Government Budget Shares from Tourism: The Florida Case#

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INTRODUCTION

Many studies have documented the economic impacts on employment and income in states and local communities which flow from the development of a tourist industry (11). Other studies have provided some indication of the economic impact on government revenues attributable to tourism (4, 18, 19). Much less attention has been devoted in published studies to analyzing the shares of tourist-generated revenues flowing to local communities relative to state governments or to the relative impacts of tourism on the expenditure side of the budgets of state and local communities. This study explores the use of econometric techniques to identify the relationship between tourists and government budget components for both levels of government. Both time series and cross-section data from Florida are incorporated into traditional revenue and expenditure determinant models. Ordinary least squares techniques are utilized to estimate tourist elasticity coefficients for government budget components. Because revenue models utilizing income and population usually confront a severe degree of multicollinearity, ridge regression estimates are presented to indicate coefficient sensitivity to small data perturbations. The elasticity coefficients are used to indicate the relative shares of tourist affected revenues and expenditures. Since the relative shares will be related to the unique constitutional and statutory division of revenue sources and expenditure responsibility of each state, the specific empirical results are particular to the Florida case. Nonetheless, given the appropriate data, the methodology is transferable to any case.

THE REVENUE MODEL

The standard tax revenue estimating model developed by Groves and Kahn (8), expanded by Legler and Shapiro (13), and modified by Durden (4) to incorporate the role of tourists provides a framework for relating changes in tax revenues produced by expenditure based taxes to changes in tax rates and tax bases.[1] In the presence of tourists, total expenditure-

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based tax revenues are the sum of resident tax contributions and tourist tax contributions expressed as the identity

$$R \equiv R_r + R_T \tag{1}$$

Revenues are related to expenditures on taxed items and the tax rate. Expenditures are a function of relative prices and the respective populations and incomes of residents and tourists. In the absence of relative price data and data on tourist expenditures or incomes, we must assume relative prices do not change over the estimation period as well as rely on the annual number of tourists as a proxy for tourist expenditures. With these provisions we derive the reduced form equation as

$$R = f(y_R, P, T, t) \tag{2}$$

and for estimation purposes utilize a multiplicative model with equation (2) linearized via double log transformations as

$$R_i = A y_R^{E_1} T^{E_2} P^{E_3} t_i^{E_4} \tag{3}$$

where

y_R = resident personal income
T = number of tourists
P = resident population
t = ith tax rate
R_i = ith tax revenue
E_i = elasticity coefficient
A = antilog of the constant of integration

A model in this form has no more or no less validity on any *a priori* basis than an additive model. We have chosen this form as the one most utilized in the literature and as the one which provides direct estimates of the responsiveness of revenues to changes in tourists.[2]

Given that the reduced form equation of the structural model is utilized, the tourist elasticity coefficient may be interpreted as the sum of the direct and indirect contribution of tourists to the ith revenue source. That is, the coefficient reflects not only the direct taxes paid by tourists but the indirect contribution via the impact of tourist expenditures on resident income, resident expenditures and resident taxes stemming from the tourist presence.

The model is estimated with Florida data for seven state revenue sources using annual time series for the fiscal years 1970–1980.[3] State revenue sources are taxes on general sales (food at home, rent, medical excluded by law), cigarettes, gasoline, pari-mutuel events, alcoholic beverages, and licenses on hotels, restaurants and beverage establishments. These revenues constitute 66% of all own state revenue sources. Tax rates were constant over the sample period except for beverage taxes and licenses where a dummy variable was included to take account of the rate change. The model is estimated for three local government revenue

TABLE 1.
ELASTICITY COEFFICIENTS, SELECTED STATE REVENUES IN FLORIDA
OLS ESTIMATES FOR SELECTED YEARS 1970–1980

	Revenue Source						
Variable	Sales	Pari-mutuel Taxes	Cigarette Taxes	Beverage Taxes	Beverage Licenses	Hotel/Rest Licenses	Gas* Gallons
Intercept	5.22	−2.15	0.46	0.51	−0.87	−2.46	10.56
	(1.82)[a]	−(.20)	(.60)	(.45)	(2.73)	(1.15)	(11.79)
Personal Income	1.21	−0.08	−0.43	−0.17	−0.27	0.25	.867
	(2.16)	(.36)	(2.43)	(.50)	(2.90)	(.52)	(6.90)
Population	−1.31	2.07	2.80	2.35	1.91	−0.33	
	(.70)	(2.62)	(4.86)	(2.06)	(6.29)	(.21)	
Tourists	0.02	0.16	0.09	0.10	0.09	0.81	0.223
	(.04)	(.69)	(.53)	(.41)	(1.32)	(1.71)	(1.80)
Tax Rate Change				0.25	0.08		
				(3.92)	(4.61)		
Gas Price Index ÷ Consumer Price Index							−0.421
							(3.12)
$\bar{R}^2$	.96	.97	.97	.98	.99	.79	.99

*Adjusted for autocorrelation using Cochrane-Orcutt techniques.

