

An Examination of Cigarette Sales in New York State By Source: 2011

Prepared for the New York Association of Convenience Stores



By



John Dunham and Associates
Brooklyn, New York

October 10, 2012

An Examination of Cigarette Sales in New York State By Source: 2011

This report is the latest in a series of updates to a study which was first prepared for the Fair Application of Cigarette Taxes (FACT) Alliance in 2002. The main purpose of that study was to assess the total demand for cigarettes by New York State residents and to estimate the number of cartons which were purchased through local retailers and sold with the excise tax fully paid and the appropriate tax stamp, and the number purchased via alternative means. The earlier studies concluded that there was a significant disparity between the number of cartons of cigarettes consumed by New York State residents and the number of cartons of cigarettes that were actually taxed. In large part, this is due to the significant differential in excise tax rates between New York State and its neighbors, as well as between New York State and the national average sales price for tobacco products. This encouraged New York State smokers to seek alternative sources for tobacco products.

The 2011 update of the study was conducted by John Dunham and Associates (JDA) for the New York Association of Convenience Stores (NYACS) using a different methodology than the previous version; however, the results produced are similar to those from earlier reports.

Based on this analysis, nearly half of all cigarettes sold for consumption in New York State, or nearly 384.0 million packs, come from alternative sources including lower taxed states, Native American reservations, military sales or duty free sales. This figure does not include black market or counterfeit cigarettes that are not taxed at the Federal level. It has been estimated that internet-based and remote sales were as high as 14% of the U.S. domestic market in 2005, comprising 50 billion cigarettes and revenues of over \$5 billion.¹ This also does not include product coming into the United States from the international black and gray markets. By way of example, it is estimated that counterfeiters in China alone have the ability to produce more than 400 billion counterfeit cigarettes each year for global distribution, which would be equal to 125% of the total U.S. cigarette volume.² Chinese counterfeiters are known to be one of leading sources of black market cigarettes in the United States.

The 384.0 million packs represent 52 percent of all of the cigarettes estimated to be sold to New York State consumers. This is slightly lower than the 53 percent of sales estimated in the last version of this report; however, the methodology used in that report may or may not have included certain black market sales that cannot be measured based on our methodology.

Another important aspect of the 2011 update is that it takes into account additional changes in excise tax rates at the federal level as well as new federal laws designed to curtail illegal cigarette trafficking. It is still too early to draw definitive conclusions as to whether these laws are working effectively, or are being fully enforced, but evidence suggests that greater enforcement at both the federal level and within New York State are required, certainly in terms of non-taxed Native American sales to non-Native Americans in direct contravention of federal and state laws that have been upheld by numerous courts.

Background on Tobacco Taxes in New York State

New York State, and particularly New York City, has the highest taxes on cigarettes, and some of the highest taxes on other tobacco products (such as cigars, moist snuff, and smoking tobacco) in the

¹ Docket No. FDA-2011-N-0467 (RIN 0910-AG43) (56 Fed. Reg. 55,835) Comments on Advanced Notice of Proposed Rulemaking “Non-Face-to-Face Sale and Distribution of Tobacco Products And Advertising, Promotion and Marketing of Tobacco Products”, Altria Client Services, January 19, 2012, Page 2

² Ibid.

country.³ This report focuses on the state's cigarette taxes since even in New York State, cigarettes make up 94 percent of total tobacco tax collections.⁴

Set to \$4.35 per pack in July of 2010, the excise tax on cigarettes in New York state is nearly 26 percent higher than in Rhode Island, the next most expensive jurisdiction.⁵ The City of New York imposes an additional tax of \$1.50 per pack, making the combined excise tax rate for 42 percent of the state's population \$5.85 per pack. Other states in the region also impose very high cigarette taxes; however, the rates in Pennsylvania, Connecticut, New Jersey, Massachusetts and Vermont are all well below the New York State rate, and particularly the very large tax in New York City. Smokers who purchase their cigarettes in Pennsylvania will pay 63 percent less in state excise taxes simply by going to one of the myriad cigarette stores that dot the landscape across the border, New York City smokers would pay 73 percent less in taxes. A smoker commuting to a job in New Jersey would save \$1.65 per pack in excise taxes simply by purchasing their cigarettes near their job rather than near their home in Rockland County, or \$3.15 if they live in the City.

Table 1
Comparative Cigarette Excise Tax Rates: 2011

State	Excise Tax Rate	Compared to New York State		Compared to New York City	
		Rate	Percent	Rate	Percent
CT	\$3.00	(\$1.35)	31%	(\$2.85)	49%
MA	\$2.51	(\$1.84)	42%	(\$3.34)	57%
NJ	\$2.70	(\$1.65)	38%	(\$3.15)	54%
PA	\$1.60	(\$2.75)	63%	(\$4.25)	73%
VT	\$2.24	(\$2.11)	49%	(\$3.61)	62%

Table 1 compares New York State and New York City's cigarette excise tax with the rates charged in surrounding jurisdictions. On top of the excise taxes, New York State and City (as well as other jurisdictions in New York State) charge sales taxes which raise the overall cost of cigarettes even further.

Cigarette taxes in New York have consistently been higher than the national average. Moreover, New York's cigarette taxes have increased very rapidly in recent years. As Figure 1 on the following page shows, taxes in New York began to significantly deviate from the national average beginning in 1990, but then blew up starting in about 2000, so that now the state excise tax is more than 3.5 times the national average excise tax rate – and this does not include the additional \$1.50 per pack charged in New York City.

