

The Potential Economic Impact of a U.S. Excise Tax on Selected Beverages

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Submitted by:
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Executive Summary

The United States Congress is considering the introduction of a national excise tax on sugar-sweetened beverages (an “SSB tax”). I have been asked by the American Beverage Association (ABA) to utilize existing beverage market analyses to estimate the potential economic effects that the proposed SSB tax would have on the consumption of both taxed and non-taxed beverages. I have also been asked to provide an estimate of the impact that an SSB tax could have on related industries and on the U.S. economy as a whole.

The analysis, described in detail below, suggests that an SSB tax comparable to that currently being discussed among policymakers would likely result in a significant short-term reduction in economic output in the industries currently involved in the production of beverages, and that negative short-term secondary effects could also be significant.¹

The precise amount of the proposed SSB tax has not yet been determined. I have been asked by the ABA to examine two prospective alternative tax rates: 3 cents per 12 ounce serving (a proposal evaluated by the Congressional Budget Office²) and 10 cents per 12 ounce serving. Economic analyses of excise taxes often focus on what is referred to as a tax “pass-through” rate. A pass-through rate refers to the relationship between the amount of taxes collected by the government and the effect of the tax on prices paid by consumers. For the purpose of this analysis, I start with the assumption of a 100 percent pass-through rate. This assumption implies that a federal tax of 3 cents per 12 ounces on a particular beverage will result in an increase of 3 cents in the price consumers pay for a 12 ounce beverage.

Using a 100 percent pass-through rate, I estimate that a 3 cents tax per 12 ounces would result in an increase of 4 to 6 percent in the prices of the taxed beverages.³ (See Table 1.) My demand analysis, which is based on an existing study by Dharmasena and Capps (2009),⁴ suggests that total spending by U.S. consumers on beverages will fall by an estimated 6 percent. This reduction amounts to an estimated \$10 billion decrease in beverage industry revenues based on 2008 U.S. consumptions levels.

To estimate the “direct effect” that reductions in consumer spending on beverages have on jobs and wages, I conducted what is known as an input-output analysis. This input-output analysis suggests that the estimated reductions in beverage consumption associated with the 3 cents tax per 12 ounces will lead to a loss of approximately 60 thousand jobs in industries directly involved with the production and sale of beverages, and a corresponding reduction in wages of approximately \$2 billion. These industries include soft drink and ice manufacturing, wholesale trade businesses, and food and beverage retail trade stores.

¹ Long-term adjustments in the U.S. economy to the short-term economic effects of the tax are not estimated in this study.

² “Budget Options Volume I: Health Care; Option 106,” Congressional Budget Office, December 2008.

³ All numerical estimates discussed in the text and tables of this study have been rounded to the nearest whole number (for percentages), \$100 million (for dollar values) or 10,000 (for jobs) in order to reflect the fact that these estimates are not precise. The attached exhibits do not round off the numbers; however, the reader should interpret the numbers in the exhibits similar to those reported in the texts and the tables. Figures in the tables and text may not match those in the exhibits due to rounding.

⁴ Senarath Dharmasena and Oral Capps Jr., “Demand Interrelationships of At-Home Nonalcoholic Beverage Consumption in the United States,” selected paper prepared for presentation at the Agricultural & Applied Economics Association’s 2009 AAEE & ACCI Joint Annual Meeting, Milwaukee, Wisconsin, July 26-29, 2009, downloaded from <http://purl.umn.edu/49443> (June 16, 2009).

I also utilized the input-output analysis to estimate the “secondary effects” associated with reductions in consumer spending on beverages. These secondary effects are in addition to the direct effects discussed above. Secondary effects include an “indirect effect” that captures the effect on industries that ultimately supply goods and services to the industries captured in the direct effects estimates. These indirectly effected industries include flavoring syrup and concentrate manufacturers, aluminum product manufacturers, and wholesale trade firms, among others. Many sectors of the economy account for some portion of the indirect effects due to the numerous interlocking relationships among the different economic sectors. The input-output analysis suggests that the estimated reductions in beverage consumption associated with the 3 cents tax per 12 ounces will lead to reduced economic output of an additional \$12 billion, a loss of approximately 50 thousand more jobs and a corresponding reduction in wages of an additional \$2 billion in sectors of the economy not directly involved in the production of beverages. This direct and indirect reduction in taxable economic activity would be accompanied by an estimated reduction of \$2 billion in federal, state and local tax revenues.⁵

Utilizing the same methodological approach described above, a 10 cent tax per 12 ounces would result in an estimated 13 to 21 percent increase in the price of taxed beverages and an estimated 19 percent reduction in consumer spending on beverages (after accounting for the effect on both taxed and non-taxed beverages and excluding payments associated with the tax.). This change results in an estimated loss of \$33 billion in revenues based on 2008 U.S. consumption levels. (See Table 1.) This reduction in beverage consumption (economic output) would lead to an estimated loss of approximately 210 thousand jobs in industries directly involved in the production of beverages and a corresponding \$8 billion reduction in wages. Estimates of indirect effects suggest that economic output could decline by an additional \$42 billion, with a corresponding loss of approximately 150 thousand jobs and \$8 billion in wages. This direct and indirect reduction in taxable economic activity would be accompanied by an estimated reduction of nearly \$8 billion in federal, state and local tax revenues.⁶

⁵ The change in tax revenues reflects change in economic activity as a result of direct and indirect effects only, and does not include incremental federal tax revenues generated by the proposed SSB tax. I address the net effect of changes in tax revenue below.

⁶ Change in tax revenues reflects change in economic activity as a result of direct and indirect effects only, and does not include incremental federal tax revenues generated by the proposed SSB tax. I address the net effect of changes in tax revenue below.