[a]Number in parenthesis is t-ratio.

sources using cross-section data for eighteen Florida counties.[4] Local revenue sources are licenses, fines and forfeitures and commercial property taxes.[5] These revenues constitute 26% of locally derived revenues from all sources.

REVENUE ELASTICITY ESTIMATES

STATE REVENUES

Results of the OLS estimates in Table 1 reveal some not unexpected problems. First, the small sample size does not enable use of the Durbin Watson test for first order autocorrelation and guarantees high R^2 values. More importantly the substantial number of reversals of expected signs combined with insignificant coefficients clearly indicates a classic case of multicollinearity. Given the high simple correlation betwen the time series data on population, income and tourist, this condition is not surprising.

The exception probably holds for the gasoline gallons equation where we are able to estimate a standard demand function for quantity in terms of relative prices and income but including tourists as a proxy for tourists income. The coefficients are of the expected sign with the tourist coefficient significant at the 10% level. We interpret the coefficient as indicating that tourists would contribute both directly and indirectly approximately 22% of gasoline tax revenues.[6]

In order to provide the reader with some insight concerning the impact of the multicollinearity problem, a series of ridge regressions is performed on all data series excepting gasoline.[7] The ridge regression results in Table 2 trace the coefficient magnitudes as the parameter k assumes values from 0.0 to 0.20 in increments of 0.05. The reader will note that in nearly every case 1) the coefficients assume the expected sign for $k \leq 0.05$, and 2) either the income or population coefficient declines substantially for $k \leq .05$. Furthermore, the income coefficients, and to a lesser extent the population coefficients, tend to stabilize for $0.10 \leq k \geq 0.05$. The tourist coefficients achieve a 10% level of significance for $k \leq 0.10$ in most cases. The exceptions are cigarette and pari-mutuel taxes. Most of the tourist coefficients approach values generally accepted in Florida as representing the tourist contribution to selected taxes.[8] The significant exception is in the cases of sales and cigarettes.

An alternative version of the model including the unemployment rate in the sales tax equation and employing Cochrane-Orcutt techniques to adjust for autocorrelation was estimated as[9]

$$\begin{aligned} \text{Sales Tax} = \underset{(3.45)}{2.09} + \underset{(2.73)}{1.02}\ \text{Population} + \underset{(6.06)}{.66}\ \text{income} \\ + \underset{(1.90)}{.183}\ \text{Tourists} - \underset{(16.51)}{.174}\ \text{Unemployment} \end{aligned}$$

$$\bar{R}^2 = .99 \qquad \text{D.W.} = 2.02$$

TABLE 2.
RIDGE REGRESSION COEFFICIENTS FOR SELECTED STATE REVENUES

	Intercept	DPY	POP	Total Tourists	Tax Rate Change	$\bar{R}^2$
Sales						
k = 0.00	5.22(1.82)	1.21(2.16)	−1.31(0.70)	.02(0.04)		.96
k = 0.05	1.45(1.70)	.44(5.01)	1.08(2.95)	.51(1.38)		.94
k = 0.10	1.22(1.65)	.38(6.58)	1.17(4.36)	.60(1.90)		.94
k = 0.15	1.17(1.69)	.35(7.48)	1.17(5.18)	.64(2.32)		.94
k = 0.20	1.18(1.76)	.34(8.03)	1.15(5.73)	.67(2.69)		.93
Pari-mutuel						
k = 0.00	−2.15(0.20)	−.08(0.36)	2.07(2.62)	.16(0.69)		.97
k = 0.05	.80(1.79)	.17(3.14)	1.08(5.38)	.19(0.97)		.96
k = 0.10	.86(2.17)	.19(5.02)	.93(6.48)	.25(1.47)		.95
k = 0.15	.88(2.35)	.19(6.13)	.86(7.08)	.28(1.91)		.95
k = 0.20	.91(2.48)	.18(6.83)	.81(7.45)	.31(2.29)		.94
Cigarettes						
k = 0.00	.46(0.60)	−.43(2.43)	2.80(4.86)	.09(0.53)		.97
k = 0.05	2.42(5.31)	.07(1.22)	1.04(5.10)	.04(0.21)		.91
k = 0.10	2.54(5.43)	.10(2.71)	.83(5.50)	.10(0.54)		.90
k = 0.15	2.59(6.55)	.12(3.62)	.73(5.76)	.13(0.85)		.89
k = 0.20	2.62(6.83)	.12(4.22)	.67(5.95)	.16(1.13)		.88