Table 2, also on the following page, shows that once the sales taxes are included, the average price of cigarettes in New York State is, on average, as much as \$4 per pack more than can be found in surrounding states, and is about \$4.60 per pack more than the national weighted average price.⁶ This provides ample opportunities for New York residents to acquire cheaper cigarettes simply by driving to a store across the state's border.

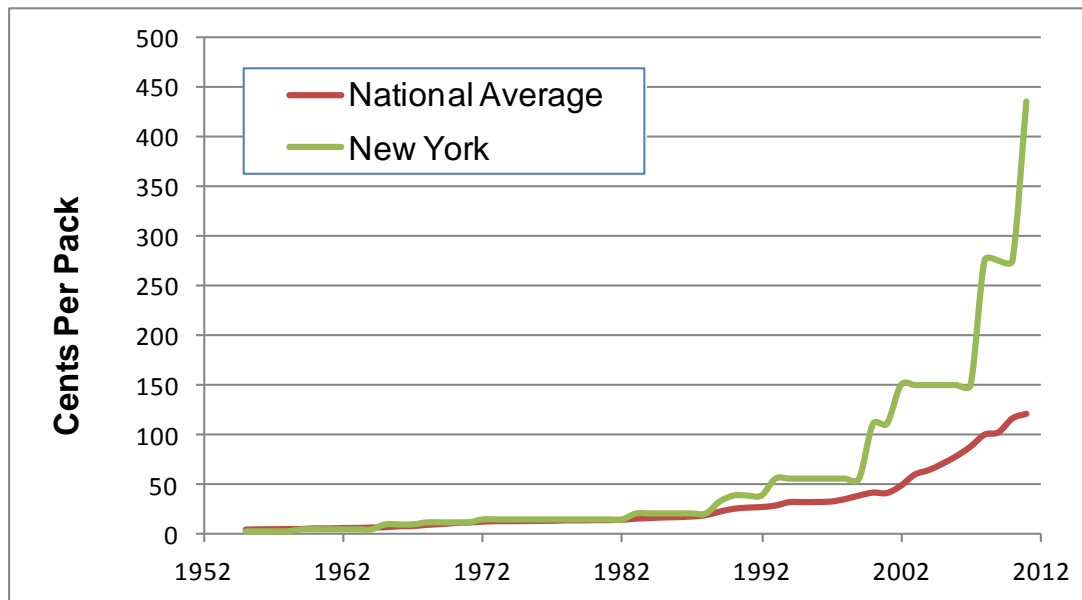
³ Orzechowski & Walker, *The Tax Burden on Tobacco Volume 46*, 2011, April 2012.

⁴ Ibid.

⁵ New York State last raised its cigarette tax from \$2.75 per pack. See *New York State excise tax on cigarettes to increase on July 1, 2010*, New York State Department of Taxation and Finance, June 2010, at: www.tax.ny.gov/pdf/notices/n10_4.pdf

⁶ These figures account for New York City's taxes. Source: Orzechowski & Walker, *The Tax Burden on Tobacco Volume 46*, 2011, April 2012.

Figure 1
Growth in New York State Cigarette Excise Tax



Cigarette Sales in New York State

As can be expected, the very high cigarette taxes in New York State have severely curtailed taxable cigarette sales. The “taxable” qualifier is very important in this statement since overall demand for cigarettes and tobacco products in the state have not fallen at nearly the rate as have legitimate tax paid sales. Figure 2 on the following page shows how taxable sales in the state began to collapse as excise taxes began to deviate from the national averages beginning in the later 1980’s. As of 2011, the last year for which data are available, taxable sales in New York State were only 435 million packs, or just 18.3 packs per resident. This is the lowest taxable sales figure in the country, with only similarly high taxed Washington DC, Washington state and California; and Arizona and Utah (which have high percentages of residents who are members of the Mormon Church) even coming close in terms of per capita sales.⁷

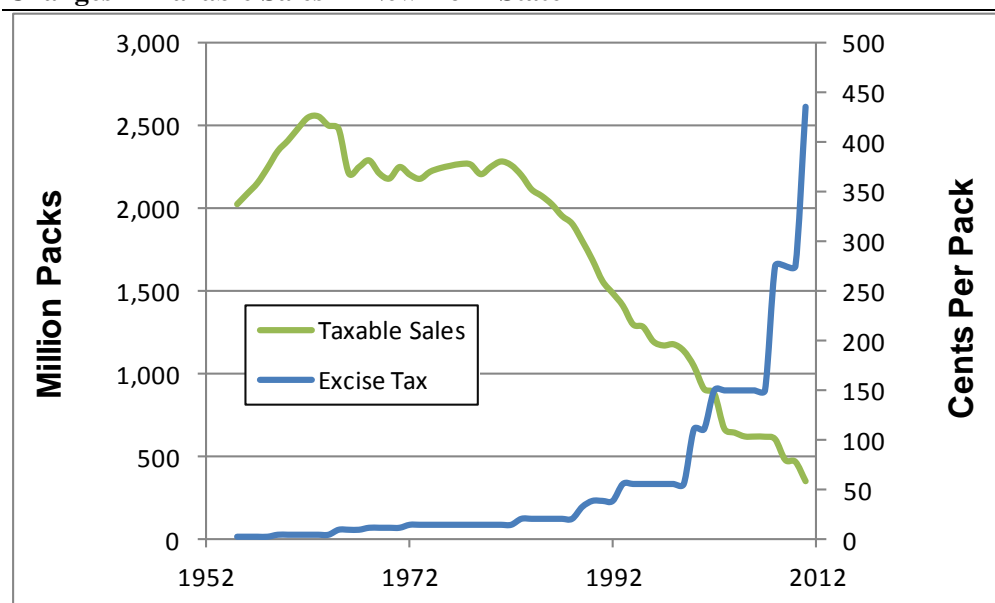
Table 2
Comparative Cigarette Prices and Combined Taxes: 2011

State	Price	Combined Taxes	Percent of Total
NY	\$10.22	\$5.73	56.1%
CT	\$8.46	\$4.86	57.5%
MA	\$7.96	\$3.97	49.8%
NJ	\$7.86	\$4.20	53.4%
PA	\$6.10	\$2.94	48.2%
VT	\$7.85	\$4.05	51.6%

⁷ Orzechowski & Walker, *The Tax Burden on Tobacco Volume 46*, 2011, April 2012.

