

**NEW CIGARETTE TAX REVENUE SOURCES**  
**FOR NEW YORK STATE**

Prepared for the  
FACT Alliance for the Fair Application of Cigarette Taxes

This document was prepared on  
December 24, 2002

by  
**REA**  
Ridgewood Economic Associates, Ltd.  
77 Walther Avenue  
Ridgewood, New Jersey 07450  
(201) 444-4196 fax (201) 670-4835

## Objective

This study examines the potential for new state revenue collections that could be generated from sales of cigarettes in New York State. Using well-established econometric techniques, we have developed a methodology to quantify these new sources of revenue. The study addresses four marketing activities: (1) alternate distribution channels (Internet, 800-number phone networks and Native-American reservation sales) servicing New York State residents; (2) alternate channel sales to other geographic markets outside of New York State; (3) bootlegged sales to New Yorkers; and (4) cross-border sales. The bulk of the study is devoted to estimating the volume of sales associated with each of these market segments. The final section uses these volume estimates, in conjunction with tax rates, to quantify the potential size of additional tax revenue.

## Background

Although the cigarette industry has experienced a secular decline in demand over the last two decades, the marketplace remains substantial. In 2001, using individual state data, the total number of cartons sold was approximately 2.1 billion. Industry revenue exceeded \$70 billion in 2001, excluding an undetermined volume of retail sales activity not captured by industry data. The cigarette industry has always been the target of public sector excise taxes. From a fiscal policy point of view, cigarettes are an attractive product for generating tax revenues because market demand is characterized by relatively low consumer price sensitivity. Economists would label cigarettes as “inelastic.” If the price of such a product is raised by a tax increase, the quantity demanded in the marketplace would not change significantly, thus yielding the tax authority a revenue stream that can be crudely estimated by multiplying the new excise tax rate by the old quantity of goods sold. The practical problem with this approach is that it assumes all suppliers in the marketplace are equally subject to the provisions of the new tax. In reality, the steadily rising tax burden on cigarettes has fostered the development of alternative channels of distribution, some of which have been successful in avoiding excise taxes. The higher the tax rate, the larger the incentive becomes for customers to seek out new, lower-cost modes of purchasing cigarettes. As states continue to lean on excise taxes to help close the widening gap in their operating budget deficits, the problem will only get worse. Internet sales, 800-line sales, bootlegged product, and cross-border activity (where significant differences exist between two taxing authorities) will grow in popularity, fostered by recent advances in communications technology.

## Judicial Setting

The purchase of cigarettes from non-traditional, out-of-state retailers does not exempt the buyer from excise tax liability. The local purchaser still has the responsibility to pay these taxes, though in practice there is little compliance with such rules, and limited enforcement. Although the tax liability arises as cigarettes enter a taxing authority region, the states have little or no power to collect such fees.

In 1949, the U.S. Congress passed the Jenkins Act. This legislation required cigarette dealers to report all out-of-state sales back to local state tax officials. The key section of this law states the following:

### Section 376 - Reports to State tobacco tax administrator

- (a) Contents - Any person who sells or transfers for profit cigarettes in interstate commerce, whereby such cigarettes are shipped into a State taxing the sale or use of cigarettes, to other than a distributor licensed by or located in such State, or who advertises or offers cigarettes for such a sale or transfer and shipment, shall -
  - (1) first file with the tobacco tax administrator of the State into which such shipment is made or in which such advertisement or offer is disseminated a statement setting forth his name and trade name (if any), and the address of his principal place of business and of any other place of business; and

(2) not later than the 10th day of each calendar month, file with the tobacco tax administrator of the State into which such shipment is made, a memorandum or copy of the invoice covering each and every shipment of cigarettes made during the previous calendar month into such State; the memorandum or invoice in each case to include the name and address of the person to whom the shipment was made, the brand, and the quantity thereof.

#### Section 377 - Penalties

Whoever violates any provision of this chapter shall be guilty of a misdemeanor and shall be fined not more than \$1000, or imprisoned not more than 6 months, or both.

The Department of Justice acts as the enforcing federal agency, with split responsibility given to the Federal Bureau of Investigation (FBI) and the Bureau of Alcohol, Tobacco, and Firearms (ATF). The FBI has been given primary responsibility, with an auxiliary role played by the ATF. Enforcement has been mainly limited to cases that involved bigger crimes, major smuggling operations, etc.