Table 1
Estimated Direct Effect of SSB Tax on U.S. Economy

Scenario	Change in Retail Price for Taxed Beverage Categories ⁷ (%)	Change in Retail Net Revenues ⁸ (%)	Predicted Direct Effect			
			Output ⁹ (\$billions)	Jobs (000s)	Wages (\$billions)	Taxes ¹⁰ (\$billions)
3 cent tax	4% to 6%	(6%)	(\$10.0)	(60)	(\$2.3)	(\$1.3)
10 cent tax	13% to 21%	(19%)	(\$33.3)	(210)	(\$7.8)	(\$4.2)

Estimated Indirect Effect of SSB Tax on U.S. Economy

Scenario	Change in Retail Price for Taxed Beverage Categories (%) ¹¹	Change in Retail Net Revenues ¹² (%)	Predicted Indirect Effect			
			Output (\$billions)	Jobs (000s)	Wages (\$billions)	Taxes ¹³ (\$billions)
3 cent tax	4% to 6%	(6%)	(\$12.4)	(50)	(\$2.5)	(\$1.2)
10 cent tax	13% to 21%	(19%)	(\$41.5)	(150)	(\$8.2)	(\$4.0)

Source: Exhibits 3, 7 and 10.

The analysis described so far relies on the assumption that 100 percent of an SSB tax would be passed through to consumer retail prices. There is some evidence that an SSB tax may be passed through to consumers at a rate higher than 100 percent. A literature search revealed two studies that examined tax pass-through rate for non-alcoholic sugar-sweetened beverages (Besley and Rosen, 1999 and Bergman and Lynngard, 2009).¹⁴ Both studies found evidence that consumer prices increased by more than twice the amount of the tax revenues associated with a tax on selected beverages. The Besley and Rosen study found that taxes on carbonated soft drinks were passed-through to consumers at a rate of 230 percent and the Bergman and Lynngard study found similar results. While both studies are subject to certain limitations, each suggests that an excise tax on beverages could be accompanied by a substantial markup on retail prices. Using the methodology described above, applying a 230 percent pass-through rate to a 3 cents tax per 12 ounces scenario results in an estimated 9 percent to 14 percent increase in the price of the taxed beverages.¹⁵ A 10 cents tax per 12 ounces scenario would result in an increase in the prices of the taxed beverages of approximately 30 percent to 48 percent.¹⁶ My analysis reveals that the large changes in prices resulting under high tax rates and high pass-through rates are likely to be accompanied by a

⁷ Percentage change shown for taxed beverages only. Low end of range corresponds to change in price of isotonic and high end of the range corresponds to change in price of regular soft drinks. See Exhibit 3.

⁸ Calculated as total after-tax retail sales (including pass-through of proposed excise tax) minus revenue generated by proposed SSB tax. Change shown net of decrease in taxed beverages and increase in non-taxed beverages.

⁹ Measured as net change in beverage retail sales estimated in the demand analysis.

¹⁰ Does not include tax revenue generated by proposed SSB tax.

¹¹ Percentage change shown for taxed beverages only. Low end of range corresponds to change in price of isotonic and high end of the range corresponds to change in price of regular soft drinks. See Exhibit 3.

¹² Calculated as total after-tax retail sales (including pass-through of proposed excise tax) minus revenue generated by proposed SSB tax. Change shown net of decrease in taxed beverages and increase in non-taxed beverages.

¹³ Does not include tax revenue generated by proposed SSB tax.

¹⁴ Timothy J. Besley and Harvey S. Rosen, "Sales Taxes and Prices: An Empirical Analysis," *National Tax Journal*, Vol. 52 No. 2 (June 1999), pp. 157-178. U. Michael Bergman and Niels Lynngard Hansen, "Excise Tax Pass-Through on Beverage Prices," Working Paper, March 17, 2009. The Besley and Rosen study used U.S. price data from 1982 through 1990. The Bergman and Hansen study used Danish price data from 1998, 2001 and 2003.

¹⁵ See Exhibit 3.

¹⁶ See Exhibit 3.

substantial reduction in industry economic output and employment, though a price increase of this level is too large to allow for meaningful estimates of the corresponding amounts.

The demand analysis underlying the above calculations is subject to a number of limitations, including the following:

- The Dharmasena and Capps study used in the demand analysis did not examine the same set of beverages that would be subject to the proposed SSB tax, nor did it examine the same set of potential substitute beverages. My analysis necessarily employed certain assumptions (discussed below) in order to apply the price elasticity estimates in the Dharmasena and Capps study to the analysis of beverages potentially affected by an SSB tax.
- The price elasticity estimates in the Dharmasena and Capps study are appropriately applied to small changes in beverage price. Consequently, the inferences made in the Dharmasena and Capps study regarding beverage substitution patterns may not hold for some of the larger SSB tax rates under consideration.
- The methodologies employed in this analysis rely on data that reflect historical relationships in consumer behavior and in the U.S. economy. Such historic relationships can change over time and may no longer hold. Moreover, the estimated relationships do not account for longer-term adjustments in consumer and producer behavior that would typically accompany significant changes in taxes and prices.
- As noted, I made the assumption that 100 percent of an SSB tax would be passed-through to consumers. This assumption may understate the actual pass-through rate. Further, the tax pass-through rate may vary from product to product. These possibilities are not incorporated into this study.
- Finally, there are other alternatives to consuming the beverages examined here, such as consuming tap water. Data limitations, however, preclude explicit consideration of all possible beverage alternatives. I do not estimate changes in consumption of non-beverage goods or changes in consumer saving in response to an SSB tax.

The input-output analysis I relied on also includes a number of limitations, including the following:

- The input-output analysis is subject to numerous simplifying assumptions and effectively relies on industry averages to estimate the relationship between changes in economic output and changes in various factors of production. The simplifying assumptions do not always hold in the actual economy.
- Estimates of secondary effects become less reliable for industries with more tenuous connections to those directly affected by the tax.
- Additionally, the input-output analysis does not rely on statistical “tests” that provide confidence intervals regarding the likely range of a given estimate. Accordingly, the reliability of the estimates is difficult to judge.
- Finally, the input-output analysis reflects estimated effects resulting from changes in consumer demand for beverages. It does not reflect effects resulting from other potential changes in consumer behavior such as consumption of non-beverage goods or changes in consumer saving.

