CIGARETTE TAX RATES AND CIGARETTE TAX REVENUES*

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INTRODUCTION

ALL 50 STATES IMPOSE A SEPARATE EXCISE TAX on cigarettes, set in cents per pack. In addition to the excise tax, almost all states include the retail price of cigarettes, inclusive of the tax, in the sales tax base. In 2004 six states also had local cigarette excise taxes.

This paper estimates the relationship between state and local cigarette tax rates and tax revenues. The model takes account of cross-border shopping effects, lags in adjustment, and non-linearities in revenue responses.

The first section of the paper provides a descriptive picture of state and local cigarette taxation, focusing on geographic patterns and trends over time. In the second section I discuss the modeling strategy and data. The third section presents the basic results. The fourth section presents robustness tests. The fifth section concludes.

THE IMPORTANCE OF CIGARETTE TAXES IN STATE REVENUE SYSTEMS

National average rates of cigarette taxation from 1972 to 2004, in cents per pack, adjusted to 2005 price levels, are shown in Figure 1. Average rates declined by 50 percent between 1972 and 1985, and then increased slowly between 1985 and 1995. By 2004 rates were double their level of 1997, reaching 85 cents per pack for the excise tax alone, and $1.12 for the sales tax inclusive rate. Since the end of 2004, nine states have raised their excise tax rates, by an average amount of 52 cents per pack. The average state excise tax rate in February of 2006 was 91.7 cents per pack (Campaign for Tobacco-Free Kids, 2006).

As shown in Figure 2, tobacco tax revenues were flat between 1980 and 2001, and only began to increase after 2001. The drop in revenue from 1972 to 1980 reflects both the decline in real tax rates and reductions in smoking prevalence. The flat revenue period shows the offsetting effect of modest increases in tax rates and continued decline in rates of smoking. Only under very rapid rates of increase in the tax rate in the 2000s, have revenues shown a noticeable increase, reaching $60 per capita. The last time cigarette revenues were this high was in 1978.

Figure 3 shows cigarette tax revenues as a share of tax revenues, both for the nation and for the five highest states and the five lowest states. Between 1976 and 2002 cigarette taxes fell from almost 5 percent of state taxes to a little more than 2 percent. In 2002 the share began to rise, reaching 2.7 percent in 2004. The share in 2004 was the highest since 1986. In 2004, cigarette taxes comprised more than 4.5 % of revenues in the high tax states. Over time, the highest and lowest tax states have become more regionally concentrated. In 2004, the five lowest were Kentucky, North Carolina, South Carolina, Virginia, and Mississippi. In 2004, the five highest were New Jersey, New York, Rhode Island, Massachusetts, and Connecticut. While the low tax states have kept their real tax rates practically unchanged, the high tax states converged towards the average until about 1980, then gradually widened the gap. As of 2004, the gap between high and low is by far the highest it has been in the sample period, equal to about $1.70 per pack. By 2006, the gap in the highest state tax (Rhode Island) and the lowest (Missouri) was $2.29.

ESTIMATING THE EFFECT OF TAX RATES ON CIGARETTE TAX REVENUES

Specification

Per capita tobacco tax revenues in a given state i in year t are equal to

(1) $$REV_{i,t} = \tau_{i,t} \cong TAXABLE\ CONS_{i,t}$$

Assume that taxable consumption of cigarettes is a function of the retail price, the retail price in neighboring states, and income. Since the main cross-state source of variation in price is the state cigarette excise tax, I use the tax rate as the measure of price. is The own state tax rate is τ, the neighbor state is τ_n, and income is Y.

(2) $$Q_{tax} = a_0\, \tau^{a1}\, \tau_n^{a2}\, Y^{a\Sigma}$$

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Figure 1: **State and Local Cigarette Tax**