TABLE 2.—CONTINUED

Beverage Taxes						
k = 0.00	.51(0.45)	−.17(0.50)	2.35(2.06)	.10(0.41)	.25(3.92)	.98
k = 0.05	1.44(2.80)	.20(4.62)	.95(6.00)	.27(1.31)	.18(4.28)	.97
k = 0.10	1.40(3.07)	.21(6.54)	.86 (7.04)	.34(1.99)	.17(4.25)	.97
k = 0.15	1.38(3.23)	.21(7.48)	.81(7.43)	.38(2.55)	.16(4.23)	.97
k = 0.20	1.38(3.36)	.20(8.00)	.77(7.58)	.40(3.01)	.16(4.20)	.97
Beverage Licenses						
k = 0.00	−.87(2.73)	−.27(2.90)	1.91(6.29)	.09(1.32)	.08(4.61)	.99
k = 0.05	.19(0.73)	.09(4.61)	.63(7.91)	.16(1.65)	.03(1.57)	.98
k = 0.10	.24(1.05)	.10(6.84)	.55(8.48)	.19(2.33)	.03(1.72)	.97
k = 0.15	.28(1.30)	.10(7.94)	.50(8.67)	.20(2.89)	.03(1.92)	.97
k = 0.20	.31(1.53)	.10(8.54)	.47(8.71)	.22(3.35)	.03(2.11)	.96
Hotel/Restaurant Licenses						
k = 0.00	−2.46(1.15)	.25(0.52)	−.33(0.21)	.81(1.71)		.79
k = 0.05	−2.82(3.55)	.12(1.27)	.18(0.50)	.74(2.13)		.79
k = 0.10	−2.71(4.10)	.12(1.96)	.27(1.15)	.67(2.40)		.78
k = 0.15	−2.63(4.26)	.12(2.32)	.39(1.49)	.63(2.57)		.78
k = 0.20	−2.55(4.37)	.12(2.69)	.32(1.84)	.59(2.74)		.77

Note: Numbers in parenthesis are t-ratios.

These results, while generating population and income coefficients only slightly larger than those in the ridge regressions, provide a tourist coefficient with a more reasonable magnitude. We are unable to improve on the cigarette or pari-mutuel tax equations.

While recognizing the statistical imperfections of these estimates we are inclined to select tourist coefficient magnitudes from the ridge regressions where k = .10 and attribute the following shares to tourists: Beverage taxes, 34%; Beverage licenses, 19%; hotel and restaurant licenses 67%; pari-mutuel taxes, 25%; and cigarette taxes, 10%.[10] And if the sales tax share from the alternative model is taken at 18% while the gasoline tax share is at 22%, the total tourist contribution for these sources based upon state revenues for fiscal year 1980 is $628.6 million or 19.8% of revenues from these sources. Using survey data from the U.S. Travel Data Center, the Florida Division of Tourism attributed tourists with contributing $785.7 million in tax revenues for calendar year 1980.(6).

LOCAL REVENUES

OLS estimates for licenses, fines and forfeitures and commercial property taxes in Table 3 also suggest significant multicollinearity and ridge regressions coefficients for k = 0.05 and k = 0.10 are included in Table 3. In the OLS estimates (k = 0.00), the tourist coefficient is significant at

TABLE 3.
OLS AND RIDGE REGRESSION COEFFICIENTS
SELECTED LOCAL GOVERNMENT REVENUES IN FLORIDA
FISCAL YEAR ENDING SEPTEMBER 30, 1979

