Abstract

This article investigates the impact of earmarking on tax revenues. By dedicating revenues to a particular purpose, earmarking overcomes a free-rider problem among interest groups. The group receiving the benefits of the dedicated revenues has a strong incentive to lobby for higher effective tax rates. This hypothesis is tested using data on the federal gasoline tax.

EFFICIENT LOBBYING AND EARMARKED TAXES

MWANGI S. KIMENYI
University of Mississippi

DWIGHT R. LEE
University of Georgia

ROBERT D. TOLLISON
George Mason University

Obviously, the effect of tax earmarking will depend on the political response that earmarking generates. In particular, it has to be realized that tax earmarking does more than generate funds for specific government activities. By dedicating tax revenues to a particular purpose, earmarking creates a proprietary interest in the tax and the revenue it generates on the part of organized recipient groups. The focus of the present article is not primarily on the efficiency comparison between earmarked and general fund financing of public services,1 but, to investigate the effects on lobbying on tax revenues when revenues are earmarked as opposed to the situation in which revenues are allocated among various functions through the general fund.

Our basic argument is that under general fund budgeting, individual interest groups are more concerned with competing for larger shares of the existing level of tax revenue than with lobbying for tax rates that increase the revenue pool. In contrast, under an institutional arrangement where tax revenues are earmarked, each recipient group is interested in increasing revenue from a given source and therefore will lobby for revenue increasing changes in the tax rate. We expect that changing from general fund financing to earmarked financing of a particular government function will lead to an increase in the revenue generated by the tax that has been earmarked.

The next section briefly outlines interest-group behavior under institutions of earmarking and general fund financing. The third section provides empirical tests and results. The final section contains concluding remarks.

TAX INSTITUTIONS AND LOBBYING

In the case of general fund financing, each interest group can increase its benefits either by lobbying the legislature to increase the share of the total budget that the group gets relative to others or by lobbying the legislature to adopt a tax structure that increases total revenues. However, if one group invests resources in lobbying for revenue-increasing tax rates, although total revenue collections increase, there is no guarantee that the particular group will benefit any more than others. In fact, if the other groups concentrate their resources in lobbying for larger shares of the budget, they may benefit more than the group that lobbies for the revenue-increasing tax rate. In the general fund setting, therefore, gains to each group are maximized if resources are invested in influencing the legislature for a larger share of the total "pie." The result is a situation in which interest groups compete for budget shares rather than for changes in the fiscal structure. If a particular group decides to invest resources in influencing the legislature to adopt revenue-increasing tax rates, such behavior would generate a positive externality to all other groups. Where there are many revenue-sharing interest groups, a classical prisoner's dilemma problem arises as a collusive outcome, one that would increase total tax revenues, becomes difficult to achieve. The consequence

AUTHORS' NOTE: William Shughart offered useful comments. The usual caveats apply.

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is that no interest group is likely to lobby effectively for revenue-increasing tax changes, but rather all groups will compete for the available revenues.

A rule of caution is necessary at this point. We do not intend to imply that under general fund financing tax rates will tend to be rigid. Lobbying activities may lead the legislature to increase tax rates. The point is, however, that the tax-rate changes under such a setting will not necessarily be revenue-enhancing.

Turning to the case where all revenues are earmarked, it is evident that the gains obtained by an interest group from investing resources in lobbying the legislature for budget shares are zero. The only way that a particular interest group would benefit is by lobbying the legislature to push for tax rates that increase the earmarked revenues. All gains from such lobbying activity are internalized—that is, no other group benefits. We would expect that, through the influence of the internalization, earmarking would generally lead to more revenues from a particular source.

In summary, the foregoing analysis suggests that rent-seeking groups will direct their lobbying activities either to increase total revenues or to obtain larger shares of the budget, based on the expected benefit from such lobbying. In the case of earmarking, lobbying for revenue-increasing taxes has the highest returns. Consequently, we would expect revenues from a particular tax to be greater if such revenues are earmarked for a particular function, ceteris paribus.