New York's per capita taxable cigarette sales pale in comparison to the other high tax jurisdictions in the northeastern United States. Rhode Island, with the nation's second highest cigarette tax, sells 36.3 packs per capita, while the border states of Connecticut (36.3 packs per capita), Massachusetts (34.2 packs per capita), New Jersey (32.5 packs per capita), Pennsylvania (56.4 packs per capita) and Vermont (48.7 packs per capita) all sell significantly more taxed cigarettes than does New York even though all except for Pennsylvania are below the national average of 54.5 packs per capita.

Figure 2
Changes in Taxable Sales in New York State



Even though taxable cigarette sales have been falling, New York has continued to generate more and more revenue from cigarette excise tax receipts. This may not continue as the revenue generating capacity from higher taxes has collapsed from over \$19,000 per penny of tax in 1980 to just about \$3,500 (in nominal dollars) the last time the tax was increased. This shows that the state does not have much additional capacity to generate increased cigarette tax revenue from higher tax rates because of the “drag” being caused by in-state and inter-state non-taxable sources that are available to New York residents.

If New York were to raise taxes much more, it could actually begin to realize less tax revenue even with a higher excise tax rate. This means that it has becoming increasingly important for the state to further interdict non-taxed sales which are emanating from these alternative sources.

Cigarette Demand in New York State

Especially with the Internet acting as a platform to facilitate national and even international sales even consumers in the interior of a state have broad means in which to purchase a wider range of products with greater price flexibility. This is particularly true in the case of tobacco. Since tobacco is taxed (and priced) at different rates in different states, consumers in a given jurisdiction can take advantage of a wide range of prices. Not only can consumers in New York purchase cigarettes from local retailers like convenience stores, grocery stores or tobacco outlets, but they can also purchase the same exact product from similar stores in neighboring states, or from duty free stores on ships in airports or along the Canadian border. In addition, consumers can order cigarettes from hundreds of internet based retail outlets located in low-tax states, on Native American reservations or abroad. Consumers also have access to cigarettes sold in Native American smoke shops located on one of the 10 reservations in the state, or on

military commissaries and post exchanges.⁸ While many of these sales may not be legal and even though New York residents are required by law to remit the proper excise tax to the Department of Taxation and Revenue, widespread tax avoidance is common, either intentionally or unintentionally.

Since consumers have so many different – and less expensive – options for cigarettes and tobacco products, the taxable sales recorded in New York cannot fully reflect actual demand. In particular, since many of these alternative transactions are illegal, they are not recorded in official records, making actual data on alternative transactions impossible to obtain. Therefore, a model has to be constructed to determine actual cigarette demand in New York.

The model used in this analysis is a multi-segment demand model. This model is similar to those that JDA has constructed to model the national cigarette, moist snuff, cigar, beer, wine, spirits, and aviation fuel industries all of which have similar tax structures. A detailed demand model methodology is presented in Appendix 4 to this document.

Based on the model, residents of New York likely purchased about 38.2 packs per capita in 2011, which places actual demand in the state on the low side nationally.⁹ This suggests that total demand in New York is approximately 738.4 million packs, with just under half of that being met with taxable sales at retailers located in the Empire State. The remaining 384.0 million packs (i.e., 38.4 million cartons) come from cross-border sales, bootlegging, internet sales, Indian reservations, military bases and duty-free shops.

This estimate of demand is somewhat smaller than the 1,050 million packs estimated in the last report in this series (see discussion below for a full comparison of this report to earlier reports); however, that report was completed prior to a number of substantial changes in both state and federal law that have led to higher prices both nationally and in New York. These include:

- A substantial increase in the Federal government's own cigarette excise tax, an increase that alone would have likely reduced overall cigarette sales in the state by about 50.2 million packs;
- Changes to Federal taxes on other tobacco products – particularly on smoking tobacco and pipe tobacco – that encouraged consumers to switch to roll-your-own tobacco products;
- Changes to the New York State excise tax rate on little cigars bringing the tax on these products in line with that on cigarettes;
- A \$1.60 increase in the state cigarette tax that likely reduced overall demand by as much as 147 million packs;
- The adoption of the Prevent All Cigarette Trafficking Act (the PACT Act) which went into effect on June 29, 2010. This law was supposed to ensure the collection of federal, state and local tobacco taxes on cigarettes and smokeless tobacco sold via the Internet or other mail-order sales. While it appears as if cigarette bootlegging and interstate sales are as abundant as they were prior to the law, it is likely that there has been some impact on the price of cigarettes sold over the internet.

In addition to higher prices, residents of New York are subjected to a large amount of anti-tobacco advertising and receive incentives to quit smoking or reduce tobacco consumption. All of these factors together have likely helped reduce overall cigarette demand in the state to levels well below those in Fiscal Year 2009. Table 7 on page 11 shows the current demand estimate compared to those from earlier studies.

⁸ The reservations in New York are the Allegany, Cattaraugus, Oil Springs, Oneida, Onondaga, Poospatuck, St. Regis Mohawk, Shinnecock, Tonawanda, and Tuscarora

⁹ New York ranks 46th out of the 50 states plus the District of Columbia.