Variable	Licenses	$\bar{R}^2$	Fines	$\bar{R}^2$	Commercial Property Tax	$\bar{R}^2$
Intercept						
k=0.00	−5.08(1.59)	.74	−2.02(1.01)	.77	−7.90(4.38)	.88
k=0.05	−0.84(0.44)	.69	0.46(0.39)	.74	−6.15(5.96)	.87
k=0.10	−0.54(0.30)	.68	0.74(0.67)	.73	−5.95(6.08)	.87
Personal Income						
k=0.00	2.83(2.18)		1.55(1.90)		1.28(1.73)	
k=0.05	0.72(3.66)		0.38(3.19)		.46(4.38)	
k=0.10	0.58(4.25)		0.31(3.75)		.41(5.58)	
Population						
k=0.00	−2.17(1.48)		−1.21(1.32)		−0.61(0.74)	
k=0.05	−0.17(0.81)		0.09(0.71)		0.28(2.41)	
k=0.10	.30(2.12)		0.17(1.94)		0.32(4.22)	
Tourists						
k=0.00	0.42(1.16)		0.57(2.49)		0.50(2.42)	
k=0.05	0.27(0.81)		0.45(2.19)		0.43(2.38)	
k=0.10	0.28(0.93)		0.43(2.31)		0.43(2.59)	

Note: Numbers in parentheses are t-ratios.

the 5% level only for fines and property taxes. Because we are unable to exlude forfeiture revenue from the total, this coefficient is likely to be overstated. However, taking the coefficient as representative of the tourist contribution would mean tourists contribute via this revenue source less than one half of one percent of local government revenues in Florida.

The tourist coefficient on property taxes where $k \geq .05$ would indicate tourists contribute 43% of commercial property tax revenues in Florida. Previous studies of the tourist contribution to Florida sales taxes imposed on businesses such as hotels, restaurants, department stores, clothing stores, variety stores, and jewelry stores indicate that on average tourists pay approximately 43% of the sales tax collected from these businesses as a group. (18). If tourists are alleged to pay only 20% of sales tax collected from all types of business, the tourist elasticity coefficient in the commercial property tax equation lies at the higher end of this range.[11] Given that commercial property tax revenues average 14.87% of total property taxes across the eighteen county sample, tourists probably contribute on average between 3.0% and 6.4% of total property tax revenues (.20* .1487 and .43* .1487). Since total property taxes generate only 24.6% of locally derived revenues in Florida, tourists would contribute a maximum of 1.56% (.064 * 24.6) via property taxes. Combined with revenues from fines, tourists would contribute approximately 2% of local revenues.

THE EXPENDITURE MODEL

Expenditure determinant models in the public finance literature have utilized OLS techniques to explain both aggregate and per capita state and local government expenditures as functions of variables such as population density, percentage change in population, percent owner occupied homes, percent of commercial property on the tax roll, and various socioeconomic indices. Among the most recent investigations which relate selected expenditures to income, population, and tax share include Borcherding and Deacon (2) as well as Bergstrom and Goodman (1).

In the presence of tourists, the demand for the ith community service is the sum of demands by residents and by tourists where demand is reflected in budgeted expenditures, E_i or

$$E_i = D^R_i + D^T_i \qquad (4)$$

In accordance with Bergstrom and Goodman (BG), resident demand for any particular public service in a community is taken as a function of income, tax share, population and other factors specific to the community including but not limited to density, population age distribution, etc. and is written

$$D^R_i = f(y_R, t(y_r), P_R, X,) \qquad (5)$$

In contrast, tourists do not possess a demand for services in the traditional meaning of demand functions. The relative level of services available and

TABLE 4.
OLS AND RIDGE REGRESSION COEFFICIENTS
SELECTED STATE EXPENDITURES IN FLORIDA
FISCAL YEARS 1971-1980

	Intercept	Income	POP	Lagged Tourist Person Days	$\bar{R}^2$
Current Operations of Roads					
k = 0.00	6.50(2.54)	1.36(2.25)	−1.67(0.77)	−0.68(2.08)	.76
k = 0.05	3.00(3.18)	0.48(2.86)	0.62(0.95)	−0.31(1.27)	.64
k = 0.10	2.57(3.05)	0.34(3.09)	0.71(1.52)	−0.18(0.92)	.58
k = 0.15	2.41(2.95)	0.29(3.23)	0.69(1.83)	−0.11(1.83)	.54
k = 0.20	2.33(2.89)	0.25(3.32)	0.66(2.05)	−0.06(0.46)	.51
Corrections Total					
k = 0.00	−1.13(4.39)	−1.23(2.01)	10.64(4.90)	−0.25(0.77)	.97
k = 0.05	−4.74(3.65)	0.27(1.19)	4.22(4.64)	−0.06(0.18)	.91
k = 0.10	−4.09(3.35)	0.38(2.37)	3.27(4.92)	0.09(0.30)	.89
k = 0.15	−3.70(3.11)	0.41(3.13)	2.83(5.19)	0.17(0.71)	.87
k = 0.20	−3.48(2.92)	0.41(3.67)	2.57(5.41)	0.23(1.08)	.86
Police Protection					
k = 0.00	0.10(0.08)	0.69(2.38)	0.71(0.69)	−0.05(0.29)	.98
k = 0.05	−0.87(2.08)	0.41(5.50)	1.26(4.28)	0.11(1.00)	.97
k = 0.10	−0.94(2.47)	0.36(7.04)	1.22(5.81)	0.17(1.89)	.97
k = 0.15	−0.93(2.44)	0.33(7.98)	1.18(6.73)	0.20(3.17)	.96
k = 0.20	−0.89(2.28)	0.32(8.56)	1.14(7.34)	0.22(3.17)	.96