Background

Assignment

The United States Congress is considering the introduction of a national excise tax on sugar-sweetened beverages (an “SSB tax”). I have been asked by the American Beverage Association (ABA) to utilize existing beverage market analyses to estimate the potential economic effects that the proposed SSB tax would have on the consumption of both taxed and non-taxed beverages. I have also been asked to estimate the impact that an SSB tax could have on related industries and on the U.S. economy as a whole.

I have not been asked to consider potential effects on health outcomes that may result from the proposed tax, nor have I been asked to conduct a benefit-cost analysis of the proposed tax policy.¹⁷

A copy of my current *curriculum vitae* is provided in Appendix 3.

U.S. Beverage Industry

The analysis utilizes Beverage Marketing Corporation (BMC) data provided by the ABA summarizing U.S. retail sales for 13 categories of non-alcoholic beverages (see Exhibit 1). It also utilizes Bureau of Economic Analysis (BEA) estimates of consumer expenditures for three additional non-alcoholic beverage types (see Exhibit 2). Estimates provided by the ABA were used to determine the portion of 2008 U.S. beverage consumption that would be subject to the proposed SSB tax. These include regular carbonated soft drinks, energy drinks, ready-to-drink coffee, enhanced water and fruit drinks, as well as 98 percent of sports beverages and 85 percent of ready-to-drink tea (see Exhibit 1). Table 2 shows that the majority of 2008 sales of beverages in the U.S. would be subject to the proposed SSB tax, and that these beverages are already priced higher on average than beverages that would not be subject to the tax.

Table 2
U.S. Retail Sales of Selected Beverages, 2008

Beverage Category	Revenues (\$billion)	Quantity (billions of gallons)	Avg. Price (per gallon)
Subject to SSB Tax	\$82.5	14.4	\$5.75
Not Subject to SSB Tax ¹⁸	\$60.3	12.2	\$4.94
Total	\$142.8	26.6	\$5.38

Source: Exhibit 1. Individual numbers may not sum to total due to rounding.

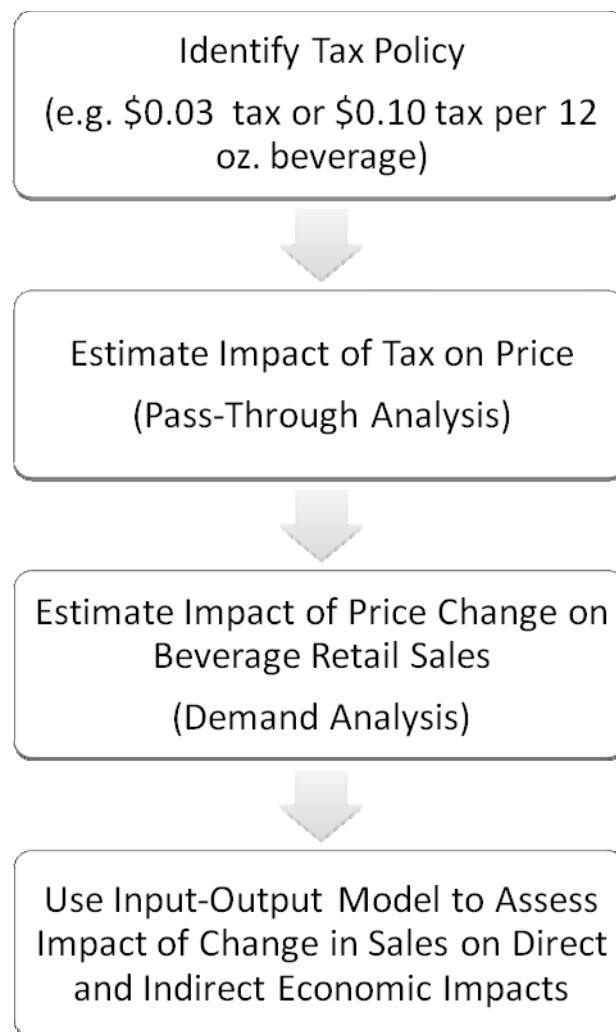
¹⁷ It is my opinion that a benefit-cost analysis should be considered by policy makers before reaching an informed decision about this important policy issue. See, for example, Kenneth Arrow, et al., “Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?,” *Science*, Vol. 272 No. 5259 (April 12, 1996), pp. 221-222.

¹⁸ Includes all diet carbonated soft drinks, bottled water, flavored water and 100 percent juices, as well as 2 percent of sports beverages and 15 percent of ready-to-drink tea. Figures in Table 2 based on data provided by BMC and an evaluation of taxable categories by ABA and BMC. Table 2 does not include sales of non-taxed coffee, tea or milk. Estimates of coffee, tea and milk sales included elsewhere in this analysis are based on BEA estimates of consumer expenditures (retail sales revenues) for off-premises consumption of those beverages. Insufficient data was available to determine quantity (in gallons) or corresponding average price per gallon for coffee, tea and milk, or to determine on-premises consumption of those beverages.

Methodology

This analysis is implemented in four steps, shown in Figure 1. First, I identified two particular tax policies for sugar sweetened beverages that are currently under consideration. Next, I estimated the effect that a tax increase would likely have on the price paid by consumers for sugar sweetened beverages. Third, I conducted a “demand analysis” to estimate the effect that an SSB tax would have on consumer spending on beverages (measured in retail sales), including beverages subject to the tax and beverages not subject to the tax. Fourth, I conducted an “input-output” analysis to estimate the effect reductions in beverage consumption would have on economic output, employment and wages in those industries directly and indirectly affected by changes in the production and sale of beverages.