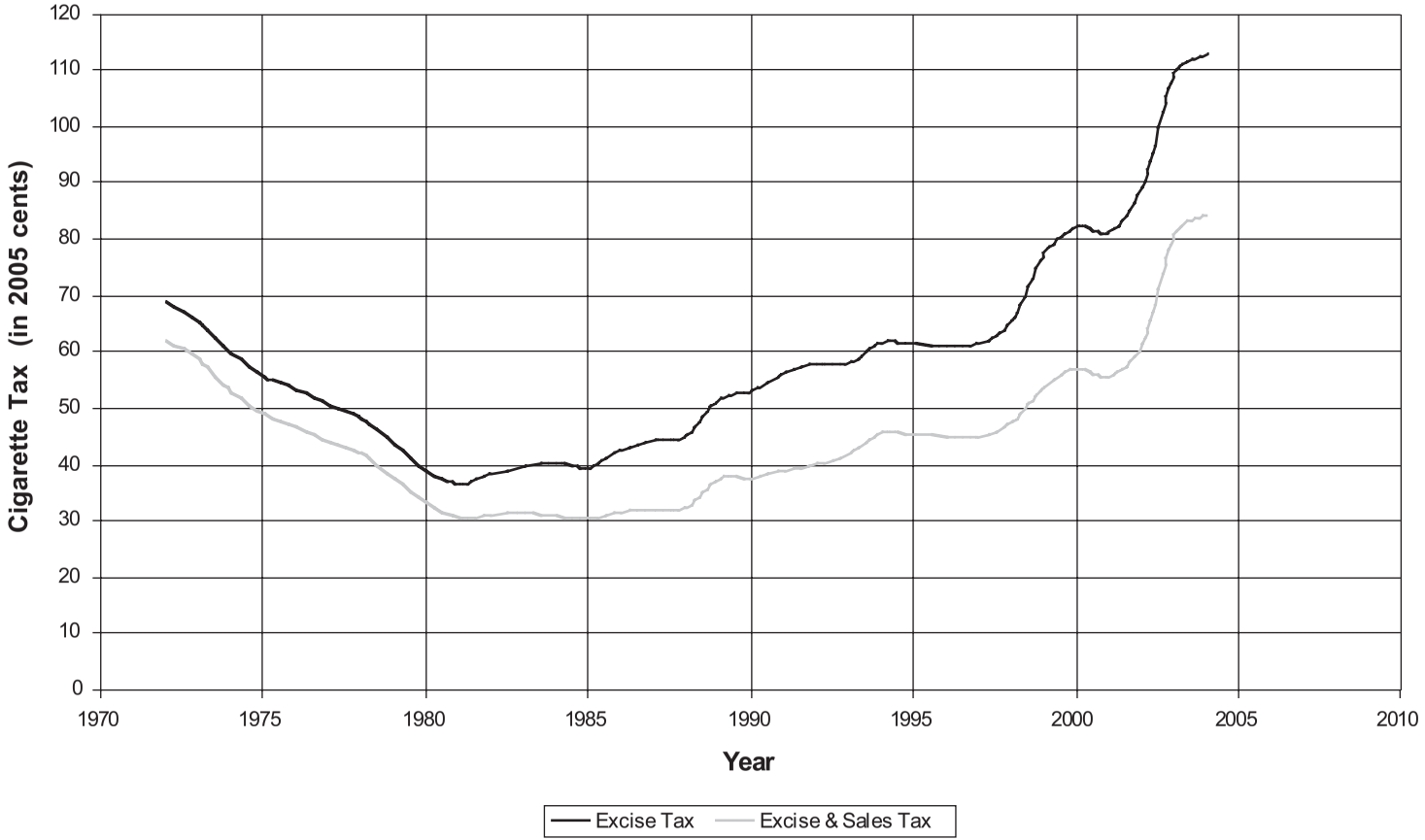


Figure 2: **State and Local Cigarette Tax Revenue Per Capita**