TABLE 4.—CONTINUED

Judicial Control (Courts)					
k = 0.00	−7.12(1.70)	0.21(0.21)	7.78(2.21)	−1.17(2.19)	.92
k = 0.05	−4.76(3.15)	0.65(2.45)	4.26(3.98)	−0.58(1.45)	.88
k = 0.10	−4.61(3.23)	0.62(3.26)	3.40(4.33)	−0.28(0.85)	.85
k = 0.15	−4.51(3.15)	0.58(3.72)	2.97(4.53)	−0.12(0.42)	.83
k = 0.20	−4.42(3.05)	0.55(4.02)	2.70(4.67)	−0.01(0.58)	.81
Fish/Game Commission					
k = 0.00	4.24(2.25)	1.60(3.62)	−2.38(1.51)	−0.46(1.93)	.93
k = 0.05	0.08(0.09)	0.56(3.84)	0.61(1.05)	−0.13(0.61)	.84
k = 0.10	−0.37(0.50)	0.42(4.21)	0.42(1.91)	−0.02(0.15)	.81
k = 0.15	−0.53(0.72)	0.36(4.50)	0.82(2.44)	0.03(0.25)	.79
k = 0.20	−0.59(0.81)	0.32(4.71)	0.82(2.83)	0.07(0.51)	.78
Parks					
k = 0.00	−14.83(1.65)	−1.75(0.85)	11.95(1.64)	−0.18(0.16)	.66
k = 0.05	−6.20(2.15)	0.12(0.24)	4.29(2.18)	−0.06(0.08)	.58
k = 0.10	−5.33(2.17)	0.28(0.85)	3.22(2.38)	0.07(0.12)	.56
k = 0.15	−4.95(2.13)	0.32(1.27)	2.74(2.57)	0.15(0.32)	.54
k = 0.20	−4.70(2.09)	0.34(1.59)	2.46(2.74)	0.20(0.50)	.53
TOTAL Roads					
k = 0.00	10.89(3.59)	2.20(3.21)	−3.61(1.42)	−1.03(2.67)	.83
k = 0.05	4.67(3.63)	0.75(3.25)	0.65(0.71)	−0.47(1.39)	.66
k = 0.10	3.95(3.35)	0.53(3.36)	0.86(1.32)	−0.38(1.00)	.58
k = 0.15	3.67(3.18)	0.44(3.44)	0.87(1.66)	−0.17(0.74)	.55
k = 0.20	3.54(3.09)	0.38(3.49)	0.86(1.88)	−0.11(0.52)	.50

the tourist share of taxes are likely arguments in a tourist's demand function for vacation sites. Furthermore, the tourist tastes and income level will undoubtedly influence the level of services expected from a vacation site. However, having chosen a vacation site, tourists will utilize services in that community largely in terms of their numbers and length of stay.

Expenditure levels on the ith service in a community are assumed to represent an equilibrium between the quantity of that service and the combined use of that service by residents and tourists. Resident demand is represented by resident income and resident population, while tourism "demand" is represented by tourist person days.[12] With these provisions a model of the following form was estimated:

$$E_i = A \, y_R^{e_1} \, P_R^{e_2}, \, T_{-1}^{e_3} \tag{6}$$

where

E_i = ith expenditure category
y_R = resident personal income
P_R = resident population
T_{-1} = tourist person days lagged
e_i = elasticity coefficients
A = antilog of the constant of integration

The model is estimated with Florida data for eight state expenditure categories using annual time series for the fiscal years 1971–1980.[13] State expenditure categories are for roads (operations only and total including capital outlay), courts, total corrections, police protection, fish and game commission, and parks. The model is estimated using cross section data for eighteen Florida counties for fiscal year 1979 for the following expenditure categories: general government; public safety (police and fire); roads; and parks and recreation.[14]