Figure 1



Effect of an SSB Tax on Prices

The precise amount of the proposed SSB tax has not yet been determined. I have been asked by the ABA to examine two possible tax rates: a 3 cents tax per 12 ounce serving (a proposal evaluated by the

Congressional Budget Office¹⁹) and a 10 cents tax per 12 ounce serving. Economic analyses of excise taxes often focus on what is referred to as a tax’s “pass-through” rate. Pass-through rate refers to the relationship between the amount of taxes collected by the government and the effect of the tax on prices paid by consumers. A 100 percent pass-through rate implies, for example, that a 3 cents tax per 12 ounces collected by the government will result an increase in consumer prices of 3 cents per 12 ounces. I use a 100 percent pass-through rate as a starting point. This assumption is commonly used in tax impact analyses.²⁰

Table 3 shows that an excise tax with a 100 percent pass-through rate will lead to price increases on sugar-sweetened beverages of 4 to 21 percent, depending on the assumed tax rate.²¹

Table 3
Estimated Change in 2008 Retail Price of Taxed Beverages
(100% Pass-Through Rate)

Scenario	Change in Retail Price for Taxed Beverage Categories ²² (%)
3 cent tax	4% to 6%
10 cent tax	13% to 21%

Source: Exhibit 3.

There is some evidence from existing studies that the proposed SSB tax may be passed through to consumers at a rate higher than 100 percent. A literature search revealed two studies that examined tax pass-through rate for non-alcoholic sugar-sweetened beverages (Besley and Rosen, 1999 and Bergman and Lynngard, 2009).²³ Both studies found evidence that pass-through rates for consumers of carbonated soft drinks exceed 100 percent. While both studies are subject to certain limitations, each suggests that an excise tax on beverages could be accompanied by a substantial markup on retail prices. Thus, a pass-through percentage of 100 percent is likely to be conservatively low.

To test the sensitivity of my estimates to the assumed pass-through rate, I applied the pass-through rate of 230 percent found in the Besley and Rosen study for carbonated beverages. I found that applying a 230 percent pass-through rate to a 3 cents tax per 12 ounces scenario results in an estimated 9 percent to 14 percent increase in the price of the taxed beverages.²⁴ A 10 cents tax per 12 ounces scenario would result in an increase in the prices of the taxed beverages of approximately 30 to 48 percent.²⁵ The results of the model are likely to be less reliable as the size of the price hike faced by consumers increases.

¹⁹ “Budget Options Volume I: Health Care; Option 106,” Congressional Budget Office, December 2008.

²⁰ See Appendix 3 for a discussion of the literature on pass-through rates in the beverage industry.

²¹ Calculated as the quantity-weighted average percentage change in price for all taxed beverages under a 3 and 10 cents tax per 12 ounces scenario, respectively. See Exhibit 6.

²² Percentage change shown for taxed beverages only. Low end of range corresponds to change in price of isotonic and high end of the range corresponds to change in price of regular soft drinks. See Exhibit 3.

²³ Timothy J. Besley and Harvey S. Rosen, “Sales Taxes and Prices: An Empirical Analysis,” *National Tax Journal*, Vol. 52 No. 2 (June 1999), pp. 157-178. U. Michael Bergman and Niels Lynngard Hansen, “Excise Tax Pass-Through on Beverage Prices,” Working Paper, March 17, 2009. The Besley and Rosen study used U.S. price data from 1982 through 1990. The Bergman and Hansen study used Danish price data from 1998, 2001 and 2003.

²⁴ See Exhibit 3.

²⁵ See Exhibit 3.

Demand Analysis

I next estimated the effect of the price change on consumer spending on beverages, measured by retail sales. I estimated this effect using a demand analysis. The demand analysis was developed based on a review of existing beverage market studies. This review identified numerous studies that examined how beverage consumption has historically responded to price changes. Dharmasena and Capps (2009)²⁶ examined the responsiveness of demand for specific types of beverages (*e.g.*, diet *versus* regular carbonated soft drinks) to changes in their own prices, called “own price elasticity.” They also examined the responsiveness of demand to changes in price of alternate beverages, called “cross price elasticity.” Using the own- and cross-price elasticity estimates provided in Dharmasena and Capps and the estimated changes in price described above, I estimated the percentage change in the quantity of consumer spending for both taxed and non-taxed beverages. I then applied the predicted after-tax prices to the predicted after-tax sales quantities to estimate the change in total dollar value of beverage retail sales in response to the tax. The methodology for the demand analysis is explained in more detail in Appendix 1.

Overview of Input-Output Analysis

I used an input-output model to measure the potential economic impacts of the estimated reduction in beverage retail sales. Generally, an input-output analysis is used to measure the impact of a change in economic activity (say, resulting from a beverage tax) on a specific sector or the overall economy. The estimated reduction in sales is the “input” used in this input-output analysis. Through the use of input-output analysis, the impact of the initial change in demand for beverages – called the *direct effect* – can be used to estimate *secondary effects*. Secondary effects include *indirect* and *induced* effects, which are explained below. An input-output analysis models an economy by accounting for the economic interdependence between industries, households, and various levels of government.

“Outputs” of the input-output model are the variables of interest. An input-output analysis examines three primary measures of economic activity as the variables of interest: output, jobs, and wages. “Output refers to economic output, and equals the value of production or sales. Jobs are the number of person-years of employment and include both full- and part-time positions. Wages consist of income earned by households, including self-employed individuals. Wages also includes tips and benefits, such as health insurance and retirement payments. In this study, the IMPLAN economic modeling system was used to estimate changes in output, jobs, wages, and tax revenue as a result of the proposed beverage excise tax. See Appendix 2 for background on IMPLAN.

The geographic region in which the economic impact is to be measured in this report is the United States. This region was chosen because the proposed tax will be national in scope.

Data limitations preclude explicit consideration of all possible beverage alternatives in the input-output analysis. Additionally, the input-output analysis does not reflect effects resulting from other potential changes in consumer behavior, such as consumption of non-beverage goods or changes in consumer saving.

²⁶ Senarath Dharmasena and Oral Capps Jr., “Demand Interrelationships of At-Home Nonalcoholic Beverage Consumption in the United States,” selected paper prepared for presentation at the Agricultural & Applied Economics Association’s 2009 AAEA & ACCI Joint Annual Meeting, Milwaukee, Wisconsin, July 26-29, 2009, downloaded from <http://purl.umn.edu/49443> (June 16, 2009).