EMPIRICAL MODEL AND RESULTS

The federal motor fuel tax provides a convenient and direct way to assess the level of revenues under general fund and earmarked financing. Although a federal motor fuel tax was first imposed in 1931, revenues from the tax were not earmarked until 1956, following the enactment of the Highway Revenue Act of that year. Thus, between 1931 and 1956, revenues from the federal motor fuel tax were subject to competition by all interest groups. Following our previous analysis, we would expect that interest groups would have concentrated their resources in competing for the allocation of such revenues rather than lobbying for increases in fuel tax revenues. After 1956, a large share of the federal fuel tax was earmarked for highways. Our analysis suggests that under these circumstances the highway lobby would concentrate more resources in lobbying for fuel tax increases rather than lobbying for larger shares of the total budget. We would thus expect earmarking of motor fuel taxes to be associated with increases in highway tax revenues.

To test this hypothesis, we constructed the following empirical models:

\[
\text{LRFEDR} = a_0 + a_1 \text{LRGNP} + a_2 \text{LPCRUDE} + a_3 \text{LMVR} + a_4 \text{DUMMY} + a_5 T + a_6 T^2 + u \tag{1}
\]

\[
\text{LPRFEDR} = b_0 + b_1 \text{LPY} + b_2 \text{LPCRUDE} + b_3 \text{LMVR} + b_4 \text{DUMMY} + b_5 T + b_6 T^2 + u \tag{2}
\]

where

- \(\text{LRFEDR}\) = natural logarithm of real federal fuel tax revenues
- \(\text{LRGNP}\) = natural logarithm of real gross national product
- \(\text{LPCRUDE}\) = natural logarithm of real price of crude oil (well price per barrel)
- \(\text{LMVR}\) = natural logarithm of motor vehicles registered
- \(\text{DUMMY} = 0\) before the fuel tax revenues were earmarked, and 1 afterwards
- \(T\) = linear time trend
- \(T^2\) = nonlinear time trend
- \(\text{LPRFEDR}\) = natural logarithm of per capita real federal fuel tax revenues
- \(\text{LPY}\) = natural logarithm of per capita income
- \(u\) = regression error term.
Increases in real income are expected to increase tax revenues. Given that increased economic activity is normally associated with increased demand for transportation, we expect fuel consumption to increase as income increases, and therefore fuel tax revenues to increase. The more motor vehicles registered, the higher the demand for fuel; therefore, we expect a positive relationship between fuel-tax collections and the number of motor vehicles registered. In recent years, however, there has been an increase in the number of small, fuel-efficient cars in the United States. This implies that the level of fuel consumption may have increased at a lower rate when compared to the increase in the number of vehicles registered. Such an effect would mitigate the impact of motor vehicles registered on tax revenues. The real price of crude oil is entered in the model as a proxy for changes in the price of gasoline. The price of crude oil is used because it avoids the complications that would arise if prices for the various grades of gasoline were used. We expect increases in the price of crude oil to translate into higher gasoline prices, and therefore a reduction in the quantity of gasoline consumed. Given that a unit (per gallon) tax is normally imposed on gasoline, increases in the price of gasoline would lead to a reduction in tax revenue. Of course, the magnitude of such a reduction would depend on the price of elasticity of demand for gasoline. If a percentage tax is imposed on gasoline, price increases may lead to increases in the tax revenue, again depending on the elasticity of demand.

The focus of the article is on the relationship between tax revenues and the binary variable. If our theoretical framework on the behavior of interest groups is correct, we would expect a positive relationship between the binary variable and tax collections. Over the earmarked period, the interest group(s) benefiting from highway revenues would be expected to lobby more effectively for federal fuel-tax increases than over the period before earmarking. This would lead to larger fuel tax revenues, ceteris paribus. Finally, we included the linear time trend, T, to account for secular increases in fuel-tax revenues accounted for by factors other than the demand variables included in the model. A linear time trend is included to capture such effects as changes in the composition of the population. The signs of the coefficients on T and T^2 are indeterminant, a priori.

Using data for the United States for the period 1933 to 1982, we estimated the empirical models using an autoregressive procedure. The results of estimating various specifications of the models are shown in Tables 1 and 2.