In 1992, the U.S. Supreme Court ruled in *Quill Corp. vs. North Dakota* that states could not impose a requirement on out-of-state vendors to collect sales and use taxes from local buyers and transfer those balances back to the local taxing agency. The court found that such a provision would violate the Commerce Clause of the U.S. Constitution. In its decision, the court used as its basis the “substantial nexus” concept. Firms which did not have a physical presence in a state were exempt from such filing requirements. In addition, the Court ruled that the use of a common carrier, such as UPS, did not satisfy the “substantial nexus” condition.

In August 2000, Governor Pataki of New York signed the Public Health Law. This legislation made it a crime to ship to local residents any cigarettes which were sold over the Internet, by telephone, or via mail order. This ground-breaking initiative did not directly attack the retailers, but rather focused on the common carriers handling the shipment. In the Fall of that year, Brown & Williamson filed suit in Manhattan federal court to overturn the ban on Internet sales as a violation of its interstate commerce protections. The federal court agreed with the tobacco company. In addition, the court noted that there were other measures that the state could take to restrict the sale of cigarettes to minors (a key provision of the original law).

#### **Cigarette Demand - New York State**

The process of constructing a demand function begins by fitting a multiple regression, over the period 1975 to 2000, to obtain nationwide estimates of income elasticity (buyer sensitivity to changes in income) and price elasticity (buyer sensitivity to changes in price). Our statistical results are remarkably strong, indicating an income elasticity of 0.61032 and a price elasticity of -0.34198. The estimate for income elasticity has both the correct sign and magnitude to be consistent with economic theory, and falls in the range between zero and one, which would be classified by economic textbooks as more of a “necessity” than a “luxury” good. The price elasticity of demand is negative, reflecting the normal inverse relationship that exists between price and sales volume. Its numerical magnitude is consistent with what economists would call “inelastic,” with moderately low buyer price sensitivity for the product as a whole. For any individual brand or retailer, however, price elasticity would be sharply higher than we have estimated here for the nationwide market, because of the potential for competition from other suppliers and other products.

With these nationwide elasticities in hand, the characteristics of the market in New York State can now be examined. Economic theory would suggest that New York residents should exhibit a very similar income elasticity to customers in other parts of the nation. Thus, we fit a multiple regression, in log - log form, to explain per-capita cigarette sales in the state with the national income elasticity applied to per-capita real income in New York, plus the following: (1) the price of cigarettes in New York relative to the general level of prices in the economy; (2) a trend to capture secular drift in the use of cigarettes; (3) a proxy to

address the availability of alternative sales channels (Internet, 800-line phone networks, and Native-American reservation sales); and (4) a surrogate to account for the special promotional activity undertaken in 1983 and 1984 which reduced the actual cigarette prices below posted prices.

Our statistical results yield an estimate for price elasticity of demand in New York at  $-0.38295$ , very close to but on the high side of the national estimate, as economic theory would suggest. The  $-0.23456$  coefficient for the proxy variable on alternative modes of distribution suggests a significant negative impact from these newer sales channels.

To validate these estimates, we construct a statistical demand function for cigarette sales in the State of Texas using the same functional form of the regression as for New York. Substituting per-capita sales, per-capita personal income and the relative price measures in Texas for the New York-based series, we obtain remarkably similar statistical results. Both regressions are shown in Appendix One.

### **Lost Cigarette Sales**

Comparing calculated cigarette sales by applying historically accurate data to the New York demand function with the distribution proxy set first to one and then to zero yields an estimate of demand for 27 million cartons that would have been taxed in the state had sales not been diverted to alternative marketing channels in 2001, the last full year for which data are available. In addition, there are sales from Native-American reservations to other states via the Internet and 800-networks that are not captured by the demand equation. Based on nationwide figures, if e-commerce cigarette sales hold slightly more than a two percent market share our estimate for this channel in New York State would be in the range of 6 million to 8 million cartons. Bootlegged sales are a significant problem for New York State, particularly the traffic flow up I-95 from Virginia. The ATF has estimated these sales for the total country at 3.5 percent of total industry volumes. Assuming the flow into New York is at least 2 to 3 times the national rate, because of geographic access and the high state excise tax rate, we estimate bootleg sales into New York at 7 million to 10 million cartons. Lastly, cross-border activity is driven by differentials between various taxing authorities. Appendix Two contains a summary of state excise tax rates by state in 2001. Although cross-border sales are very likely influenced not only by tax rates but by the geographic distribution of a state's population and public infrastructure, the significant differences in tax rates between New York and neighboring states would lead us to conclude that cross-border sales could well be in the range of 3 million to 5 million cartons in 2001.