Input-Output Analysis: Direct Effect

Change in retail sales of beverages estimated in the demand model – calculated as the decrease in sales of taxable beverages net of any increase in sales of non-taxable beverages – is the “input” to the input-output analysis. I use the economic relationships estimated by IMPLAN to determine the model’s “output.”

One aspect of the “output” of the input-output analysis includes what is referred to as the direct effect. The direct effect reflects the impact the SSB tax would have on industries involved in manufacturing the beverages that are the focus of the demand analysis (*e.g.*, soft drinks, milk, juice, coffee and tea) as well as the industries involved in bringing the beverages from manufacturers to consumers (*e.g.*, wholesalers, distributors, and stores that sell beverages). Each of these industries produces what is referred to as “economic output” – the dollar value of the goods or services provided by the industry. Using IMPLAN, I estimate the effect a change in retail sales of beverages would have on economic output from these directly affected industries. After estimating the effect on economic output, I use the economic relationships estimated by IMPLAN to determine the associated changes in jobs and wages.

Input-Output Analysis: Secondary Effects

Another aspect of the “output” of the input-output analysis includes what is referred to as a secondary effects. Secondary effects arise when the economic activity generated by the direct effect works its way through the economy (*i.e.*, dollars are spent and re-spent). Secondary effects can include indirect and induced effects. Indirect effects reflect expenditure changes in industries that supply to the directly affected industries. These include, for example, producers of flavoring syrups and manufacturers of aluminum cans, plastic bottles and cardboard boxes. Induced effects, which reflect follow-on effects in the economy resulting from the direct and indirect effects are not estimated here.

The methodology for estimating the indirect effect follows that used by the IMPLAN economic modeling system.²⁷ IMPLAN makes certain assumptions about relationships in the economy in order to implement the model. (See Appendix 2.) These assumptions do not necessarily always hold true in the actual economy.

Input-Output Analysis: Tax Effect

Taxes are another economic measure that can be computed as a result of an input-output analysis. There are two sources of changes in tax relevant to the analysis here: 1) the incremental tax revenue generated by the federal government as a result of the proposed SSB tax and 2) changes in the federal, state, and local tax revenue resulting from the changes in economic activity measured in the direct and indirect effects.

I do not include the first type of change in tax – incremental tax revenue generated by the proposed tax – in either the direct or indirect effects measured by the input-output model for the following reasons: 1) I have been asked to evaluate the economic effects of generating the desired increase in federal tax revenues by taxing SSBs,²⁸ rather than to evaluate the economic effects of additional government spending, and 2) there is insufficient detail as to how or when the increased tax revenues would be spent by the federal government to meaningfully model the economic effects of such spending.

²⁷ See MIG, Inc., IMPLAN Pro Version 2.0 Manual (3rd ed, Feb. 2004) for a full description of the modeling techniques and assumptions used by IMPLAN.

²⁸ I assume that the economic activity resulting directly from increased federal expenditure would be the same regardless of the source of the funding. Therefore, I focus on the area in which economic impact can change - the sector of the economy taxed in order to generate the additional revenues.

This analysis focuses on the second type of change in tax: changes in federal, state and local tax revenue resulting from changes in economic activity reflected in the direct and indirect effects. These changes stem from reduced sales tax revenues as a result of reduced retail sales of beverages, reduced income taxes as a result of job losses, reduced taxes paid by corporations as a result of lower profits, and other reductions in economic activity. Tax revenue is calculated by applying appropriate tax rates to *taxable* economic activity. As with the analysis of indirect effects, the methodology for estimating tax effects follows that used by the IMPLAN economic modeling system.²⁹

Results

Table 4 shows that the proposed SSB tax would have a negative direct effect on output, jobs and wages in the U.S. The magnitude of these losses is estimated to be a \$10 billion reduction in output, a 60 thousand reduction in jobs and a \$2 billion reduction in wages for a 3 cents tax per 12 ounces. Losses are estimated to be greater for a 10 cents tax per 12 ounces. Indirect effects, also summarized in Table 4, could further magnify losses.

Table 4
Estimated Effect of SSB Tax on U.S. Economy

Scenario 1: Tax of \$0.03 per 12 ounce with 100% Pass-Through Rate

	Output³⁰ (\$billions)	Jobs (000s)	Wages (\$billions)	State/Local Taxes (\$billions)	Federal Government Taxes³¹ (\$billions)	Total Taxes (\$billions)
Direct	(\$10.0)	(60)	(\$2.3)	(\$0.7)	(\$0.6)	(\$1.3)
Indirect	(\$12.4)	(50)	(\$2.5)	(\$0.5)	(\$0.8)	(\$1.2)
Total	(\$22.5)	(110)	(\$4.8)	(\$1.1)	(\$1.4)	(\$2.5)

Scenario 2: Tax of \$0.10 per 12 ounce with 100% Pass-Through Rate

	Output³² (\$billions)	Jobs (000s)	Wages (\$billions)	State/Local Taxes (\$billions)	Federal Government Taxes³³ (\$billions)	Total Taxes (\$billions)
Direct	(\$33.3)	(210)	(\$7.8)	(\$2.2)	(\$2.0)	(\$4.2)
Indirect	(\$41.5)	(150)	(\$8.2)	(\$1.5)	(\$2.5)	(\$4.0)
Total	(\$74.8)	(360)	(\$16.0)	(\$3.7)	(\$4.5)	(\$8.3)

Source: Exhibit 10. Individual numbers may not sum to total due to rounding.

Demand Analysis

The results of the demand analysis are summarized in Tables 5 and 6.³⁴ These estimates largely reflect the Dharmasena and Capps findings³⁵ that certain of the beverage categories subject to the excise tax are

²⁹ See MIG, Inc., *IMPLAN Pro Version 2.0 Manual* (3rd ed, Feb. 2004) for a full description of the modeling techniques and assumptions used by IMPLAN.

³⁰ Direct effect change in output measured as net change in beverage retail sales estimated in the demand analysis.

³¹ Does not include tax revenue generated by proposed SSB tax.