Estimates of Cigarette Market Channels in New York State

While taxable cigarette sales are available from the State and from *The Tax Burden on Tobacco*, estimates of sales from alternative sources come from the interstate demand model. Five types of alternative sources are estimated using the model:

- Cross-border sales: This includes cigarette sales from states surrounding New York including the border states of Connecticut, Pennsylvania, Massachusetts and Vermont, as well as from the nearby states of Rhode Island, New Hampshire, Delaware, Maryland and Ohio.
- Interstate sales: This includes cigarettes taxed in other states but sold to New York consumers either over the internet, or by organized bootlegging and smuggling.
- Sales from local Native American reservation smoke shops that are not taxed at the state level.¹⁰
- Sales from military reservations.
- Sales from duty-free stores either on the Canadian border or in airport and ship based stores.

Table 3
Sources for Cigarettes Consumed in New York State: 2011

Source of Cigarettes	New York State Excise		Percent of Total
	Packs	Tax Value	
Legitimate Taxed Sales	354,400,000	\$1,541,640,000	48.00%
Alternative Sources	383,995,864	\$1,670,382,008	52.00%
Cross-Border Sales	208,192,153	\$905,635,865	28.20%
Other Interstate Sales	101,132,487	\$439,926,320	13.70%
Duty Free Sales	2,924,304	\$12,720,723	0.40%
Indian Smoke Shops (on Premise)	70,553,957	\$306,909,715	9.56%
Military	1,192,962	\$5,189,385	0.16%
Total Sales	738,395,864	\$3,212,022,008	100.00%

In total about 384.0 million packs are purchased in New York state from these alternative sources. Of these, the bulk (54.2 percent) are from regional cross-border sales, be these casual sales made to commuters or residents who generally shop in towns located across the state border, or through some sort of organized smuggling activity. The next largest segment (26.3 percent) comes from other inter-state sales, particularly from lower tax states like Missouri and Virginia. Another 18.4 percent of the alternative sales are made on Indian reservations directly to non-native consumers in direct contravention of federal and state laws, while about 0.3 percent are made on military bases to the civilian population. In New York, a substantial number of sales appear to be coming from duty-free outlets. These sales, which include Canadian sales account for as much as 0.75 percent of the total volume of alternative sales in the state. Table 3 above shows total estimated sales in New York by source.

It is also important to point out that while we can determine the total amount of Native American sales in New York State we cannot specifically determine where they were ultimately sold. Total sales on reservation to non-natives are based on a model that includes the population of the state where the reservation is located, the price differential, the native population in the state and the number of “smoke shops” located in the state. As such we can calculate native sales made on-premise to New York

¹⁰ Note that many cigarettes are sold on-line through reservation smoke shops not only in New York but in other states will not be recorded as Native American sales but rather as interstate sales.

consumers; however, native internet sales are part of overall Indian sales and impossible to assign to a given state. This last point is important because it suggests that New York State should be working in closer concert with other states with Native American reservations to further close down an obvious avenue of tax avoidance.

The Economic Impact of Tobacco Retailing in New York State

Even though per capita cigarette sales in New York are very low, tobacco sales account for a sizable amount of employment in the Empire State. No comprehensive economic impact analysis of the tobacco industry has been conducted for well over a decade, but a good estimate of the importance of tobacco retailing can be developed using overall retail employment data and information from the US Department of Commerce's economic census.

Tobacco dependent retailing jobs currently employ an estimated 4,674 individuals in New York. This includes people who work in tobacco stores, but also those who work in convenience stores, department stores, and other retail establishments that rely on part of their income from tobacco sales. In addition, suppliers to these firms and the re-spending by employees create an additional 1,537 jobs.¹¹ The current economic impact of the industry is shown in Table 4 below.

Table 4
Economic Impact of Cigarette Retailing in New York: 2011

	Jobs	Wages	Economic Activity
Direct Retailing	4,674	\$143,050,800	\$293,063,100
Supplier	492	\$34,106,600	\$93,481,500
Induced	1,045	\$60,313,500	\$160,735,600
Total	6,211	\$237,470,900	\$547,280,200

The firms that sell tobacco products and the people that they employ, along with the suppliers and the induced effects help to generate as much as \$67.7 million in state and local property, sales, income and other taxes. It is important to recognize that these positive economic impacts are in addition to the taxes consumers pay on tobacco products.

These economic impacts are not just abstract numbers, but represent real people and real families in businesses as diverse as warehousing, trucking, and convenience stores in states and towns across the country. If sales volumes of tobacco products were to increase dramatically, more jobs would be created in the state's economy. If the state was to capture all of the 738 million packs of cigarettes currently smoked by New York residents, the number of jobs in tobacco retailing would grow proportionally. Table 5 on the following page shows total employment and economic activity under this assumption.

¹¹ We use the Minnesota IMPLAN Group model (the IMPLAN Model) for our economic impact calculations. The model adopts an accounting framework through which the relationships between different inputs and outputs across industries and sectors are computed. This model can show the impact of a given economic decision – such as a factory opening or operating a sports facility – on a pre-defined, geographic region. It is based on the national income accounts generated by the US Department of Commerce, Bureau of Economic Analysis (BEA). RIMS II is a product developed by the U.S. Department of Commerce, Bureau of Economic Analysis as a policy and economic decision analysis tool. IMPLAN was originally developed by the US Forest Service, the Federal Emergency Management Agency and the Bureau of Land Management. It was converted to a user-friendly model by the Minnesota IMPLAN Group in 1993.

