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# Cigarette Consumption: Estimating the Effects of an Excise Cigarette Tax in California

## Summary

Recently, California passed Proposition 56, which increased the tax on cigarettes and other tobacco products by $2. The new tax is expected to impact both consumers and producers, causing consumers to pay more for a pack of cigarettes and producers to produce less. Because it is uncertain how the $2 tax burden will be divided between consumers and producers, this memo examines the potential impact of a $2 cigarette excise tax on the quantity demand of cigarettes in California when the tax burden is split equally between producers and consumers and when it falls more on consumers. In all three circumstances, increasing the tax on cigarettes from .87 cents to 2.87 dollars would decrease cigarette consumption in California.

## Policy—California Proposition 56 Tobacco Tax Increase

On November 8, 2016, California residents passed Proposition 56, which will increase the cigarette excise tax from .87 to $2.87.[1] According to California's Official Voter Information Guide, the purpose of the tax increase is to lower tobacco consumption in California and to generate additional revenue for state programs.[2] Proponents of Proposition 56 estimate a $1 billion to $1.4 billion increase in state revenue for 2017-2018. This revenue will be used for research, health programs for low-income individuals, and development programs for children.[3]

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[1] California Proposition 56, Tobacco Tax Increase (2016); See Chart 1 in the Appendix for state cigarette tax rates and rank; Boonn, Ann. 2016. *State Cigarette Tax Rates & Rank, Date of Last Increase And Related Data*. Washington, DC: Campaign for Tobacco Free Kids. Accessed October 16,2016. https://www.tobaccofreekids.org/research/factsheets/pdf/0099.pdf

[2] *California Secretary of State*. 2016. "Prop 56." Accessed November 2, 2016. http://voterguide.sos.ca.gov/en/propositions/56/arguments-rebuttals.htm

[3] Ballotpedia. 2016. "California Proposition 56, Tobacco Tax Increase." Accessed October 17, 2018.

**Calculation Summary**

The impact of a cigarette tax on cigarette consumption will be calculated as the following:

1. Finding the average price of cigarettes ($P_{old}$).
2. Calculating the price of cigarettes after the $2 excise cigarette tax when consumers bear 3/4 of tax ($P_{new1}$), when producers bear 1/4 of tax ($P_{new2}$), and when the tax is split evenly ($P_{new3}$).
3. Finding the approximate number of cigarette packs sold in California ($Q_{old}$)
4. Finding the price elasticity of demand of cigarettes.
5. Calculate the change in consumption of cigarettes ($Q_{new}$) by using a high mean and a low mean of price elasticity of demand.

**Calculation Details**

1. The retail price of a pack of cigarettes in FY 2015 was $5.53. This price included a .87 excise cigarette tax and a 7.5% sales tax. The price for one pack of cigarettes without taxes was $4.24.
2. Under Proposition 56, the cigarette tax will increase from .87 to $2.87 plus the current sales tax of 7.5%. Because it is uncertain how the tax will be split between consumers and producers, there are three new prices estimates of cigarettes. These estimates represent when the consumers bears the majority of the tax or if the tax is split evenly between producers and consumers.

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https://ballotpedia.org/California_Proposition_56,_Tobacco_Tax_Increase_

a. If the consumers bear 3/4 of the $2.00 tax, the new price of a pack of cigarettes will be $7.56.

b. Producers will then bear 1/4 of the $2.00 tax, and the new price would be $6.44.

c. If producers and consumers equally share the burden, the new price would be $7.02

| **Tax Burden $2.00** | **Calculations $P_o$ + Tax * Sales Tax** | **Price** |
|---|---|---|
| $P_{new1}$- Consumers bear ¾ of tax | ($5.53 + $1.50) * 7.5% | $7.56 |
| $P_{new2}$- Producers bear ¼ of tax | ($5.53 + .50) * 7.5% | $6.44 |
| $P_{new3}$ Producers and Consumers equally share tax | ($6.53 + $1.00) * 7.5% | $7.02 |

3. An estimated 867.1 million packs of cigarettes were sold in FY 2015. According to the Henry J. Kaiser Family Foundation, 12.9 percent of California's population smoked cigarettes in 2015.[4] In 2014, the U.S. Census Bureau reported that 38.8 million people reside in California. We can estimate, based on the total population of California in 2014 and the amount of cigarettes packs consumed in 2015, that each smoker consumes 173 packs of cigarettes annually.