Summing these four individual estimates, cigarette sales not taxed in New York would have run in the neighborhood of 43 million to 50 million cartons during 2001. An offset to this total should be recognized, to reflect the erosion of customer demand in response to higher prices from any newly-imposed excise taxes. We fit another econometric equation to capture the incidence of an excise tax change on cigarette prices (see Appendix One). The regression shows that close to 40 percent of a state excise tax is passed on to the buyer in the form of higher prices. Taking into account the tax burden and an assumed one-third market share for the newly-taxed product, the net effective price increase would be about 4.5 percent for the total state market. Applying our price elasticity of  $-0.38295$ , the reaction to higher excise taxes would trim cigarette sales 1.7 percentage points, or from 2 million to 2.5 million cartons. Net of this price response, taxable sales would be higher in 2001 by between 41 million and 47.5 million cartons.

### **Fiscal Impact**

New York State has an extremely complex tax structure. In 1981, the State reorganized its accounting system to separate its revenues into four major funds. These are: (1) the General Fund which contains the vast majority of state tax receipts; (2) the Special Revenue Fund which accounts for federal grants and certain dedicated taxes and user fees; (3) the Capital Projects Fund which covers capital expenditures for various infrastructure projects; and (4) the Debt Service Fund which contains monies to pay the principal and interest on state bonds. For fiscal impact analysis, it is important to note that certain dedicated tax revenues are not included in the General Fund - for example, the majority of cigarette excise taxes are channeled directly into a fund to support health-related programs.

In fiscal year 2001-2002, cigarette excise tax receipts in the General Fund were \$532 million. These revenues represented approximately half of the excise tax imposed on a pack of cigarettes. In 2001, 49.5 percent of total cigarette taxes were dedicated to a special fund used to finance the operation of Health Care Reform Act (HCRA) programs in the State. If excise taxes had been applicable to alternate distribution channels, bootlegged and cross-border cigarette sales in 2001 at the prevailing tax rate of \$11.10 per carton, the extra 41 million to 47.5 million cartons would have generated additional excise tax receipts of between \$455 million and \$527 million. These new revenues would have been allocated in approximately equal proportions between the General fund and the HCRA programs. The General Fund would have recorded an additional \$227.5 million to \$263.5 million, but more importantly a similar increase in HCRA funding would have represented a significant source of new funds to the expanding list of health-related programs supported by these taxes.

In fiscal year 2001-2002, sales and use taxes in the General Fund were \$6.1 billion. New York imposes a sales tax of 4 percent on all retail transactions, rental contracts, leasing agreements, and any exchange of goods, excluding those items specifically exempted by law. Unprepared food stuffs and clothing/shoewear under \$110 per item are the largest exceptions to the State sales tax. In 2001, applying the 4 percent tax rate to an average sales price of \$43.13 per cigarette carton would have brought in another \$70.7 million to \$81.9 million of revenues. These tax receipts, associated with currently untaxed cigarette sales, would have accounted for more than 1 percent of added sales tax inflows to the State treasury.

In total, the additional cigarette tax revenues would have added \$298 million to \$345 million to the General Fund, plus \$228 million to \$264 million to the HCRA fund.

### **Recent Developments**

By the end of this coming March, New York State will have posted back-to-back revenue declines over the last two fiscal years. While these problems are not unique to New York, the magnitude of the fiscal challenge has been far greater for a number reasons. In addition to the revenue losses associated with the national recession of 2001; the jobless increases, which stemmed from the terrorist attack of 9/11 on the Twin Towers; and the weakness of the financial securities industry, which translated into significantly lower industry profits and variable compensation payments; had combined to put severe downward pressure on State revenue collections.