Table 5
Impact of Cigarette Retailing in New York Assuming No Alternative Market: 2011

	Jobs		Wages		Economic Activity	
Direct Retailing	9,762	\$	298,046,800	\$	610,598,000	
Supplier	1,043	\$	71,061,000	\$	194,769,400	
Induced	2,182	\$	125,663,300	\$	334,893,200	
Total	12,987	\$	494,771,100	\$	1,140,260,600	

Clearly, as our model suggests, New York State has extremely compelling reasons to take more aggressive action in enforcing existing laws pertaining to cigarette excise and sales tax collection. If not just from the standpoint of generating greater revenues, certainly the state would benefit by the additional legal jobs, wages and economic activity created in the retail sector, in addition to further diminishing a burgeoning black market that is increasingly linked to organized crime, drug gangs, human trafficking and terrorism. Of greater significance, there are some immediate steps that New York should be taking to work with neighboring states and to enforce existing laws pertaining to Native Americans that could reap significant benefits in terms of revenues and jobs.

Impact Model Methodology

This economic impact model uses standard econometric methodologies first developed by the U.S. Forest Service, and now maintained by the Minnesota IMPLAN Group to determine the size and scope of tobacco retailing in New York.

Total jobs in each type of retail outlet in New York come from Dun & Bradstreet's Hoovers database as of May 2012. Dun & Bradstreet data is recognized nationally as a premier source of micro industry data. The D&B database contains information on over 15 million businesses in the United States.¹² It is used extensively for credit reporting, and according to the vendor, encompasses about 98 percent of all business enterprises in the country. Since retail employment is linearly related to retail sales,¹³ these figures are adjusted using the percentage of sales in each establishment type from the US Department of Commerce, Bureau of the Census' 2007 Census of Retail Trade.¹⁴ If, for example, the Census of Retail Trade says that 5 percent of grocery store sales are from tobacco products, the jobs in grocery stores are multiplied by 0.05. This way, only the percentage of jobs in each establishment that are directly due to tobacco sales are captured.

Industries are linked to each other when one industry buys from another to produce its own products. Each industry in turn makes purchases from a different mix of other industries, and so on. Employees in all industries extend the economic impact when they spend their earnings. Thus, economic activity started by the sale of cigarettes (for example) generates output (and jobs) in hundreds of other industries, often in

¹² The D&B information database updates over 1 million times a day, over 350 million payment experiences are processed annually, and over 110 million phone calls are made to businesses. In addition, D&B uses a patented matching technology and over 2,000 information computer validations to ensure a high standard of data quality.

¹³ See DeFranco, Laurence, Lilley, William, and John R. Dunham, *The Case of the Transient Taxpayer: How Tax-Driven Price Differentials for Commodity Goods Can Create Improbable Markets*, Business Economics, July 1998.

¹⁴ US Department of Commerce, Bureau of the Census, *Retail Trade: Subject Series - Product Lines: Product Lines Statistics by Kind of Business for the United States and States: 2007*, at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_44SLLS1&prodType=table

states far removed from the original economic activity. The impact of supplier firms, and the “induced impact” of the re-spending by employees of industry and supplier firms, is calculated using an input/output model of the United States. The model calculates the impact on a national basis and by state and also estimates taxes paid by each industry and its employees. Federal taxes include business and personal income taxes, FICA, and the unemployment insurance.

Once the direct employment numbers are calculated from the adjusted Dun & Bradstreet data they are entered into the IMPLAN model. The model adopts an accounting framework through which the relationships between different inputs and outputs across industries and sectors are computed. This model can show the impact of a given economic decision – such as a factory opening or operating a sports facility – on a pre-defined, geographic region. It is based on the national income accounts generated by the US Department of Commerce, Bureau of Economic Analysis (BEA).¹⁵

It is sometimes mistakenly thought that initial spending accounts for all of the impact of an economic activity or a product. For example, at first glance it may appear that consumer expenditures for a product are the sum total of the impact on the local economy. However, one economic activity always leads to a ripple effect whereby other sectors and industries benefit from this initial spending. This inter-industry effect of an economic activity can be assessed using multipliers from regional input-output modeling.

The economic activities of events are linked to other industries in the state and national economies. The activities required to sell a pack of cigarettes from stocking, to checking for identification, to shipping generate the direct effects on the economy. Supplier (or indirect) impacts occur when these activities require purchases of goods and services such as building materials from local or regional suppliers. Additional, induced impacts occur when workers involved in direct and indirect activities spend their wages in the region. The ratio between total economic and direct impact is termed the multiplier.

This method of analysis allows the impact of local production activities to be quantified in terms of final demand, earnings, and employment in the states and the nation as a whole.

The IMPLAN data are used to generate estimates of direct wages and output in each of the sectors analyzed: manufacturing, importing, wholesaling and retailing. Wages are derived from data from the U.S. Department of Labor’s ES-202 reports that are used by IMPLAN to provide annual average wage and salary establishment counts, employment counts and payrolls at the county level. Since this data only covers payroll employees, it is modified to add information on independent workers, agricultural employees, construction employees, and certain government employees. Data are then adjusted to account for counties where non-disclosure rules apply. Wage data include not only cash wages, but health and life insurance payments, retirement payments and other non-cash compensation. It includes all income paid to workers by employers.

Total output is the value of production by industry in a given state. It is estimated by IMPLAN from sources similar to those used by the BEA in its RIMS II series. Where no Census or government surveys are available, IMPLAN uses models such as the Bureau of Labor Statistics Growth model to estimate the missing output.

Comparison To Earlier Studies

¹⁵ RIMS II is a product developed by the U.S. Department of Commerce, Bureau of Economic Analysis as a policy and economic decision analysis tool. IMPLAN was originally developed by the US Forest Service, the Federal Emergency Management Agency and the Bureau of Land Management. It was converted to a user-friendly model by the Minnesota IMPLAN Group in 1993.