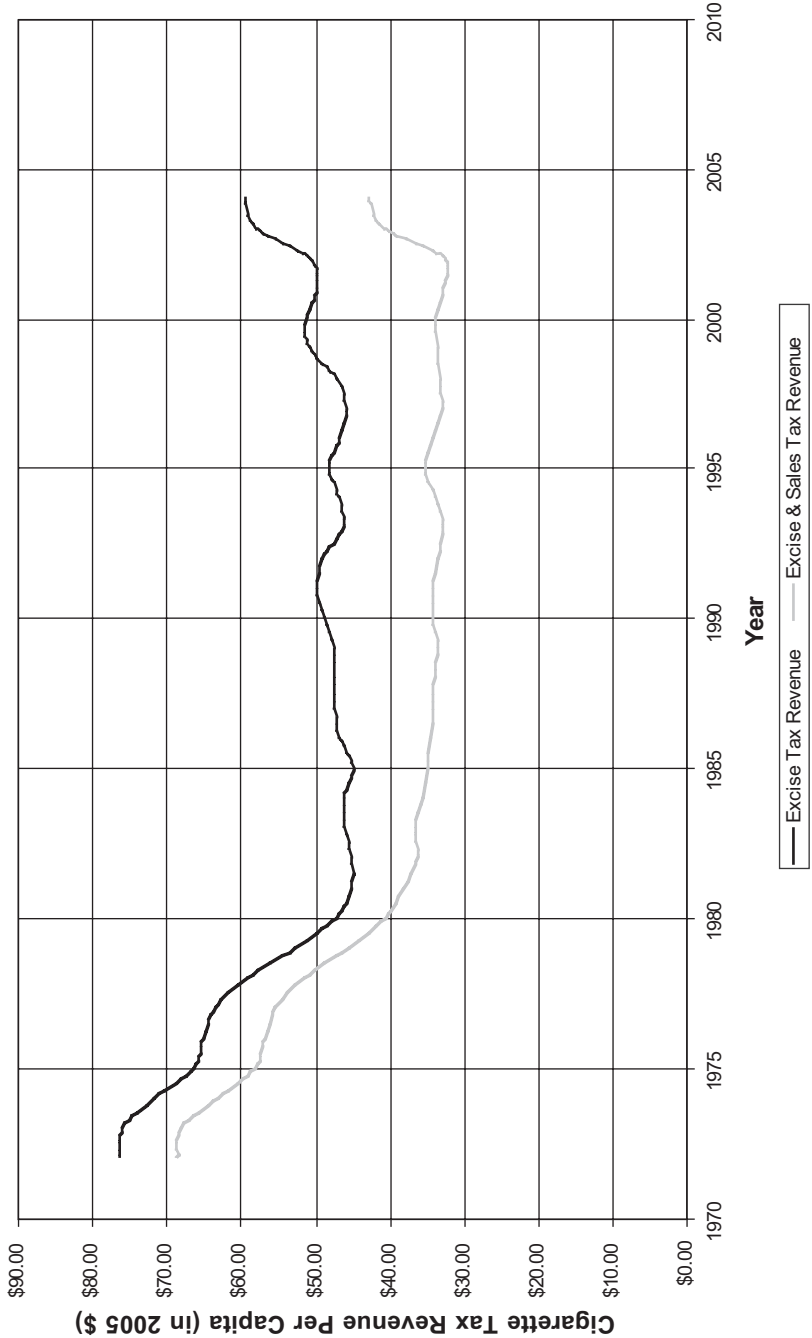
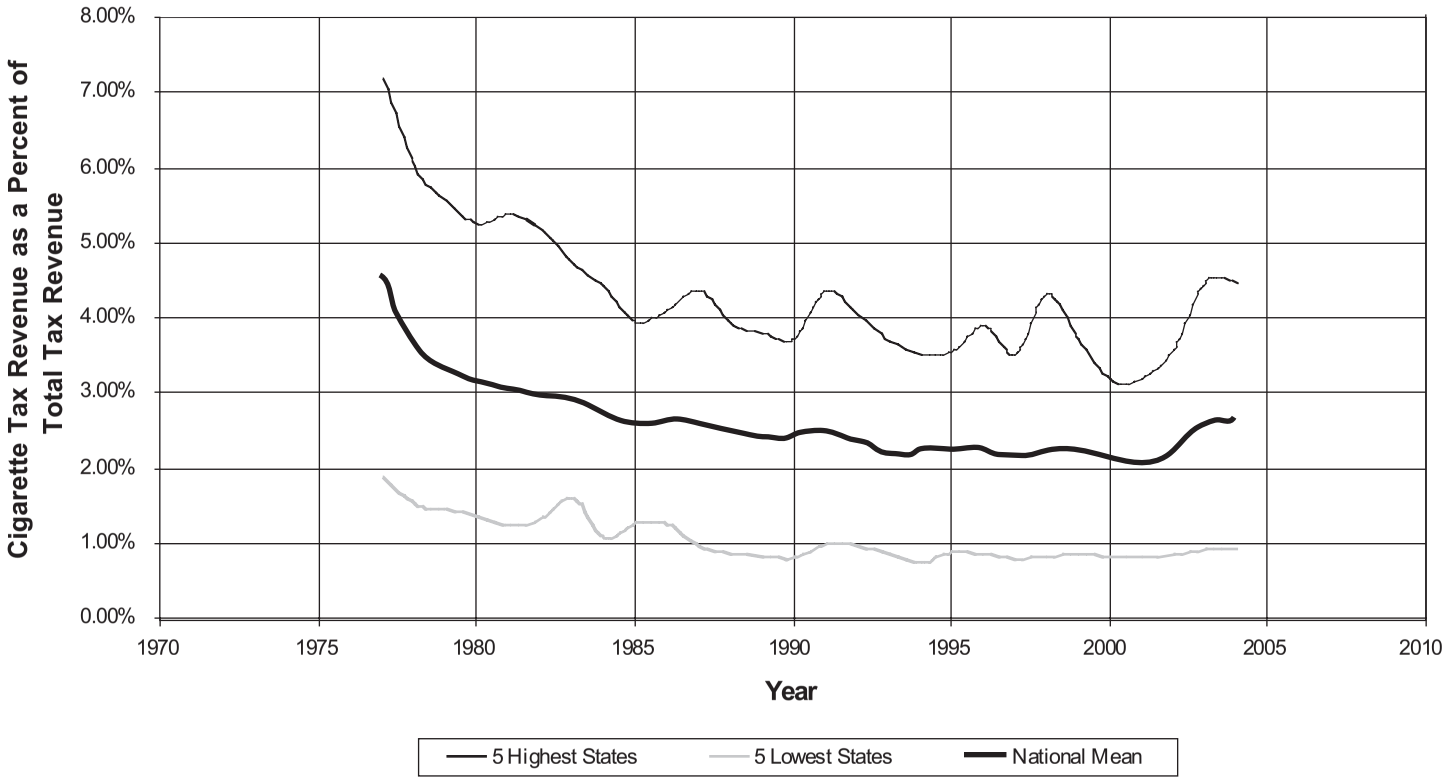