EXPENDITURE ELASTICITY ESTIMATES

STATE EXPENDITURES

OLS estimates for the expenditure model in Table 4 exhibit multicollinearity problems similar to those experienced in the revenue model. In the ridge regression estimates the lagged tourist coefficients take on the correct sign in the case of total corrections expenditures, police protection, and parks. However, the tourist coefficient is significant at the 10% level or better only in the case of police protection for $k \geq .10$. Population and income elasticities in all ridge regressions assume the expected sign and tend to stabilize at reasonable magnitudes for values of k between 0.05 and 0.10. Given that the tourist population is equal to approximately 14% of resident population in Florida on any given day, a tourist elasticity coefficient of .17 in the police protection equation is probably of reasonable magnitude. Nonetheless, given the statistical problems, the estimate is one with a high risk.

There are at least three explanations for the unsatisfactory results for this model. First, the small sample size and attendant multicollinearity create high risk estimates. Second, the expenditure series reflect changing legislative priorities from year to year and embody inherently lumpy capital outlays for program expansion, enhancement or upgrading. For this reason, even were the legislature consciously and systematically to incorporate the level of tourism into needs projections, the relationship between tourism and expenditures is likely to be a haphazard outcome.[15] Third, the possibility exists that the level of tourism is simply not a determinant of the level of direct state expenditures, i.e., state expenditures are programmed in accordance with resident population levels regardless of tourism levels. If so, the costs of services impacted upon by tourists will take the form of congestion costs and will be borne by residents and tourists alike in the form of crowded highways, parks and beaches and possibly higher crime rates and court backlogs.

LOCAL EXPENDITURES

We again resort to ridge regression estimates in Table 5 in seeking to assess the tourism component of local expenditures. As in the previous models coefficients for income, population, and tourists take on the expected sign at values of $k \leq 0.05$, with income and population elasticities tending to stabilize at reasonable magnitudes for k between 0.05 and 0.10. The tourist elasticity coefficient attains statistical significance at the 10% level only in the case of public safety expenditures with $k = 0.10$ and for park and recreational expenditures with $k = 0.15$. While the tourist coefficient magnitudes for public safety of .25 and .19 for parks and recreational expenditures are not unreasonable magnitudes, we are unable with any certainty to assert these as the "true" impact of tourists on these services.

SUMMARY

The use of OLS regression techniques to assess the contribution of tourists to revenues and expenditures of local communities in Florida relative to the state government was hampered by severe multicollinearity problems in association with a small data sample. Alternative estimates of tourist elasticity coefficients utilizing ridge regression provided acceptable though admittedly higher risk assessments of the tourist share of revenues but in general failed to establish relationships between tourists and expenditures.

Based upon the ridge regression estimates, the share of state revenues from sales, cigarettes, beverages, pari-mutuel events, gasoline and hotel/restaurant licenses attributed to tourists is approximately 20% while the share of local revenue from fines and commercial property taxes is 2 percent.[16] Based on the ridge regression results, tourists were found to impact

TABLE 5.
OLS AND RIDGE REGRESSION COEFFICIENTS
SELECTED LOCAL GOVERNMENT EXPENDITURES IN FLORIDA
FISCAL YEAR ENDING SEPTEMBER 30, 1979