This analysis was last conducted by Dr. Brian P. O'Connor in May 2009. That analysis used a different methodology that estimated overall demand for cigarettes in New York using a regression analysis. This analysis associated cigarette demand with different demographic characteristics across states. A similar analysis is built into the multi-state demand model; however, this is enhanced in that each state's demand for cigarettes is reflected in every other state's sales.¹⁶ Dr. O'Connor calculated alternative sales by subtracting taxable sales (calculated using state tax collection data) from the estimated demand. Shares by source are based on generalized assumptions.

Table 6
Comparison of Tobacco Tax Receipts

Fiscal Year	Tobacco Tax Receipts (\$ Millions)	Cigarette Tax Receipts (\$ Millions)	Cigarette Tax Rate (Pack)	OTP Tax Receipts (\$ Million)
2000-01	\$1,024.00	\$999.00	\$1.11	\$25.00
2001-02	\$1,005.00	\$980.00	\$1.11	\$25.00
2002-03	\$1,121.00	\$1,079.00	\$1.47	\$42.00
2003-04	\$1,013.00	\$969.00	\$1.50	\$44.00
2004-05	\$979.00	\$936.00	\$1.50	\$43.00
2005-06	\$974.00	\$932.00	\$1.50	\$42.00
2006-07	\$985.00	\$938.00	\$1.50	\$47.00
2007-08	\$976.00	\$926.00	\$1.50	\$50.00
2008-09	\$1,311.00	\$1,261.00	\$2.54	\$50.00
2010-11	\$1,639.00	\$1,541.00	\$4.35	\$98.00

The current model uses an inter-state system of demand equations (described in detail in Appendix 4) to estimate total in-state demand and sales coming from – or going to – each other state. In other words, the model calculates state import and export volumes across each state pair based on overall demand and supply, as well as differential prices, distances, and population.

Differences in methodology, as well as the substantial changes that have happened in both the national and New York state tobacco markets suggest that there will be some break in the estimates provided as part of this analysis and the trends outlined in the earlier report. Table 6 on the prior page replicates the data in the earlier report and includes the most recent data on tax collection and per pack excise taxes for New York State. These should represent actual data and therefore can be considered as a continuous series.

The difference in estimating methodologies comes to light when comparing the estimates of alternative or non-taxed sales across type. While our estimate of the total alternative market and of cigarette demand appear to be very close to the earlier model, our interstate demand model allocates sales differently. Taxable sales in each state are recorded; therefore, a pack of cigarettes sold in Kentucky to a New York consumer shows up as a taxable sale in Kentucky and as non-taxed consumption in New York. This sale could have been made in a number of ways. It could have been:

- A legitimate sale made to a traveler at the Cincinnati airport (which is located in Kentucky) who then went home to New York City;
- Made over the internet by a less than scrupulous tobacco seller in Kentucky, to a buyer in New York who failed to pay the use tax as required by law;

¹⁶ O'Connor, Brian P., *An Update – Additional Cigarette Tax Revenue Sources for New York State*, Prepared for the New York Association of Convenience Stores, March 2, 2009.

- Legitimately purchased in Kentucky as part of a much larger sale by someone who then shipped the cigarettes to New York City and then sold them outside of bars without a license and without paying the appropriate New York State or City taxes.

Table 7
Comparison of Cigarette Sales

Fiscal Year	Taxed Packs	Total Demand	Untaxed Sales	Untaxed Share	Tribal/Internet	Bootlegged	Cross-Border
2000-01	900	1,240	N/A	N/A	N/A	N/A	N/A
2001-02	883	1,160	357	29%	264	70	23
2002-03	735	1,130	425	37%	316	90	19
2003-04	646	1,130	484	43%	366	100	18
2004-05	624	1,130	506	45%	369	120	17
2005-06	621	1,130	509	45%	373	120	16
2006-07	625	1,130	505	45%	370	120	15
2007-08	617	1,130	513	45%	379	120	14
2008-09	496	1,050	554	49%	410	130	14
2010-11	354	738	384	52%	71	101	208

As such, it is impossible to determine if the Kentucky sale was a cross-border sale or bootlegged. Likewise, while our model allows us to calculate total Indian reservation sales, we cannot specifically determine where they were ultimately sold. Total sales on reservation to non-natives are based on a model that includes the population of the state where the reservation is located, the price differential, the native population in the state and the number of “smoke shops” located in the state. As such we can calculate native sales made on-premise to New York consumers; however, native internet sales are part of overall Indian sales and impossible to assign to a given state.

We also define cross-border sales more broadly than did the previous author, as many legitimate transactions are made across state or regional lines as people travel to vacations in Maine or Washington DC. Finally, our model includes estimates of military sales and of duty free sales made in Canada or at airports or on ships located in New York. These may have been classified as Native American sales in the earlier reports.

About John Dunham and Associates

John Dunham and Associates is a leading New York City based economic consulting firm specializing in the economics of fast moving issues. JDA is an expert at translating complex economic concepts into clear, easily understandable messages that can be transmitted to any audience. Our company’s clients include a wide variety of businesses and organizations, including some of the largest Fortune 500 companies in America, such as:

- Altria
- Diageo
- Feld Entertainment
- Forbes Media
- MillerCoors
- Verizon
- Wegmans Stores

John Dunham is a professional economist with over 25 years of experience. He holds a Master of Arts degree in economics from the New School for Social Research as well as a Masters of Business Administration from Columbia University. He also has a professional certificate in Logistics from New

York University. Mr. Dunham has worked as a manager and an analyst in both the public and private sectors. He has experience in conducting cost-benefit modeling, industry analysis, transportation analysis, economic research, and tax and fiscal analysis. As the chief domestic economist for Philip Morris, he developed tax analysis programs, increased cost-center productivity, and created economic research operations. He has presented testimony on economic and technical issues in federal court and before federal and state agencies.