Figure 3: **State Cigarette Excise and Sales Tax Revenue as a Percent of Total State Tax Revenue - Averages of the Five Highest and Five Lowest States, Plus National Mean**



Multiplying equation (2) by τ gives

(3) $REV = \tau\, Q_{tax} = a_0\, \tau^{(1+a1)}\, \tau_n^{a2}\, Y^{a3}$

Letting $b = (1 + a1)$, and taking logarithms, gives the basic specification to be estimated:

(4) $\ln Rev = \ln a_0 + b \ln \tau + a2 \ln \tau_n + a3 \ln Y$

I also include a vector of demographic characteristics, and an error term, assumed to be normally distributed. The estimated equation is

(5) $\ln Rev_{it} = \ln a0 + \text{b} \ln \tau_{it} + a2 \ln \tau_n + a3 \ln Y_{it} + \boldsymbol{a4} \ln \boldsymbol{Z} + State_i + Year_t + error_{it}$

I also estimate equation (5) in quantity form, with the dependent variable equal to per capita taxable sales of packs of cigarettes. The variables in equation (5) are defined as follows:

- τ: cigarette tax rate, in cents per package of 20 cigarettes; $\tau = \tau_{cig} + D_{it} \cong \tau_{sales}(P_{cig})$, the sum of the state/local excise tax rate τ_{cig}, plus, in those states where cigarettes are included in the sales tax base (D_{it} =1), the sales tax rate τ_{sales} times the retail price;
- τ_n: weighted average tax rate in a state's geographical neighbors;
- Y: state personal income per capita;
- ***Z*:** vector of demographic characteristics of a state. ***Z*** includes: PCTCOLL, percent college graduates; PCTFOR, percent foreign born; PCTBLK, percent of the population African-American; PCTHSP, percent of the population Hispanic; PCTYOUNG, percent of population less than 18; PCTOLD, percent of population 65 and older.

The coefficient b in equation (5) gives the elasticity of revenues with respect to the tax rate. It is equal to $(1 + a1)$, from equation (2). If $a1 = 0$ (i.e., taxable consumption is completely insensitive to the tax rate), then $b = 1$, implying that a 1 percent increase in the tax rate would lead to a 1 percent increase in tax revenues. The estimated model is a pooled cross section of states over time, and all specifications include individual state and year effects, the latter to take into account the secular decline in smoking prevalence (Harris, 1994).

Measurement and Estimation Issues

Most of the interstate variation in cigarette prices stems from differences in tax rates, and the typical approach in the literature is to use the tax rate as an instrument for the retail price (Gruber et al., 2003; Stehr, 2005). Here, our main interest is in the tax effect itself. A number of studies have found that interstate cigarette tax importing and exporting are quantitatively significant phenomenas (Stehr, 2005; Coats, 1995). Stehr (2005) finds that 85 percent of the response of tax-paid cigarette sales to a change in price comes from tax avoidance, rather than an actual change in the consumption of cigarettes. Despite the evidence of significant amounts of tax avoidance at the margin, the overall amount of tax avoidance accounted for less than 10 percent of sales (Stehr, 2005; Thursby and Thursby, 2000). The relatively small share of out-of-state or other nontaxable purchases may reflect the fact that interstate tax differentials are actually relatively small, due to tax mimicking between neighbors Rork (2003).

Variable Definitions and Data

The model was estimated using data on cigarette tax rates and revenues for the 48 continental U.S. states, for the time period from 1980 to 2004. Tax rates are measured for the state and separately for its localities, and are separated into an excise tax rate and a sales tax rate on cigarettes. The most comprehensive tax rate is the combined state-local excise plus sales tax rate. All values are expressed in 2005 dollars. The basic results are reported for the excise tax alone, because of its importance as a policy variable. Variable definitions and data sources are described in Table 1.

To measure the potential revenue effects of cross-border purchases, we used three variables. The first is the weighted average tax rate in neighboring states, *NBRCIGTAX*. Neighbors are defined as states sharing a geographic border with the given state, *i*,

(6) $NBRCIGTAX_i = 3\, w_{ij}\, CIGTAX_j$,

where the sum *j* is over all of a state *i*'s neighbors. The border population is the population living in counties bordering that particular state. The weight for any given border state in equation (6) is that state's border population as a share of the total border population of a state. The expected effect of neighbor price is positive. PCTBORD is