³² Direct effect change in output measured as net change in beverage retail sales estimated in the demand analysis.

³³ Does not include tax revenue generated by proposed SSB tax.

³⁴ Data limitations preclude explicit consideration of all possible beverage alternatives in this analysis.

³⁵ See Exhibit 5.

highly sensitive to price changes. For example, although prices for taxed beverages under a 3 cents tax per 12 ounces scenario increase by 4 to 6 percent, the sales quantity for those same beverages decreases by more than double that amount on a percentage basis. The results also show that the sales of beverages not subject to tax are likely to increase (as consumers switch to relatively less expensive non-taxed beverages), but that this increase is not likely to be large enough to offset the corresponding decrease in sales of taxed beverages. The net effect of the proposed tax would be to decrease total beverage revenues by \$10 billion to \$33 billion (net of excise tax), depending on the magnitude of the tax.³⁶

Table 5
Estimated Change in 2008 Retail Price and Sales Quantity
(100% Pass-Through Rate)

Scenario	Change in Retail Price for Taxed Beverage Categories ³⁷ (%)	Change in Retail Sales Quantity (%)	
		Beverages Subject to SSB Tax	Beverages Not Subject to SSB Tax ³⁸
3 cent tax	4% to 6%	(13%)	1%
10 cent tax	13% to 21%	(43%)	5%

Source: Exhibits 3 and 7.

Table 6
Estimated Tax Revenues and Change in 2008 Retail Revenues
(100% Pass-Through Rate)

Scenario	Tax Revenues ³⁹ (\$billions)	Change in Retail Net Revenues ⁴⁰ (\$billions)	Change in Retail Net Revenues ⁴¹ (%)
3 cent tax	\$4.0	(\$10.0)	(6%)
10 cent tax	\$8.8	(\$33.3)	(19%)

Source: Exhibit 7.

Input-Output Analysis: Direct Effect

I use the change in retail revenues estimated in the demand analysis as the “input” to the input-output analysis. The total change in beverage industry revenue is reflected as a change in multiple IMPLAN industry “sectors” (or groupings of businesses that engage in similar economic activities). These industries and the magnitude of change in retail revenues are summarized in Table 7.⁴²

³⁶ Does not include potential losses in tax revenues from decreased economic activity, discussed below.

³⁷ Percentage change shown for taxed beverages only. Low end of range corresponds to change in price of isotonic and high end of the range corresponds to change in price of regular soft drinks. See Exhibit 3.

³⁸ 2008 sales quantity not available for coffee, tea and milk. Percentage change shown for all other non-taxed beverages listed in Exhibit 1.

³⁹ Includes incremental tax revenue raised by SSB tax only. Value is *not* shown net of other tax effects.

⁴⁰ Calculated as total after-tax retail sales (including pass-through of proposed excise tax) minus revenue generated by proposed SSB tax. Change shown net of decrease in taxed beverages and increase in non-taxed beverages.

⁴¹ Calculated as total after-tax retail sales (including pass-through of proposed excise tax) minus revenue generated by proposed SSB tax. Change shown net of decrease in taxed beverages and increase in non-taxed beverages.

⁴² IMPLAN industry code 70 includes taxable and non-taxable beverages under the proposed SSB tax, including, *e.g.*, diet and regular carbonated soft drinks, fruit juices, and bottled water. Thus, the direct effect for this industry code represents the net effect of decreased sales of taxable beverages and increased sales of non-taxable beverages.

Table 7
Inputs to Economic Impact Analysis

Effect	IMPLAN Industry Description	Change in Retail Revenues (\$billions)	
		Scenario 1: 3 cent tax	Scenario 2: 10 cent tax
Net Decrease in Sale of Taxable Beverages ⁴³	Soft drink and ice manufacturing	(\$11.5)	(\$38.3)
Increase in Sale of Non-Taxable Beverages	Fruit and vegetable canning, pickling, and drying	\$1.0	\$3.5
Increase in Sale of Non-Taxable Beverages	Fluid milk and butter manufacturing	\$0.2	\$0.7
Increase in Sale of Non-Taxable Beverages	Coffee and tea manufacturing	\$0.2	\$0.8
Total		\$10.0	\$33.3

Source: Exhibit 9. Individual numbers may not sum to total due to rounding.

Direct impacts on output, jobs, wages and taxes are summarized in Table 8. The change in total output summarized in Table 8 is reflected as a change in economic output at different points along the beverage distribution chain, and is referred to as the *direct effect*. By breaking out the direct effect on economic output in this manner, IMPLAN is able to take into account differences in supplier relationships at each point along the distribution chain. The majority of the direct effect is estimated to be reflected as a reduction in output in the soft drink and ice manufacturing, wholesale trade, and food and beverage retail stores industries, as shown in Table 9. On a percentage basis, the soft drinks and ice manufacturing industry would experience the largest direct-effect drop in output: a drop of 9 percent to 29 percent, depending on the magnitude of the tax (See Exhibits 11 and 14.) Other industries that would experience direct effect changes in output include transportation (with a reduction in output) and the fruit and vegetable canning industry (with an increase in output).⁴⁴

IMPLAN industry code 54 includes sales of 100 percent fruit juices, IMPLAN code 55 includes sales of milk, and IMPLAN code 66 includes sales of non-sweetened coffee and tea, each of which is assumed to be a non-taxable beverage. Due to data constraints, the estimated direct effect for milk, coffee and tea includes sales of those beverages for off-premises consumption only. There are other alternatives to consuming the beverages examined here, such as consuming tap water, that are not included in the analysis due to data limitations.

⁴³ Includes all beverages taxable under the proposed beverage excise tax, as well as the following non-taxable beverages: diet carbonated soft drinks, bottled water, flavored water, 100 percent juices, 2 percent of sports beverages, and 15 percent of ready-to-drink tea.

⁴⁴ See Exhibits 11 and 14.