Prior to Phillip Morris Mr. Dunham was an economist with the Port Authority of New York and New Jersey, the Philadelphia Regional Port Authority and the City of New York.

Appendices

Appendix 1
State Tobacco Excise Tax Rates (FY 2011)

State	2011 Tax Rate	Rank
AL	\$0.43	47
AK	\$2.00	11
AZ	\$2.00	11
AR	\$1.15	29
CA	\$0.87	33
CO	\$0.84	34
CT	\$3.00	4
DE	\$1.60	20
DC	\$2.50	9
FL	\$1.34	26
GA	\$0.37	48
HI	\$3.00	4
ID	\$0.57	42
IL	\$0.98	32
IN	\$1.00	31
IA	\$1.36	25
KS	\$0.79	36
KY	\$0.60	40
LA	\$0.36	49
ME	\$2.00	11
MD	\$2.00	11
MA	\$2.51	8
MI	\$2.00	11
MN	\$1.58	22
MS	\$0.68	37
MO	\$0.17	51
MT	\$1.70	17
NE	\$0.64	38
NV	\$0.80	35
NH	\$1.78	16
NJ	\$2.70	6
NM	\$1.66	19
NY	\$4.35	1
NC	\$0.45	45
ND	\$0.44	46
OH	\$1.25	27
OK	\$1.03	30
OR	\$1.18	28
PA	\$1.60	20
RI	\$3.46	2
SC	\$0.57	42
SD	\$1.53	23
TN	\$0.62	39
TX	\$1.41	24
UT	\$1.70	17
VT	\$2.24	10
VA	\$0.30	50
WA	\$3.03	3
WV	\$0.55	44
WI	\$2.52	7
WY	\$0.60	40

Source: Orzechowski & Walker, *The Tax Burden on Tobacco Volume 46, 2011*, April 2012.

Appendix 2

New York State Tobacco Excise Tax Rates and Collections

Year	Tax Rate Per		Collections Per Penny
	Pack	Net Collections	
1955	\$0.03	\$58,377	\$19,459
1956	\$0.03	\$60,091	\$20,030
1957	\$0.03	\$62,051	\$20,684
1958	\$0.03	\$64,710	\$21,570
1959	\$0.05	\$81,997	\$16,399
1960	\$0.05	\$117,279	\$23,456
1961	\$0.05	\$120,926	\$24,185
1962	\$0.05	\$123,972	\$24,794
1963	\$0.05	\$124,687	\$24,937
1964	\$0.05	\$122,215	\$24,443
1965	\$0.10	\$155,012	\$15,501
1966	\$0.10	\$218,435	\$21,844
1967	\$0.10	\$222,142	\$22,214
1968	\$0.12	\$230,213	\$19,184
1969	\$0.12	\$263,639	\$21,970
1970	\$0.12	\$258,425	\$21,535
1971	\$0.12	\$266,694	\$22,225
1972	\$0.15	\$290,525	\$19,368
1973	\$0.15	\$323,838	\$21,589
1974	\$0.15	\$329,832	\$21,989
1975	\$0.15	\$332,492	\$22,166
1976	\$0.15	\$334,314	\$22,288
1977	\$0.15	\$336,096	\$22,406
1978	\$0.15	\$335,600	\$22,373
1979	\$0.15	\$326,589	\$21,773
1980	\$0.15	\$333,620	\$22,241
1981	\$0.15	\$338,421	\$22,561
1982	\$0.15	\$335,110	\$22,341
1983	\$0.21	\$358,206	\$17,057
1984	\$0.21	\$442,866	\$21,089
1985	\$0.21	\$430,895	\$20,519
1986	\$0.21	\$424,096	\$20,195
1987	\$0.21	\$409,058	\$19,479
1988	\$0.21	\$399,636	\$19,030
1989	\$0.33	\$414,438	\$12,559
1990	\$0.39	\$551,885	\$14,151
1991	\$0.39	\$605,466	\$15,525
1992	\$0.39	\$577,107	\$14,798
1993	\$0.56	\$556,062	\$9,930
1994	\$0.56	\$720,515	\$12,866
1995	\$0.56	\$710,976	\$12,696
1996	\$0.56	\$666,026	\$11,893
1997	\$0.56	\$652,479	\$11,651
1998	\$0.56	\$656,942	\$11,731
1999	\$0.56	\$636,989	\$11,375
2000	\$1.11	\$732,715	\$6,601
2001	\$1.11	\$1,002,382	\$9,030
2002	\$1.50	\$1,052,787	\$7,019
2003	\$1.50	\$993,050	\$6,620
2004	\$1.50	\$962,071	\$6,414
2005	\$1.50	\$935,944	\$6,240
2006	\$1.50	\$939,940	\$6,266
2007	\$1.50	\$934,689	\$6,231
2008	\$2.75	\$958,466	\$3,485
2009	\$2.75	\$1,327,691	\$4,828
2010	\$2.75	\$1,297,243	\$4,717
2011	\$4.35	\$1,541,043	\$3,543

Source: Orzechowski & Walker, *The Tax Burden on Tobacco Volume 46, 2011*, April 2012.