Table 1

Variable Definitions, Data Description, and Data Sources

Variable Name	*Variable Definition*	*Mean (Standard Deviation)*	*Range: Min, Max*
STLCCIGREV STCIGREV	Net cigarette excise tax revenue per capita; 2 variables: 1) combined state & local, and 2) state.	42.17 (27.42) 39.425 (26.51)	0, 739.22 0, 728.27
STLCCIGREVSHR STCIGREVSHR	Net cigarette excise tax revenue as a share of total tax revenue; 2 variables: 1) combined state & local, and 2) state.	0.013 (0.008) 0.021 (0.015)	0.001, 0.196 0.001, 0.337
STLCCIGSLSREV STCIGSLSREV	Net cigarette excise and related sales tax revenue per capita; 2 variables: 1) combined state & local, and 2) state.	50.258 (22.51) 47.715 (26.24)	12.24, 550.22 0, 735.52
STLCCIGSLSREV-SHR STCIGSLSREVSHR	Net cigarette excise and related sales tax revenue as a share of total tax revenue; 2 variables: 1) combined state & local, and 2) state.	0.017 (0.008) 0.027 (0.015)	0.004, 0.201 0.006, 0.344
STLCSLSREV STSLSREV	Total sales tax revenue per capita; 2 variables: 1) combined state & local, and 2) state.	773.72 (1331) 459.56 (264.3)	0, 20108 0, 1511
STLCCIGTAX STCIGTAX	Cigarette excise tax rate per pack in cents; 2 variables: 1) combined state & local, and 2) state.	41.793 (23.39) 38.875 (22.43)	0, 215.74 0, 215.74
STLCCIGSLSTAX STCIGSLSTAX	Combined cigarette excise tax rate and sales tax per pack in cents; 2 variables: 1) combined state & local, and 2) state.	52.032 (28.9) 47.412 (25.64)	9.969, 251.44 0, 250.47
STLCSLSTAX STSLSTAX	Sales tax per pack in cents; 2 variables: 1) combined state & local, and 2) state.	11.0 (8.77) 7.63 (7.17)	0, 49.106 0, 39.99
NBRSTLCCIGTAX	Average of neighboring states' state and local cigarette excise tax, using border county population as weights, in cents.	43.24 (20.86)	8.716, 191.91
PCTBORD	Percent of state's population residing in border counties.	44.35 (25)	6.713, 100
NBRPCTBORD	Ratio of sum of neighboring states' border county populations divided by own state population.	3.629 (5.636)	0.085, 41.543
PCINC	State personal income per capita.	23206 (7092)	7478, 48179
PCTYOUNG	Percent of state population under 18 years of age.	27.992 (3.55)	21.19, 40.04
PCTOLD	Percent of state population 65 years of age and over.	11.847 (2)	6.3, 18.55
PCTBLK	Percent of state population African American.	9.918 (9.49)	0.17, 76.18
PCTHSP	Percent of state population Hispanic.	6.062 (8.13)	0.44, 43.68
PCTFOR	Percent of state population foreign born.	4.954 (4.43)	0.4, 26.78
PCTCOLL	Percent of state population who are college graduates.	18.771 (5.92)	6.62, 36.7
CONSPC	Individual cigarette consumption per person 18 years and older.	2807.75 (612.4)	1837, 3849

Note: All amounts are in 2005 dollars/cents.

Data Sources

Components of Variables:

State population: U.S. Department of Commerce http://www.bea.doc.gov/bea/regional/spi/, various years.

..SHR (revenue suffix for share of state & local total tax revenue): U.S. Census Bureau, 2001, 2003, and 2004. Interpolate local data for 2001, and extrapolate local data for 2003 and 2004.

..BORD (suffix and weight for border county populations): Border county indicators furnished by McKinnish (2005)1969-2003. 2004 was extrapolated from previous five years. County populations taken from U.S. Department of Commerce http://www.bea.doc.gov/bea/regional/spi/, various years.

Variables:

(STLC)(CIGSLS)REV, ..SHR: Orzechowski and Walker (2004), Tables 9, 15, 17. Local sales tax revenue from cigarettes was interpolated using sales tax revenue from cigarettes, and aggregate state and local sales tax, and state (see stlcslstaxrev.)

(STLC)(CIGSLS)TAX, NBR(STLC)(CIGSLS)TAX: Orzechowski and Walker (2004), Tables 7, 10, 15, 17. An average local excise tax per pack was computed by dividing the aggregate local cigarette revenues by the total tax-paid cigarettes sold in a state. All neighbor states' averages are weighted by county population (See ..BORD)

PCTBORD, NBRPCTBORD: (See data source for '..BORD above)

(STLC)SLSREV, ..SHR: U.S. Census Bureau, 2001, 2003, 2004. Interpolated local data for 2001, and extrapolated local data for 2003 and 2004.

STSLSTAXRT: Orzechowski and Walker (2004), Table 15.

PCINC: U.S. Department of Commerce, various years.

PCTYOUNG, PCTOLD, PCTBLK, PCTHSP: www.census.gov/popest/archives/pre-1980/e7080sta.texthttp://www.census.gov/popest/archives/1980s/estage80.txthttp://www.census.gov/popest/archives/1990s/ST-99-09.txthttp://www.census.gov/popest/states/files/SC-EST2004-AGESEX_RES.csvhttp://www.census.gov/popest/archives/pre-1980/PE-19.xlshttp://www.census.gov/popest/archives/1980s/st_int_asrh.txthttp://www.census.gov/popest/archives/1990s/st_race_hisp.htmlhttp://www.census.gov/popest/states/asrh/files/se_est2004_5race.csvAlso found in U.S. Census Bureau, various years.