Table 8
Estimated Direct Effect of SSB Tax on U.S. Economy
(100% Pass-Through Rate)

Scenario	Output⁴⁵ (\$billions)	Jobs (000s)	Wages (\$billions)	Taxes⁴⁶ (\$billions)
3 cent tax	(\$10.0)	(60)	(\$2.3)	(\$1.3)
10 cent tax	(\$33.3)	(210)	(\$7.8)	(\$4.2)

Source: Exhibit 10.

Table 9
Estimated Direct Effect of SSB Tax on Output⁴⁷
by Industry
(100% Pass-Through Rate)

Scenario	Soft Drink and Ice Manufacturing (\$billions)	Wholesale Trade Business (\$billions)	Retail Stores – Food and Beverage (\$billions)	Other (\$billions)	Total (\$billions)
3 cent tax	(\$6.0)	(\$1.5)	(\$2.5)	\$0.7	(\$9.3)
10 cent tax	(\$19.9)	(\$4.9)	(\$8.3)	\$2.2	(\$30.9)

Source: Exhibits 11 and 14. Individual numbers may not sum to total due to rounding.

Input-Output Analysis: Secondary Effects

Reductions in output and wages due to secondary effects could, in the short term, equal or exceed those due to direct effects. I estimate indirect effects using IMPLAN and summarize the results in Table 10.

Table 10
Estimated Indirect Effect of SSB Tax on U.S. Economy
(100% Pass-Through Rate)

Scenario	Output (\$billions)	Jobs (000s)	Wages (\$billions)	Taxes⁴⁸ (\$billions)
3 cent tax	(\$12.4)	(50)	(\$2.5)	(\$1.2)
10 cent tax	(\$41.5)	(150)	(\$8.2)	(\$4.0)

Source: Exhibit 10.

Similar to the direct effect, indirect effects will be reflected in various industries within the U.S. economy. According to the IMPLAN model, the largest indirect effect reductions in output are likely to be felt in the flavoring syrup and concentrate manufacturing, aluminum product manufacturing, and wholesale trade industries. This result is summarized in Table 11. Other indirectly affected industries include relatively specialized industries such as plastic bottle manufacturing, paperboard container manufacturing

⁴⁵ Measured as net change in beverage retail sales estimated in the demand analysis.

⁴⁶ Does not include tax revenue generated by proposed SSB tax.

⁴⁷ Measured as net change in beverage retail sales estimated in the demand analysis.

⁴⁸ Does not include tax revenue generated by proposed SSB tax.

and wet corn milling, as well as broader industries such as wholesale trade and management of companies and enterprises. (See Exhibits 13 and 16.)

Table 11
Estimated Indirect Effect of SSB Tax on Output
by Industry
(100% Pass-Through Rate)

Scenario	Flavoring Syrup and Concentrate Manufacturing (\$billions)	Aluminum Product Manufacturing (\$billions)	Wholesale Trade Businesses (\$billions)	Other (\$billions)	Total (\$billions)
3 cent tax	(\$2.3)	(\$0.8)	(\$0.6)	(\$8.7)	(\$12.4)
10 cent tax	(\$7.7)	(\$2.6)	(\$2.1)	(\$29.1)	(\$41.5)

Source: Exhibits 13 and 16. Individual numbers may not sum to total due to rounding.

Role of Multiplier Effects

Indirect effects of an SSB tax on output exceed the direct effects. This result can be explained by examining the multipliers for the affected industries. Multipliers measure the economic interrelationships between industries in the U.S. economy that purchase from and supply to one another in order to meet consumer demand.⁴⁹ The larger the multiplier, the greater the economic impact one industry has on others. For example, an indirect output multiplier of 2.0 indicates that for every \$1 decrease in output in the direct industry, there will be corresponding \$2 decrease in output in the indirect industries that supply it. Table 12 shows selected indirect output multipliers used by IMPLAN. With an indirect output multiplier of 1.8, the soft drink and ice manufacturing industry – one of the industries directly affected by the proposed SSB tax – has one of the top ten largest indirect output multipliers (out of over 400 industries). This relatively large multiplier indicates that a direct reduction in output in the soft drink and ice manufacturing industry can be expected to lead to larger reductions in output in other industries than a similar reduction in an alternate industry.

⁴⁹ Multipliers are a commonly used component of input-output analysis, and are estimated, for example, by the U.S. Bureau of Economic Analysis. See <https://www.bea.gov/regional/rims/brfdesc.cfm>, accessed Aug. 3, 2009. The multipliers used in this study are those estimated by IMPLAN. For a complete discussion of IMPLAN's multiplier calculations, see MIG, Inc., IMPLAN Pro Version 2.0 Manual (3rd ed, Feb. 2004), pp. 163-174.

Table 12
IMPLAN Indirect Output Multipliers

Rank (by Indirect Multiplier)*	Industry	Indirect Multiplier
1	Cheese manufacturing	2.1
2	Poultry processing	2.0
3	Animal (except poultry) slaughtering- rendering	1.9
4	Dry- condensed- and evaporated dairy product	1.9
5	Fluid milk and butter manufacturing	1.8
6	Fats and oils refining and blending	1.8
7	Ice cream and frozen dessert manufacturing	1.8
8	Leather and hide tanning and finishing	1.8
9	Soft drink and ice manufacturing	1.8
10	Sugar cane mills and refining	1.8
384	Wholesale trade businesses	0.6
399	Retail Stores - Food and beverage	0.5

*Out of 440 industries. The industries with the top three largest direct effects under the proposed SSB tax are highlighted

Source: Exhibit 17.

Input-Output Analysis: Tax Effect

The proposed SSB tax generates tax revenues from the SSB tax itself and reduces tax revenues from the decreased taxable economic activity. Table 13 shows that reductions in tax revenues stemming from reduced economic activity *in the directly- and indirectly-affected industries* is likely to be less than the incremental revenue raised by the proposed tax, but likely still substantial enough to provide a meaningful offset to SSB revenues. The net effect on total tax revenues is not estimated here, as I limit this analysis to consumer switching to non-taxed beverages only, and do not estimate changes in consumption of non-beverage goods or changes in consumer saving.

