 1981): 6-19.
2. Idaho Legislative Budget Office, 1986 *Idaho Legislative Fiscal Report,* April 1986, 14.
3. See Larry Schlicht, "A History of General Account Shortfalls Since 1980," *Idaho Economic Forecast* 8 (Spring 1986): 16-22; and Sydney Duncombe and Richard Kinney, "Cutbacks-Idaho Style," *Public Budgeting and Finance* 4 (Summer 1984): 87-98.
4. 1983 Idaho Sess. Laws: 17 and 707; 1984 Idaho Sess. Laws: 672.
5. Marc Nerlove, "Expectations, Plans, and Realizations in Theory and Practice," *Econometrica* 51 (Sept. 1983): 1255.
6. Charles Etlinger, "Idaho Sales Tax Increase Expected to Create Calm Ripples in Economy," *The Idaho Statesman,* 25 March 1986, p. 1.
7. See Frederic S. Mishkin, "Does Anticipated Aggregate Demand Policy Matter? Further Econo-metric Results," *American Economic Review* 72 (Sept. 1982): 788-802.
8. See Michael Moore, Bert Steece, and Charles Swenson, "Some Empirical Evidence on Taxpayer Rationality," *The Accounting Review* 60 (Jan. 1985): 18-32.
9. Idaho State Tax Commission, *Quarterly Sales Tax Report,* various issues, 1966-1985.
10. These data are found in Idaho Division of Financial Management, *Idaho Economic Forecast,* various issues, 1979-1986.
11. Examination of the autocorrelation function estimated for the model residuals revealed no evidence of serial correlation at lags greater than one, an important consideration when dealing with seasonal and quarterly data.
12. Moore, Steece, and Swenson also used Box-Jenkins techniques in their California study.

13 Idaho Division of Financial Management, *Economic Forecast and General Account Revenue Projections* (Dec. 1985), 21; and Idaho Legislative Budget Office, 19.
14. Idaho Legislative Budget Office, 17.
15. Idaho Canst., art. VIII, §1.
16. See Schlicht.

Erratum

A line from Table 2 in the article, "Agency Budget Success: How It is Defined by Budget Officials in Five Western States," by Sydney Duncombe and Richard Kinney (Spring 1987, vol. 7, no. 1, pp. 24-37), was inadvertently omitted. The last line of Table 2 ("Agency Budget Success as Defined by Budget Officials in Five Western States") should indicate that 36 percent of the sampled budget officials identified budget success as good budget execution. The breakdown was 42 percent of agency officials, 20 percent of executive officials, and 36 percent of legislative officials.