PCTFOR: Census of the Population (decennial) plus two additional years. Data points include 1970, 1980, 1990, 2000, 2003, 2004. Other years interpolated. Also found in U.S. Census Bureau, various years.

PCTCOLL: Census of the Population (decennial) plus two additional years. Data points include 1970, 1980, 1990, 1998, 2000, 2004. Other years interpolated. Also found in U.S. Census Bureau, various years.

D_REP, D_DEM: U.S. Census Bureau, various years (1989, Tables 426, 427 and 1996, Tables 447, 448).

CONSPC: U.S. Department of Agriculture (2005), Table 2, and earlier issues.

defined as the percentage of a state's population which lives in border counties. This variable is a measure of the ease of purchasing cigarettes in other states. I expect a negative effect on a state's cigarette tax revenues. NBRPCTBORD is the sum of all the residents of neighbor states who reside in counties that border that state, relative to the own-state's population. Because it measures the potential market for cigarettes sold in any particular state, I expect a positive effect on cigarette tax sales and revenues.

RESULTS

The basic model is shown in Table 2. In the first three columns, the dependent variable is state plus local cigarette excise tax revenues per capita. All specifications are estimated with state and year fixed effects. All variables are in log form. Standard errors are clustered at the state level, using the Stata command Robust Cluster. Column 1 in Table 2 includes only the contemporaneous own and neighbor excise tax rate. The value of .7 for the tax rate coefficient implies that a 10 percent increase in the excise tax rate yields a 7 percent increase in tax revenues. Column (3) adds the lagged values of both the own and neighbor tax rates. Lags in the effect of tax rate changes on taxable revenues were fully captured in three years. As shown in equation (3), only the contemporaneous and first-year lags are economically important. The estimates suggest that most of the adjustment to a change in tax rates occurs within two years.

The dependent variable in columns 4 through 6 of Table 2 is taxable packs sold. The contemporaneous estimate of the elasticity of purchases with respect to the tax rate is about -.22. Not surprisingly, the quantity elasticity estimate is consistent with the revenue elasticity estimate. Computing the total effect of a tax rate change as the sum of the contemporaneous coefficient plus the three lagged coefficients (columns 3 and 6 of Table 2) yields a revenue elasticity of .75 for the revenue elasticity, and an equivalent quantity elasticity of -.29.

The estimated elasticity of taxable sales with respect to the tax rate implies that a 10 percent increase would lead to a decline in taxable sales of slightly less than 3 percent. This decline represents a mix of reduced consumption and tax avoidance behavior, on the part of both residents and nonresident cigarette consumers. While there is no direct way of disentangling the substitute purchase effect from the reduced consumption effect, the magnitude of the estimated neighbor tax rate effect can give some insight. As shown in Table 2, NBRCIGTAX has a significant positive effect on both cigarette tax revenues and taxable sales. A 10 percent increase in neighbor rates is associated with a little less than a 1 percent increase in own-state cigarette purchases and tax revenues.

The magnitude of the estimated neighbor-state tax coefficient is a little less than one-quarter of the own-price elasticity of demand for cigarettes (.07/.26). Because the neighbor elasticity estimates in Table 2 measures the effect of an increase in the weighted average of tax rates in all border states, if only one state raises its tax rate, the effect will be somewhat smaller. An alternative explanation for the neighbor tax rate effect is that it reflects tax mimicking behavior. Contemporaneous neighbor effects could be confounded by the spatial correlation between own and neighbor rates. To investigate tax mimicking, Table 3 regresses own-state tax rates against neighboring cigarette tax rates. The results show a significant positive effect of neighbor rates on own-state rates. If neighbor tax rates increase by 10 percent in one year, two years later own tax rates are about 3 percent higher. Over the entire sample period, the average difference between a state and its neighbors is only 2.56 cents, and still only 7.17 cents in 2004. The tax mimicking effect is potentially large enough to account for much of the neighbor effect.

Endogeneity of the Cigarette Tax Rate

The revenue and consumption elasticity estimates were unchanged under an instrumental variable specification of state tax rates. Identifying instruments are state short-term debt, and two variables characterizing the political make-up of the state. I used the neighbor values of the exogenous variables in the model to obtain predicted values for the neighbor tax rates. Neither the own nor neighbor tax rate coefficients change under the IV specification.