The late 1990s saw a huge increase in taxable income at both the federal level and across the states. And because of the composition of income, these gains in taxable income resulted in even stronger-than-normal increases in tax receipts. The double-digit annual gains in stock prices over the last half of the decade generated large capital gains, heavily reported by taxpayers in the higher tax brackets. Large bonus payments and a growing use of stock options for key employees added further to tax collections. Then came 2001. The National Association of State Budget Officers has estimated budget deficits in the range of \$40 billion to \$50 billion nationwide for Fiscal Year 2002. The problem became very apparent last April, when tax withholdings and estimated payments were reconciled against total tax liabilities for 2001. Data compiled by the National Conference of State Legislatures indicate that income tax payments fell by \$8.6 billion in April versus a year earlier. In addition, tax refunds jumped \$1.3 billion over the same period.

In response, many states have been forced to cut spending, dip into reserve accounts, raise taxes, and use tobacco settlement funds to erase the "red ink". With respect to new tax initiatives, the largest increase was seen in cigarette and tobacco excise taxes. Twenty-one states have raised excise taxes on cigarettes, ranging from 7 cents to 75 cents per pack. Other increases are still pending in several states. Effective April 3, 2002 New York State raised its cigarette excise tax rate from \$1.11 to \$1.50 per pack. The General Fund now receives 53.2 cents of the total tax, with the remaining 96.8 cents going to the HCRA fund. Local governments across the nation have also gotten in on the act. New York City recently raised its excise tax per pack by \$1.42.

Analysis of how these recent tax changes in New York State would impact the structure of the cigarette market, and, in turn, the state fiscal scene is highly imprecise at the current time. Actual data for key economic and market measures are not available for 2002, nor will they be for several months. Therefore, assumptions must be made for State personal income, the relative prices of cigarettes across distributional channels, and the average price per pack statewide. New York State has been hard hit by the troubles on Wall Street and from the aftermath of the terrorist attack on Manhattan. Household income is assumed to have grown by only 1 percent in 2002, down slightly for the year after adjusting for inflation. Average cigarette prices were assumed to grow in line with known pricing action by manufacturers, the State excise tax hike and the jump in New York City's tax. We used our empirical findings regarding the incidence of tax change to translate excise tax hikes into product price changes. Our model suggests that these factors would shift an additional 8.0 million cartons to alternative distribution channels in 2002 above the volume discussed prior for 2001. The higher excise tax rates and the larger volume of "untaxed" sales would imply fiscal revenue impacts in the range of \$777 million to \$895 million for the fiscal year 2002-2003. Approximately 43 percent of those revenues would be recorded in the General Fund ( \$335 million - \$385 million ), with the remainder earmarked for the HCRA fund ( \$442 million - \$510 million )

These increases in excise taxes, which create shifts in relative prices among suppliers in the industry, have worsened an already serious problem dealing with locally untaxed sales. While the total demand for cigarettes may be insensitive to price changes, the demand for an individual seller or a subset of sellers in the market is significantly more responsive to price. The recent increases in excise taxes give added stimulus to the use of alternate channels of distribution and to bootlegging operations, where little or no excise taxes are collected on the product. It is interesting to observe that excise tax rates in Kentucky and Virginia (two states that benefit significantly from the current relative price situation) remained unchanged this year. With respect to cross-border sales, the New York State excise tax rate is now at parity with Massachusetts, and still above the rates in Vermont and Pennsylvania, but the tax differential has been reduced by 10 cents and 30 cents, respectively. The rise in the State's tax rate will yield substantially less than New York's tax authority hopes or expects, particularly given the expected sharp fall in sales within New York City.

### **Conclusions**

New York State should rigorously enforce existing legislative codes regarding the imposition of taxes on all cigarette sales conducted within the state's boundaries and on out-of-state purchases made by New Yorkers. If only to help eliminate massive market distortions that exist in today's cigarette marketplace, enhanced enforcement would be worthwhile. But the extra tax receipts from such a proposal would have added \$298 million to \$345 million to the General Fund and \$228 million to \$264 million to the HCRA fund in fiscal 2001-2002. For the current fiscal year, the General Fund would have additional revenues of \$335 million to \$385 million from "untaxed" cigarette sales in 2002. In addition, the HCRA fund would have an extra \$442 million to \$510 million.