General Government					
k=0.00	4.14(2.63)	0.27(0.44)	0.71(0.99)	−0.05(0.28)	.91
k=0.05	3.65(4.71)	0.42(5.11)	0.47(5.42)	0.02(0.21)	.91
k=0.10	3.59(4.89)	0.41(6.95)	0.44(7.50)	0.08(0.58)	.90
k=0.15	3.58(5.01)	0.40(7.79)	0.43(8.50)	0.10(0.91)	.90
k=0.20	3.60(5.13)	0.38(8.24)	0.41(9.01)	0.13(1.20)	.89
Public Safety					
k=0.00	0.89(0.58)	1.01(1.69)	−0.07(0.10)	0.24(1.35)	.94
k=0.05	1.89(2.45)	0.53(6.51)	0.44(5.05)	0.23(1.57)	.94
k=0.10	1.96(2.70)	0.49(8.37)	0.45(7.68)	0.25(1.96)	.93
k=0.15	2.03(2.31)	0.46(9.20)	0.45(9.01)	0.27(2.32)	.93
k=0.20	2.11(3.05)	0.45(9.70)	0.44(9.76)	0.29(2.63)	.93
Roads					
k=0.00	−7.98(1.87)	−0.48(0.45)	1.57(1.30)	−0.11(0.35)	.78
k=0.05	3.04(2.29)	0.34(2.41)	0.56(3.73)	0.05(0.22)	.77
k=0.10	2.92(2.34)	0.36(3.66)	0.49(4.87)	0.10(0.46)	.76
k=0.15	2.89(2.41)	0.36(4.30)	0.46(5.44)	0.13(0.67)	.76
k=0.20	2.89(2.51)	0.36(4.70)	0.43(5.79)	0.16(0.85)	.76
Recreation					
k=0.00	−0.44(0.28)	0.90(1.48)	0.27(0.39)	0.11(0.62)	.95
k=0.05	0.06(0.08)	0.60(7.34)	0.56(6.35)	0.14(1.00)	.95
k=0.10	0.08(0.11)	0.56(9.52)	0.55(9.21)	0.19(1.45)	.95
k=0.15	0.11(0.16)	0.54(10.42)	0.53(10.55)	0.22(1.85)	.94
k=0.20	0.17(0.24)	0.52(10.84)	0.52(11.20)	0.25(2.19)	.94

only on state expenditures for police protection (17%) and local expenditures for fire and police (25%) and park and recreational expenditures (19%). These are high risk estimates.

Because a link between tourism and government expenditures is not successfully established in this study, no measure of the relative size of the impact of tourists on the total budget structure of state and local communities in Florida is derivable from this study. The results do provide support for the proposition that governments who rely most heavily on expenditure-based taxes will receive the most revenue benefit from tourism. In the Florida case that implies a significantly larger portion of tourist generated revenues will accrue to the state government than to local governments.

The weak linkage between tourism and expenditures may be inherent in the particular data set. In particular it may be that the effects of tourism are reflected in budgeted expenditures with a lag which exceeds the period reflected in the data set. An alternative hypothesis which is entirely consistent with this "extended response" hypothesis is the congestion hypothesis. The congestion hypothesis implies that governments determine budgeted expenditures levels in terms of resident demands allowing the impact of tourists to be reflected in congested facilities particularly in periods of peak tourist activity. The literature concerning congestable public goods offers a framework for examining this proposition but the implementation of such a framework requires usage level data on public services which are difficult to acquire and which are not currently available for this study. (9). Future researchers may find the "congestion approach" to be the necessary step. However, application of the models utilized in this study incorporating alternative data sets from other states may provide additional insights as to the relationship between tourism and government budgets.

FOOTNOTES

[1]More recent applications of the standard model include Friedlaender, Swanson and Due, (7); Wilford, (22); and Mikesell, (14). The standard model has been developed under the assumption that taxes are either income based or consumption based. We assume that fees and taxes levied on business are fully shifted forward and act as sales taxes. Since Florida has no income tax, this component is deleted. The work of Hogan and Shelton suggests that a state's revenue structure is likely to be tailored to taxes which maximize its tax exportability potential. In a tourist state that implies excise taxes on consumer goods. (10).

[2]Wilford (22) utilized both the additive and multiplicative version in his study of income and population elasticities in Louisiana with generally equivalent results. Use of per capita income generated slightly larger elasticities as would be expected but otherwise did not alter the results.

[3]Revenue data are from the *Annual Report of the Comptroller* (15). Population data are from the *Florida Statistical Abstract* (3). Tourist arrivals are from quarterly surveys compiled by the Florida Division of Tourism (6). Florida personal income is from the *Florida Tax Handbook* (5). All data are structured on a fiscal year basis. Sales taxes, beverage licenses, and gasoline equations are estimated for 1970–1980. All other revenues are for 1970–1979.

[4]The eighteen counties are: Bay, Brevard, Broward, Collier, Dade, Duval, Escambia, Hillsborough, Lake, Lee, Monroe, Okaloosa, Orange, Osceola, Palm Beach, Pinellas, Sarasota, and Volusia. These counties account for 75% of Florida population, 78% of personal income, and 82% of tourist arrivals by county of destination. Revenue data for fiscal year ending September 30, 1979 are from the *Local Government Financial Report* (16). Income data are from *Local Area Personal Income (21)*. Population data are from the *Florida Statistical Abstract* (3). Data are for county and city governments within the county and include all special districts except school districts.