Changes in the Elasticity over Time

The sharp increase in cigarette tax rates in the late 90s and early 2000s, and the spread of Internet shopping for lower-taxed cigarettes suggests the possibility that the revenue elasticity of the cigarette tax rate has declined in the later part of the sample (Goolsbee et al., 2007). To test for this effect, I ran a Chow test for two periods, 1980 to

Table 2

Regression of State and Local Cigarette Tax Revenue and Taxable Packs Sold Against Cigarette Tax Rate

	Cigarette Tax Revenue			*Taxable Packs Sold*		
Dependent Variable:		*Add Import &*			*Add Import &*	
Regressors	*Basic*	*Export*	*Add Lags*	*Basic*	*Export*	*Add Lags*
Cigarette Tax Rate	0.698	0.701	0.559	-0.23	-0.224	-0.147
	(0.027)***	(0.0257)***	(0.0423)***	(0.019)***	(0.018)***	(0.0259)***
Cigarette Tax Rate Lag1			0.243			-0.0579
			(0.045)***			(0.0284)**
Cigarette Tax Rate Lag2			-0.0328			-0.0752
			(0.0196)*			(0.0248)***
Cigarette Tax Rate Lag3			-0.0109			-0.0131
			(0.0175)			(0.0302)
Neighbors' Tax Rate	0.0742	0.0746	0.0282	0.0646	0.0655	0.0459
	(0.0356)**	(0.0354)**	(0.0357)	(0.0306)**	(0.0299)**	(0.0286)
Neighbors' Tax Rate Lag_1			0.0662			0.0401
			(0.0321)**			(0.0156)***
Neighbors' Tax Rate Lag_2			-0.0347			-0.00177
			(0.0252)			(0.0185)
Neighbors' Tax Rate Lag_3			0.0151			-0.00473
			(0.0339)			(0.0266)
Pct Border		-0.0486	-0.131		-0.107	-0.0432
		(0.196)	(0.19)		(0.177)	(0.172)
Neighbor Pct Border		-0.0426	-0.0873		-0.0708	-0.0218
		(0.142)	(0.139)		(0.129)	(0.126)
Income Per Capita	-0.0613	-0.0751	-0.0712	-0.19	-0.215	-0.2
	(0.202)	(0.2)	(0.186)	(0.13)	(0.135)	(0.138)
Percent Young	-0.852	-0.883	-1.12	-1.29	-1.35	-1.11
	(0.169)***	(0.172)***	(0.189)***	(0.221)***	(0.224)***	(0.183)***
Percent Old	0.111	0.117	0.2	-0.0485	-0.0353	-0.0865
	(0.229)	(0.227)	(0.219)	(0.198)	(0.194)	(0.194)
Percent African American	0.0179	0.0102	-0.0222	-0.0366	-0.0504	-0.0197
	(0.0334)	(0.0347)	(0.0396)	(0.0493)	(0.0434)	(0.0402)
Percent Hispanic	0.123	0.125	0.125	0.121	0.126	0.122
	(0.0507)**	(0.0518)**	(0.0502)**	(0.0445)***	(0.0464)***	(0.0474)***
Percent Foreign Born	-0.056	-0.0626	-0.0428	-0.0514	-0.0642	-0.0714
	(0.0531)	(0.0533)	(0.0464)	(0.0386)	(0.0349)*	(0.0371)*
Percent College Grads	0.286	0.287	0.331	0.211	0.214	0.179
	(0.142)**	(0.144)**	(0.146)**	(0.125)*	(0.127)*	(0.128)
R2	0.97	0.97	0.98	0.95	0.95	0.95
Years of Observations	25	25	25	25	25	25

Note: All cigarette revenues and packs are per capita. All variables are in logarithmic form.

All regressions include state and year effects. Standard errors clustered by state.

* 10 percent significance level ** 5 percent significance level, *** 1 percent significance level

Table 3

Regression of Own-State Cigarette Tax Rate Against Neighbor States' Average Tax Rate

	Own-State Cigarette Tax Rate				
Dependent Variable:	*Neighbors' Tax Rate: t, t-1*	*Neighbors' Tax Rate: t-1*	*Neighbors' Tax Rate: t-2*	*Neighbors' Tax Rate: t-3*	*Neighbors' Tax Rate: t, t-1, t-2, t-3*
Regressors					
Neighbors' Tax Rate	0.0374				0.0334
	(0.0727)				(0.0733)
Neighbors' Tax Rate Lag_1	0.208	0.239			0.131
	(0.111)*	(0.118)**			(0.0769)*
Neighbors' Tax Rate Lag_2			0.241		0.00113
			(0.129)*		(0.0752)
Neighbors' Tax Rate Lag_3				0.254	0.128
				(0.132)*	(0.0967)
Pct Border	0.576	0.576	0.566	0.561	0.535
	(0.722)	(0.725)	(0.723)	(0.725)	(0.711)
Neighbor Pct Border	1.18	1.18	1.16	1.15	1.16
	(0.4)***	(0.401)***	(0.405)***	(0.408)***	(0.4)***
Income Per Capita	0.676	0.686	0.689	0.696	0.681
	(0.634)	(0.635)	(0.638)	(0.637)	(0.635)
Percent Young	3.61	3.64	3.65	3.69	3.52
	(0.922)***	(0.919)***	(0.947)***	(0.943)***	(0.961)***
Percent Old	-0.618	-0.609	-0.589	-0.565	-0.614
	(0.757)	(0.756)	(0.762)	(0.756)	(0.756)
Percent African American	0.468	0.469	0.459	0.453	0.441
	(0.189)**	(0.189)**	(0.19)**	(0.189)**	(0.188)**
Percent Hispanic	-0.137	-0.137	-0.127	-0.122	-0.129
	(0.111)	(0.111)	(0.111)	(0.112)	(0.11)
Percent Foreign Born	-0.169	-0.173	-0.191	-0.199	-0.169
	(0.204)	(0.202)	(0.201)	(0.199)	(0.204)
Percent College Grads	-0.741	-0.749	-0.785	-0.802	-0.744
	(0.404)*	(0.404)*	(0.405)*	(0.407)*	(0.409)*
R2	0.89	0.89	0.89	0.89	0.9
Years of Observations	25	25	25	25	25

Note: All variables are in logarithmic form. All regressions include state and year effects. Standard errors clustered by state.