These additional tax receipts are badly needed today, more than ever, to improve the State's current fiscal condition.

## APPENDIX ONE

### Demand Function

A basic demand function describes the relationship between the price of a product and the quantity of that product purchased by consumers. There is normally an inverse relationship between price and quantity. That is, at a high price the quantity demanded is relatively low and as the price falls the quantity increases. But there are a number of conditions that are assumed to remain constant in establishing an elementary price/quantity relationship: (1) consumer income is unchanged; (2) all other prices are unchanged; and (3) customer tastes or preferences are not altered as customers face changing prices for the product purchased. To derive a comprehensive demand function, each of these assumed conditions must be addressed.

First, the demand function should include income, not just price. Normally, there is a positive relationship between a rise in customer income and a rise in the quantity of product the customer demands. Products which exhibit this positive response to income are called “normal goods”. Within this category, goods which have only a small positive income response are deemed to be necessities, while goods that are very sensitive to consumer income are viewed as luxury items.

Second, the demand function should include other prices the customer might consider when making a purchase decision. Customer response to product price is never formulated in a vacuum. The price of an individual product is evaluated against all other prices the customer faces in the marketplace. As the price of a given product rises in comparison to the general level of prices, that product loses price competitiveness to other goods and services. We would expect to observe an inverse relationship between the relative price of a good, not just the absolute price, and the quantity demanded in the marketplace.

Third, the demand function should allow for changing customer tastes or preferences. As a product becomes more popular, the quantity demanded will increase at every price and income point, while the opposite will occur when a product becomes less desirable. To capture a steady drift in customer preferences, an annual trendline is usually sufficient.

### Price Elasticity

The price elasticity of demand is the percentage change in quantity demanded in response to a one-percent change in product price, all other conditions held constant. Price elasticity is normally a negative number, reflecting the inverse relationship between price and quantity in the demand function. Price elasticity is often characterized in reference to its numerical value, dropping the negative sign. A price elasticity coefficient greater than one would indicate strong sensitivity to price changes; a value less than one, weak price sensitivity. An elasticity of zero would indicate indifference to market price. Customer preferences, the prices of other goods and both the number and quality of substitutes all have major impact on price elasticity. The relative price of a product will itself influence price sensitivity. Because the purchase of a lower-cost product would deplete less of household income than a higher-cost alternative, inexpensive products are generally less price-sensitive than expensive ones. Products which have fewer close substitutes will also be less price-sensitive.

### Income Elasticity

The income elasticity of demand is the percentage change in quantity demanded in response to a 1-percent change in customer income, all other conditions held constant. For “normal goods,” income elasticity will be positive. Higher income elasticities are usually associated with higher-priced goods. The income elasticity for a BMW, for example, will be significantly higher than

for a pack of chewing gum.

### Incidence of a Tax

While consumers might believe that a tax increase on a product would automatically result in a higher product price, dollar-for-dollar, the actual market situation is far more complex. The portion of a newly-imposed tax which is ultimately paid by the buyer depends on both the price elasticity of demand and the price elasticity of supply (a similar concept dealing with the seller's sensitivity of response to price change). On the demand side, the lower the price elasticity of demand, the more the consumer pays the new tax. In highly price-sensitive markets, suppliers will bear much of the tax change. On the supply side, the higher the supply elasticity, the larger will be the tax share carried by the buyer.

### United States Demand Function

We construct a national demand function for cigarettes to quantify the income and price elasticities of demand. We run a multiple regression, in log - log terms, relating per-capita cigarette sales in millions of packs to per capita personal income corrected for inflation as measured by the Consumer Price Index (CPI), the price of cigarettes per pack relative to the general price level in the economy, a surrogate variable to represent the promotional activities spearheaded by Philip Morris in 1983 and 1984, which lowered effective prices beyond what may be reflected in the price measures included above, and a simple annual trend to capture whatever secular shift may exist in per-capita cigarette consumption, over the period 1975-2000, beyond pure price and income effects. We take no position on the likely causes of such a shift, whether they represent reaction to health concerns, adverse publicity, advertising restrictions or the like, but merely assume a secular trend on such influences.