Appendix 3
State Taxable and Per Capita Sales Estimates

	Estimated Per Capita Consumption	Estimated Per Capita Taxable Sales	Taxable Percent
AL	73.72	72.30	98.1%
AK	67.92	46.49	68.5%
AZ	31.91	30.01	94.0%
AR	72.32	65.03	89.9%
CA	30.53	26.71	87.5%
CO	45.34	43.55	96.1%
CT	39.95	36.95	92.5%
DE	76.51	94.96	124.1%
FL	57.09	53.68	94.0%
GA	58.44	59.12	101.2%
HI	51.52	34.98	67.9%
ID	54.37	51.81	95.3%
IL	58.54	45.59	77.9%
IN	69.89	72.43	103.6%
IA	54.18	50.80	93.8%
KS	45.97	42.86	93.2%
KY	81.78	108.76	133.0%
LA	79.87	79.46	99.5%
ME	53.82	51.76	96.2%
MD	41.01	35.58	86.7%
MA	32.88	34.44	104.7%
MI	46.97	45.18	96.2%
MN	53.73	53.54	99.6%
MS	74.14	71.62	96.6%
MO	68.46	95.04	138.8%
MT	54.24	49.15	90.6%
NE	58.65	55.98	95.4%
NV	57.58	52.69	91.5%
NH	59.00	93.24	158.0%
NJ	41.24	32.64	79.1%
NM	37.94	29.75	78.4%
NY	38.23	18.35	48.0%
NC	66.14	67.81	102.5%
ND	82.71	73.98	89.4%
OH	62.42	57.09	91.4%
OK	79.17	75.34	95.2%
OR	49.93	49.80	99.7%
PA	53.69	59.45	110.7%
RI	40.80	35.17	86.2%
SC	75.81	77.64	102.4%
SD	53.63	46.58	86.9%
TN	78.54	77.19	98.3%
TX	45.43	43.00	94.7%
UT	27.78	25.72	92.6%
VT	46.75	48.93	104.7%
VA	44.32	71.69	161.8%
WA	25.39	23.45	92.3%
WV	100.43	111.28	110.8%
WI	48.06	43.87	91.3%
WY	88.70	79.07	89.1%
DC	73.95	25.43	34.4%

Appendix 4 Model Methodology

This model examines cross border sales of cigarettes among the 51 states, as well as certain un-taxed sales, mainly motivated by price differentials resulting from different tax rates. The model estimates in-state demand of own-state taxed sales of cigars, exports to and imports from other states.

The general methodology is a two-stage estimation of the demand equation linked to a non-linear programming model of the import and export patterns. The data are all at the state level. They are:

- Taxable sales were obtained from *The Tax Burden on Tobacco: 2011*.
- Price per pack was obtained from *The Tax Burden on Tobacco 2001*. The prices are adjusted for state sales tax.
- Population Estimates, Race and Hispanic Origin from the Bureau of the Census
- Distance – state-to-state centroid distance data were obtained from Caliper Corp.

The rapidly changing market for cigarettes in the United States gives rise to the modeling of the multi-layered decision process. Given the increasing degree of differentiation of products available, a representative consumer entering the market faces multiple choices regarding where and how he will purchase the cigarette product of his choice. This model addresses that question and estimates the probability attached to each of the possible decisions.

In order to illustrate the choice probability, we denote by ‘k|j,i,l’ the choice of alternative k in limb j in trunk i. Then the choice probability can be defined as the conditional probability of alternative k in limb j, and trunk i, k|j,i,l or analogously as premium cigarettes from normal retailers for cigarette purchases:

$$P(k|j,i,l) = \frac{\exp(\beta' x_{k|j,i,l})}{\sum_{n|j,i,l} \exp(\beta' x_{n|j,i,l})} = \frac{\exp(\beta' x_{k|j,i,l})}{\exp(J_{j|i,l})}$$

where $J_{j|i,l}$ is the inclusive value for branch j in limb i, trunk l, and

$$J_{j|i,l} = \log \sum_{n|j,i,l} \exp(\beta' x_{n|j,i,l})$$

At the next level of the tree, we define the conditional probability of choosing a particular branch in limb i, trunk l,

$$P(j|i,l) = \frac{\exp(\psi' y_{j|i,l} + \tau_{j|i,l})}{\sum_{m|i,l} \exp(\psi' y_{m|i,l} + \tau_{m|i,l})} = \frac{\exp(\psi' y_{j|i,l} + \tau_{j|i,l})}{\exp(I_{i|l})}$$

where $I_{i|l}$ is the inclusive value for limb i in trunk l. The probability of choosing limb i in trunk l is

$$P(i|l) = \frac{\exp(\phi' z_{i|l} + \sigma_{i|l} I_{i|l})}{\sum_{m|l} \exp(\phi' z_{m|l} + \sigma_{m|l} I_{m|l})} = \frac{\exp(\phi' z_{i|l} + \sigma_{i|l} I_{i|l})}{\exp(H_{l|l})}$$

where $H_{l|l}$ is the inclusive value for trunk l. Finally, the probability of choosing a particular limb is

$$P_{ijl} = \frac{\exp(\theta' w_l + \phi_l H_l)}{\sum_m \exp(\theta' w_m + \phi_m H_m)}$$

By the laws of probability, the unconditional probability of the observed choice made by an individual is

$$P_{ijl} = P_{j|i,l} \times P_{i|l} P_l$$

This is the contribution of an individual observation to the likelihood function for the sample.

The technical model structure specified in this section is estimated using the Full Information Maximum Likelihood (FIML) method. Once convergence to the FIML function is reached, the predicted probabilities for each decision choice are obtained from the model output. These predicted probabilities, in turn, are then transferred to an Excel sheet to distribute the changes in volume occurring from any given tax increases into state and category of products shares.