[5]License revenues arise primarily from the issuance of professional and occupational licenses to businesses. Fines and forfeiture revenues accrue through penalties for violations of rules and regulations, and for statutory offenses. They include parking and traffic tickets, library fines, performance bond forfeitures, etc. We are unable to separate revenues by each category. Locally derived

revenues from franchise taxes, utility taxes and charges for services (garbage, trash, water, sewer) have been excluded given the inability to isolate the respective portions imposed directly on business and directly on residents and given the non uniform treatment of these services among the governmental units in the sample.

[6]This interpretation rests on the assumption that the average tourist and marginal tourist are identical. This assumption appears reasonable on the basis of the relatively insignificant change in the characteristics of Florida tourists over the sample period. The relative price variable is the ratio of an index of gasoline prices per gallon to the consumer price index. Gasoline prices are from the *Oil and Gas Journal* (17). Gasoline consumption data are from the *Florida Statistical Abstract* (3). Income is deflated by the consumer price index.

[7]Ridge Regression has been utilized as a procedure to investigate the sensitivity of OLS estimates when the data exhibit severe multicollinearity. Variances of the sample observations are increased by a fixed parameter, k, while holding co-variances constant. As a result simple correlation between the variables is reduced. OLS estimates can proceed utilizing the data set containing the enhanced variances; i.e., the diminished simple correlation. By inputing different values of k between 0 and 1, in a series of ridge regressions, we can trace the impact on the estimated coefficients. For $k = 0.00$, the normal OLS estimates exist. A ridge trace, however, will not necessarily produce improved estimators but will indicate the sensitivity of the coefficients to a small data perturbations. Furthermore, selection of the appropriate value of k is not analytically based but may be related to criteria such as stability of coefficients as k varies, reasonable magnitude of coefficients, and/or reasonable signs. For a discussion of ridge regression and its use, the reader is referred to Judge, Griffiths, Hill and Lee (12, pp. 471-487).

[8]The Florida Division of Tourism asserts that tourists contribute 25% of pari-mutuel taxes, 10% of cigarette taxes, 23% of combined beverage licenses and taxes, 29.2% of gasoline taxes. See (6). The Department of Revenue attributes 20% of sales taxes to tourists. No alternative estimates exist for hotel and restaurant licenses.

[9]Both employment and construction sales in Florida are positively related to the ability of people in other states to sell their homes and export both themselves and their wealth to Florida. Construction sales contribute significantly to sales tax revenues. However, a unique portion of Florida personal income is noncyclical and related to transfer income from pensions, annuities, trusts, etc. For these reasons, income alone will poorly reflect cyclical fluctuations in sales tax revenues whereas unemployment may.

[10] Ten percent is a reasonable magnitude for cigarettes considering the relative factors. If only one-fourth of the 33 million tourists stayed only an average of 9 days and purchased 9 packs, given the 21 cent per pack tax, the direct tourist contribution would be $16.1 million. Ten percent of fiscal 1980 collections is 18.2 million.

[11]Since it seems highly likely that some counties, especially the larger counties, contain commercial establishments structured to attract in-state shoppers from neighboring counties, it is possible that the out-of-state tourist variable is picking up the influence of in-state shoppers and, as a result, is biased upward. Some evidence of this phenomenon is confirmed in the pattern of residuals from the estimating equation. Commercial property tax values for large counties tend to be underestimated in the equation, while those for small counties tend to be overestimated.

[12]A tourist person day represents one tourist in the state one day. Tourist person days are calculated by weighting the quarterly tourist count for air and auto tourists by their respective length of stay. Dividing this figure by 365 days would convert this result to the average number of tourists on any given day. However, we saw no need to make this conversion since it is merely dividing through all observations by a constant. The tax share variable was dropped for data reasons.

[13]The tourist variable is lagged one time period 1) to reflect the probable lag in both appropriating and expending funds, i.e., policy workers can only respond to changes in tourism after the fact. Expenditure data are from the U.S. Census (20). All other data are from sources used to obtain revenue model results.

[14]Average length of stay of tourists by county was unavailable and the lagged number of tourists had to be used. Expenditure data are from *Local Government Finances in Florida* (16). All other data are from sources used in the revenue model.

[15]A variation of this argument suggested by an anonymous reviewer is that because expenditures may tend to increase only periodically in a stair step fashion, constant expenditure levels would preclude finding any relationship via regression techniques. In real per capita terms expenditures increased something less than one percent per year.

[16]An additional 2.5% of local revenues are contributed by tourists through receipt by local communities of state collected locally shared sales, cigarette, beverage, and racing taxes.

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