Regression of  $\ln(\text{Sales}/\text{POP})$  on the following:

United States	Coefficient	t-value
$\ln((\text{PI}/\text{CPI})/\text{POP})$	0.61032	2.001
$\ln(\text{Price} / \text{CPI})$	-0.34198	-3.673
Promo	0.07070	2.485
Trend	-0.02522	-5.846
intercept	8.07481	8.539

R-square = 0.9683

R-bar square = 0.9623

where

Sales are millions of packs of cigarettes, annually from 1975-2000

POP is Population, in millions of people, annually from 1975-2000

PI is Personal Income, in billions of dollars, annually from 1975-2000

CPI is the Consumer Price Index, based at 100 in 1982-84, annually 1975-2000

Price is cents per pack, excluding local and sales taxes, annually 1975-2000

Promo is one in 1983 and 1984, zero in other years

Trend is 75, 76, 77, ... starting in 1975

The statistical results are quite strong. R-square, the proportion of variance explained by the regression, as a percent of actual variance in annual per-capita cigarette sales, is a robust 96.83 percent. R-bar square, which corrects for degrees of freedom, comes in at 96.23 percent. The student's t-ratio on each regression coefficient indicates that all the coefficients are statistically significant at the 95 percent level of confidence, or higher. Our nationwide income elasticity is estimated to be 0.61032, which implies that a 1-percent increase in per-capita real income is associated with a 0.61 percent rise in per-capita cigarette demand, all other factors

held constant. In addition, our estimate of the price elasticity of demand is  $-0.34198$  for the nation, quite close to what DRI came up with in a study for R. J. Reynolds several years ago. This implies that a 1-percent increase in the price of a pack of cigarettes will decrease per-capita demand by 0.34 percent.

### New York Demand Function

Holding relative prices, excise tax rates, access to alternative channels of distribution and trends in consumer preferences all constant, the demand for cigarettes sold in New York State should not differ in response to changes in income alone from what was estimated above as the nationwide-average income elasticity. Thus, we assume the national per-capita income coefficient applies equally well to New York State residents, and subtract 0.61032 times real per-capita personal income in New York from per-capita cigarette sales in New York to arrive at our dependent variable, both in natural log terms. The explanatory variables in our regression include (all in natural logs) the price of a pack of cigarettes in New York relative to the CPI, a proxy variable to account for the introduction of alternative sales channels (Internet, 800 networks, ...), the same promotional activity variable as in the national demand function, and an annual trend.

Regression of  $\ln(\text{Sales}/\text{POP}) - \ln(0.61032 * (\text{PI}/\text{CPI})/\text{POP})$  on the following:

New York	Coefficient	t-value
$\ln(\text{Price} / \text{CPI})$	-0.38295	-5.794
Trend	-0.02260	-8.275
Proxy	-0.23456	-6.736
Promo	0.06314	2.185
intercept	0.89599	3.994

R-square = 0.9914

R-bar square = 0.9897

where

Sales are millions of packs of cigarettes, annually in New York 1975-2000  
 POP is Population, in millions of people, New York 1975-2000  
 PI is Personal Income, in billions of dollars, New York 1975-2000  
 CPI is the Consumer Price Index, based at 100 in 1982-84, annually 1975-2000  
 Price is cents per pack, excluding local and sales taxes, New York 1975-2000  
 Trend is 75, 76, 77, ... starting in 1975  
 Proxy is zero prior to 1990, then .25, .50, .75, one thereafter  
 Promo is one in 1983 and 1984, zero in other years

Again the statistical results are strong. All regression coefficients are statistically significant. The price elasticity of demand in New York State is quite similar to our national estimate, perhaps marginally higher as economic theory would suggest. With more alternative marketing channels available to New Yorkers, local consumers should be more price-sensitive to the narrower state price. And with both R-square and R-bar so high, the estimated New York regression appears to have explained virtually all historical variance in per-capita cigarette sales.

### Texas Demand Function

Before we apply these statistical results to calculate the revenue implications for New York State, we want to test the validity of our estimated demand function for New York by running the same regression against corresponding data for Texas.