4. Because tobacco is an addictive substance, scholars have previously regarded tobacco as an inelastic good. Scholars have reported different estimates for the price elasticity of

[4] *The Henry J. Kaiser Family Foundation*. 2015. "Percent of Adults Who Smoke." Accessed October 18, 2016. http://kff.org/other/state-indicator/smoking-adults/?currentTimeframe=0&selectedRows=%7B%22nested%22:%7B%22california%22:%7B%7D%7D%7D&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D

demand for cigarettes in the United States. In 1991, RL Andrews and GR Franke argued that over time demand for cigarettes become less elastic and estimated the average price elasticity of demand for cigarettes from 1970 to 1990 to be -.0357.[5] In 2011, the International Agency for Research Cancer (IARC) conducted a review of studies, including Andrews's and Franke's 1991 study and more recent studies on the price elasticity of demand for cigarettes. In the review, the IARC concluded that price elasticity of demand for cigarettes ranged from -.06 to -.02.[6] More recently, the National Bureau of Economic Research published a 2016 study that estimated the price elasticity of cigarettes at different retail prices. According to the study, $2 pack of cigarettes has a price elasticity of -.34 while a $10 pack has a price elasticity of -1.70.[7] Another 2016 study by the National Bureau of Economic Research claimed that studies published between 1933 and 1990 overwhelming estimated the average price elasticity for cigarettes to be -0.697 with a range of -1 to -1.10.[8]

5. To calculate the change in quantity demand of cigarettes after the $2 tax increase, I used a low elasticity estimate of -.357 and a high elasticity estimate of -.697. Using different levels of elasticity gives a broader sense of how quantity demand will change with price change. See chart bellow for calculations.

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[5] Andrews, RL and Franke, GR. 1991. "The Determinants of Cigarette Consumption: A Meta-Analysis." Journal of Public Policy and Marketing 10 (Spring): 81-100. Accessed October 14, 2016.

[6] IARC Handbooks of Cancer Prevention. 2011. "Effectiveness of Tax and Price Policies for Tobacco Control. "International Agency for Research on Cancer 14: (iv-359). Accessed November 10, 2016.

[7] Tauras, John A., Michael F. Pesko, Jidong Huang, Frank J. Chaloupka, and Matthew C. Farrelly. 2016. "The Effects of Cigarette Prices on Cigarette Sales: Exploring Heterogeneity in Price Elasticities at High and Low Prices." National Bureau of Economic Research. Accessed October 16, 2016.

[8] Tauras, John A., Michael F. Pesko, Jidong Huang, Frank J. Chaloupka, and Matthew C. Farrelly. 2016. "The Effects of Cigarette Prices on Cigarette Sales: Exploring Heterogeneity in Price Elasticities at High and Low Prices." National Bureau of Economic Research. Accessed October 16, 2016. http://www.nber.org/papers/w22251.pdf

| | Low Elasticity Estimate | High Elasticity Estimate |
|---|---|---|
| Calculations for $P_{new1}$ | $Q_{n1} = (ED_1)(Q_O)(\Delta P) + Q_O$<br>= (-.697) (867.1) (7.55-5.53/ 5.53) + 867.1<br>= (-.697) (867.1) (.365) + 867.1<br>**= 646.51 million** | $Q_{n1} = (ED_2)(Q_O)(\Delta P) + Q_O$<br>= (-.357) (867.1) (7.55-5.53/ 5.53) + 867.1<br>= (-.357) (867.1) (.365) + 867.1<br>= **754.11 million** |
| Calculations for $P_{new2}$ | $Q_{n2} = (ED_1)(Q_O)(\Delta P) + Q_O$<br>= (-.697) (867.1) (6.44-5.53/ 5.53) + 867.1<br>= (-.697) (867.1) (.165) + 867.1<br>**= 767.38 million** | $Q_{n2} = (ED_2)(Q_O)(\Delta P) + Q_O$<br>= (-.357) (867.1) (6.44-5.53/ 5.53) + 867.1<br>= (-.357) (867.1) (.165) + 867.1<br>= **816.02 million** |
| Calculations for $P_{new3}$ | $Q_{n3} = (ED_1)(Q_O)(\Delta P) + Q_O$<br>= (-.697) (867.1) (7.02-5.53/ 5.53) + 867.1<br>= (-.697) (867.1) (.269) + 867.1<br>**= 704.52 million** | $Q_{n3} = (ED_2)(Q_O)(\Delta P) + Q_O$<br>= (-.357) (867.1) (7.02-5.53/ 5.53) + 867.1<br>= (-.357) (867.1) (.269) + 867.1<br>= **783.83 million** |

**Results/ Conclusion**

Based on the three different prices of cigarettes and the different levels of elasticity, the quantity demand of cigarettes decreases in each case. The supply curve shifts inward as price of cigarettes increases and the quantity demand decreases (See Figure 1). The quantity demand decreases the most when consumers bear ¾ of the tax burden with the new quantity demand ranging from 646.51million to 754.11 million packs of cigarettes. When producers bear ¼ of the tax burden, the demand ranges from 767.38 million to 816.02 million packs, and when producers and consumers equally share the tax burden, the quantity demand ranges from 704.52 million to 783.83 million packs. The results show that the California will generate more revenue when the elasticity of demand for cigarettes is more inelastic. In turn, the California will reduce the cigarette consumption when the elastic of demand is more elastic. Lastly, the results indicate that increasing the excise tax on cigarettes by $2 will accomplish the state's goal of reducing cigarette consumption and generating revenue for state programs.

**Appendix**

Figure 1: The Impact of Proposition 56 on the Cigarette Market