The coefficients on the income variable are positive and significant in all specifications. As income increases, fuel-tax revenues also increase. The coefficients on the variable for the price of crude oil are negative and statistically insignificant. The coefficients on the variable for motor vehicles registered are positive in three of the four specifications where this variable is included, although they are not statistically significant. This may be explained by the registration of an increased number of fuel-efficient cars in the last few years. No consistent results are obtained for the linear time trend variable; however, the coefficient on the

**TABLE 1**

<table>
<thead>
<tr>
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<th>Models</th>
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<tr>
<td></td>
<td>1</td>
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<tr>
<td>Intercept</td>
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<td>(2.66)**</td>
<td>(1.67)</td>
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<tr>
<td>LRGNP</td>
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<td>(6.39)**</td>
<td>(4.29)**</td>
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<tr>
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<td>(0.26)</td>
<td>(-0.20)</td>
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<tr>
<td>LMVR</td>
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<tr>
<td></td>
<td>(-0.53)</td>
</tr>
<tr>
<td>DUMMY</td>
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<tr>
<td>(2.93)**</td>
<td>(2.92)**</td>
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<tr>
<td>T</td>
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<td>T^2</td>
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</tr>
<tr>
<td>R^2</td>
<td>0.83</td>
</tr>
</tbody>
</table>

NOTES: t-statistics in parentheses. R^2 is the adjusted coefficient of multiple determination. Asterisks denote significance at the 1% (**), 5% (*), and 10% (*) levels. An autoregression procedure was used to correct for autocorrelation.
nonlinear time trend variable is negative and statistically significant. The effect of earmarking on the level of fuel tax revenues is positive and significant in all specifications. This is consistent with our theoretical argument that earmarking changes lobbying activities from competition for revenues to that of increasing revenues.

Although the number of registered vehicles is a useful proxy for the demand for gasoline, there are other candidates in this regard. In particular, as the quality of roads has increased over time, the number of vehicle miles driven and hence the demand for gasoline has increased. The improvements in road quality have been largely due to increased and continued federal funding of road systems. Federal financing for highway construction has greatly reduced the cost of highway travel and has resulted in significant increases in the number of motor vehicle miles driven.

To account for these changes, we used motor vehicle mileage as an independent variable in the above models. Because the number of motor vehicles miles is likely to be dependent on the level of income, we regressed motor vehicle miles against the income variables and used the predicted values as instruments.\(^4\)

The regression results for these estimations are reported in Table 3. The variable for mileage is positive and significant in all specifications. The coefficients on the dummy variable are also positive and significant, suggesting again that earmarking of federal gasoline tax revenues resulted in an increase in such revenues.

**CONCLUSION**

This article does not claim to offer a normative judgement as to the superiority of either earmarking or general fund financing. Our task has been to present a testable hypothesis on the behavior of interest groups under the two different institutions of financing public services. Using the example of federal fuel tax revenues,
it has been demonstrated that earmarking leads to increased tax revenues in contrast with general fund financing. The empirical result is consistent with our argument that tax earmarking shifts special-interest incentives away from lobbying over shares of a given revenue pie toward lobbying for more revenues.

NOTES

1. See Buchanan (1963) and Goetz (1968) for early discussions of the efficiency aspects of earmarking and general fund financing.
2. Because the revenue effects of earmarking operate through the tax structure, we have omitted tax rates in the models presented here. It is important to note that federal gasoline tax rates changed before and after 1956. Expressed in real or percentage terms, the federal gasoline tax remained fairly constant from 1932 through the 1950s. It increased in the 1960s, and consistently declined over the remainder of the period studied. Our contention, however, is that whatever tax rates are chosen under earmarking will be revenue-enhancing relative to rates chosen under general fund financing.
3. All the data used in this study are from United States Historical Statistics, Colonial Times to 1970 (vols. 1 and 2) and U.S. Statistical Abstract (various issues).
4. The fitted values were obtained from the following regressions:

   \[
   \text{LMVM} = 0.53 + 0.90 \text{LRGNP} \\
   (0.48) \quad (5.03)*** R^2 = 0.28
   \]

   \[
   \text{LMVMP} = -0.74 + 1.81 \text{LPY} \\
   (-3.01)*** (7.50)*** R^2 = 0.47
   \]

   where,

   \[
   \text{LMVM} = \text{natural logarithm of motor vehicle miles} \\
   \text{LMVMP} = \text{natural logarithm of motor vehicle miles per capita.}
   \]

   \[
   \text{LRGNP and LPY are as previously defined.}
   \]

REFERENCES


Mwangi S. Kimenyi is Assistant Professor of Economics at the University of Mississippi. He obtained his Ph.D. from George Mason University in 1986, and has published several articles dealing with microeconomic issues of public policy.

Dwight R. Lee is Professor of Economics at the University of Georgia. He has published widely in microeconomic theory and public finance, and has also written numerous books.

Robert D. Tollison is Professor of Economics and Director of the Center for Study of Public Choice at George Mason University. He is a former president of the Southern Economic Association, and has published extensively in many fields of economics.