* 10 percent significance level ** 5 percent significance level, *** 1 percent significance level

1992, and 1992 to 2004, estimated a separate model for the post-1998 period, and interacted the tax variable with indicator variables for post-1995, or post-2000. The tax rate coefficient is robust to these specifications. In contrast, the tax rate elasticity of packs sold has increased since 1995. However, the estimated quantity elasticity after 1995 - the sum of -.18 and -.05 - is equal to the .23 estimate of the elasticity from Table 2, when the coefficient is not allowed to vary over time.

Non-linear Effects

Given the large increase in the tax rate differential in the 90s and 2000s, a given change in the tax rate might have a smaller revenue effect in high versus low tax states. I therefore included a squared tax rate term. The squared term was negative and significant, indicating substantial differences in revenue effects, depending on the initial level of taxation. The revenue impact of a 10 percent increase in tax rates ranges from a full 10 percent increase in Kentucky to only 2.6 percent in New Jersey.

CONCLUSION

In 2004 cigarette taxes made up 2.7 percent of all state tax revenues, but more than 4.5 percent in the five highest tax states. Cigarette taxation continues to be a highly productive revenue source for states. A 10 percent increase in excise tax rates, from $1.10 per pack in 2004 to $1.21, would increase cigarette tax revenues by about 7 percent. In contrast to other studies, I do not find a significant decline in the revenue elasticity over time. A 10 percent increase in neighbor tax rates increases own cigarette tax revenues by almost 1 percent. However, the revenue effect of cross-border shopping is attenuated by tax mimicking, which tends to keep neighboring tax rates within a fairly close range. There are significant non-linearities in the revenue response, with the tax avoidance effects of any given increase substantially stronger in high tax than in low tax states.

References

Campaign for Tobacco-Free Kids. State Cigarette Excise Tax Rates & Rankings. Washington, D.C., 2006. http://www.tobaccofreekids.org/research/factsheets/pdf/0097.pdf

Coats, R. Morris. A Note on Estimating Cross-Border Effects of State Cigarette Taxes. *National Tax Journal* 48 (December 1995): 573-584.

Goolsbee, Austan, Michael Lovenheim, and Joel Slemrod. Playing with Fire: Cigarettes, Taxes, and Competition from the Internet. Mimeo. Office of Tax Policy Research, Stephen M. Ross School of Business, University of Michigan, Ann Arbor, 2007.

Gruber, Jonathan, Anindya Sen, and Mark Stabile. Estimating Price Elasticities When There Is Smuggling: The Sensitivity of Smoking to Price in Canada. *Journal of Health Economics* 22 (September 2003): 821-842.

Harris, Jeffrey. 1994. A Working Model for Predicting the Consumption and Revenue Impacts of Large Increases in the U.S. Federal Cigarette Excise Tax. Mimeo. Massachusetts Institute of Technology and Massachusetts General Hospital, Cambridge, MA, 1994. http://www.mit.edu/people/jeffrey/working-model.html

McKinnish, Terra. Importing the Poor. *Journal of Human Resources* 40 (Winter 2005): 57-76.

Orzechowski, W. and Walker, R.C. The Tax Burden on Tobacco, Vol. 39. Arlington, VA, 2004.

Rork, Jonathan. Coveting Thy Neighbor's Taxation. *National Tax Journal* 56 (December 2003): 775-788.

Stehr, Mark. Cigarette Tax Avoidance and Evasion. *Journal of Health Economics* 24 (March 2005): 277-297.

Thursby, Jerry and Marie Thursby. Interstate Cigarette Bootlegging: Extent, Revenue Losses, and Effects of Federal Intervention. *National Tax Journal* 53 (March 2000): 59-77.

U.S. Census Bureau.
Annual Survey of State and Local Government Finances. Washington, D.C., 2001, 2003, and 2004.
Census of Governments. Washington, D.C., 2001, 2003, and 2004.
Statistical Abstracts of the United States. Washington, D.C., various years.

U.S. Department of Agriculture. Economic Research Service. Tobacco Situation and Outlook Report. TBS-259. Washington, D.C., 2005 and earlier issues.

U.S. Department of Commerce. Bureau of Economic Analysis. Regional Economic Accounts, State Annual Estimates. Washington, D.C., various years.