Regression of  $\ln(\text{Sales}/\text{POP}) - \ln(0.61032 * (\text{PI}/\text{CPI})/\text{POP})$  on the following:

Texas	Coefficient	t-value
-------	-------------	---------

ln ( Price / CPI )	-0.42153	-7.041
Trend	-0.01372	-6.203
Proxy	-0.23516	-8.202
Promo	0.05810	2.386
intercept	0.21001	1.153

R-square = 0.9902

R-bar square = 0.9884

where

Sales are millions of packs of cigarettes, annually in Texas from 1975-2000

POP is Population, in millions of people, Texas from 1975-2000

PI is Personal Income, in billions of dollars, Texas from 1975-2000

CPI is the Consumer Price Index, based at 100 in 1982-84, annually 1975-2000

Price is cents per pack, excluding local and sales taxes, Texas 1975-2000

Trend is 75, 76, 77, ... starting in 1975

Proxy is zero prior to 1990, then .25, .50, .75, one thereafter

Promo is one in 1983 and 1984, zero in other years

The results are remarkably similar. All coefficients are statistically significant. The explanatory power of the function is near perfect. All estimated coefficients are statistically significant. And, with the lone exception of the Trend coefficient, they are within two standard errors of their New York counterparts, meaning there is no statistically significant difference between the Texas and the New York results. Our formulation of the demand function for cigarette sales in New York is confirmed by Texas data as well. The income and price elasticities are nearly identical from one state to the other.

### New York Tax Burden Function

A multiple regression is fit, in log - log terms, to estimate the tax burden on the purchaser of cigarettes from changes in New York State excise taxes. The average price of cigarettes in New York State (excluding local and sales taxes) is regressed against the state excise tax rate, the federal excise tax rate, and a synthetic variable designed to capture price hikes following the tobacco litigation settlement in late 1998.

Regression of ln (Price) on the following:

New York	Coefficient	t-value
ln (State Rate)	0.40010	3.064
ln (Federal Rate)	0.69439	4.442
Settlement	0.18366	1.637
intercept	1.64697	9.785

R-square = 0.9571

R-bar square = 0.9531

where

Price is cents per pack, excluding local and sales taxes, New York 1975-2000

State Rate is New York cigarette excise tax rate, in cents per pack, 1975-2000

Federal Rate is federal cigarette excise tax rate, in cents per pack, 1975-2000

Settlement is one for 1999, 2000, 2001, zero in all other years

The estimated coefficient for the state excise tax rate implies that very close to 40 percent of a state excise tax change is passed through to cigarette prices. And about 70 percent of a federal excise tax change is

passed onto the buying public. Because more suppliers nationwide would be impacted by a change in federal excise taxes than in New York State alone, the retail price change is higher for a change in national tax rates than at the state level.

## APPENDIX TWO

### State Excise Tax Rate - 2001 (dollars per pack)

State	Rate	State	Rate
Alabama	\$0.165	Montana	\$0.180
Alaska	\$1.000	Nebraska	\$0.340
Arizona	\$0.580	Nevada	\$0.350
Arkansas	\$0.340	New Hampshire	\$0.520
California	\$0.870	New Jersey	\$0.800
Colorado	\$0.200	New Mexico	\$0.210
Connecticut	\$0.500	New York	\$1.110
Delaware	\$0.240	North Carolina	\$0.050
District of Columbia	\$0.650	North Dakota	\$0.440
Florida	\$0.339	Ohio	\$0.240
Georgia	\$0.120	Oklahoma	\$0.230
Hawaii	\$1.000	Oregon	\$0.680
Idaho	\$0.280	Pennsylvania	\$0.310
Illinois	\$0.580	Rhode Island	\$1.000
Indiana	\$0.155	South Carolina	\$0.070
Iowa	\$0.360	South Dakota	\$0.330
Kansas	\$0.240	Tennessee	\$0.130
Kentucky	\$0.030	Texas	\$0.410
Louisiana	\$0.240	Utah	\$0.515
Maine	\$0.740	Vermont	\$0.440
Maryland	\$0.660	Virginia	\$0.025
Massachusetts	\$0.760	Washington	\$0.825
Michigan	\$0.750	West Virginia	\$0.170
Minnesota	\$0.480	Wisconsin	\$0.590
Mississippi	\$0.180	Wyoming	\$0.120
Missouri	\$0.170	All States	\$0.408