Table 13
Estimated Changes in Tax Revenue in Response to SSB Tax
(100% Pass-Through Rate)

Scenario	SSB Tax Revenue (\$billions)	Other Tax Revenue Due to Change in Economic Activity ⁵⁰		
		State/Local (\$billions)	Federal (\$billions)	Total (\$billions)
3 cent tax	\$4.0	(\$1.1)	(\$1.4)	(\$2.5)
10 cent tax	\$8.8	(\$3.7)	(\$4.5)	(\$8.3)

Source: Exhibits 7 and 10. Individual numbers may not sum to total due to rounding.

An increase in federal government expenditure can be expected, all else equal, to result in increased taxable economic activity and a resulting increase in tax revenues. However, as discussed above, I do not model the economic impact of federal government spending of the proceeds of the proposed SSB tax

Limitations of the Analysis

I discuss several of the key limitations for both the demand analysis and the input-output analysis below.

Limitations of the Demand Analysis

The demand analysis relies on existing studies examining the pass-through rate of taxes and price elasticity relationships in the beverage industry. These studies examine some, but not all, of the same beverages as those which would be affected by the proposed tax. Additionally, some of the studies are based on older data. Thus, the relationships that held in the earlier studies may not necessarily reflect those being considered in this study. As a result, the demand analysis is subject to several limitations, including, but not limited to, the following:

First, the Dharmasena and Capps study used in the demand analysis was not done in the context of an SSB tax and, as a result, did not fully distinguish between taxed and non-taxed beverages. In order to apply the price elasticity estimates to the analysis of an SSB tax, I employed a number of assumptions.⁵¹

Second, the Dharmasena and Capps study is based on data covering beverage sales from 1998 to 2003. Substitution patterns may have changed in subsequent years.

Third, the price elasticity estimates upon which the demand analysis is based are generally considered more reliable when evaluated for small changes in price. Thus, the estimates for the effects under a 10 cents tax per 12 ounces scenario presented in this study should be considered less reliable than those presented for the 3 cents tax per 12 ounces scenario.

Fourth, there are other beverage alternatives, such as tap water, which are relevant alternatives to both the taxed and non-taxed beverages currently incorporated into this analysis. Data limitations preclude explicit consideration of these and other possible beverage alternatives⁵² in this study.

⁵⁰ Includes both direct and indirect tax effects.

⁵¹ These assumptions are described in Appendix 1.

⁵² For example, the analysis includes coffee, tea, and milk categorized by the BEA as “consumed off premises” but does not include “on-premises” consumption such as milk, coffee and tea consumed in restaurants.

Finally, the 100 percent pass-through rate assumption described above (as well as the 230 percent pass-through rate assumption described in Appendix 1) is applied uniformly across all types of taxed beverages as a simplifying assumption. In reality, the tax pass-through rate may vary from product to product.

Limitations of the Input-Output Analysis

The input-output analysis relies on the data and methodology used in the IMPLAN input-output model. While IMPLAN is a well-established, widely-used impact analysis tool, it is a modeling tool whose results should be interpreted carefully. Limitations of the input-output analysis used to estimate the effect of an SSB tax on related industries and the U.S. economy as a whole include the following.

First, the input-output analysis is subject to numerous simplifying assumptions⁵³ and effectively relies on industry averages to estimate the relationship between changes in output and changes in various factors of production. The simplifying assumptions do not always hold in the actual economy, and the “averages,” while historically applicable for broadly defined industries, may not accurately reflect the future impact of the proposed SSB tax on the potentially affected industry segments.

Second, the input-output analysis does not rely on statistical “tests” that provide confidence intervals regarding the likely range associated with a given estimate. Accordingly, the reliability of the estimates is difficult to judge, especially for estimates of secondary effects.

Third, the input-output analysis does not account for long-term adjustments in the economy in response to the modeled policy changes.

Summary of Conclusions

I estimate that a 3 cents tax per 12 ounces on SSBs could increase prices paid by consumers on taxed beverages by roughly 4 to 6 percent, and that net⁵⁴ beverage industry revenue could decrease by \$10 billion. Other adverse impacts include a reduction in output, jobs and wages – primarily in the soft drink and ice manufacturing, wholesale trade, and food and beverage retail stores industries. The soft drink and ice manufacturing industry is likely to experience the biggest losses, with reductions in output, jobs and wages on the order of 9 percent. Total direct job losses could be approximately 60 thousand and wages are estimated to fall by roughly \$2 billion. Indirect effects of the proposed SSB tax could result in a loss of roughly \$12 billion in output, 50 thousand jobs, and \$2 billion in wages. Reductions in economic output, jobs and wages are likely to be larger under a 10 cents tax per 12 ounces scenario. I conclude that an SSB tax comparable to that currently being discussed among policymakers would likely result in a significant short-term reduction in economic output in the industries currently involved in the production of beverages, and that negative short-term secondary effects could also be significant.⁵⁵

⁵³ I describe several of these key assumptions in Appendix 2.

⁵⁴ Net of decrease in taxed beverages and increase in non-taxed beverages. Excludes revenue generated by proposed SSB tax.

⁵⁵ Long-term adjustments to the tax and the associated long-term economic effects are not estimated in this study.

Appendix 1: Demand Analysis

The purpose of this appendix is to provide an overview of the demand analysis and to highlight key assumptions and potential drawbacks associated with it. The estimates of beverage industry revenue losses presented in this paper depend on a number of assumptions. One critical assumption involves the portion of the tax that is “passed through” to end consumers in the form of a price change. A second critical assumption involves how beverage consumption quantities will respond to the resulting change in price.

Tax Pass-Through Rate

There is a well-established body of research examining the theory of the extent to which taxes are passed-through from producers to consumers in the form of price increases. The extent to which consumers will bear the tax is affected by both the level of consumer and producer sensitivity to price changes (price elasticity of demand and price elasticity of supply) and the extent of competition among producers and/or retailers. The less sensitive consumers are to price changes and the more competitive the producer/retailer market is, the greater the likelihood the full amount of the tax will be reflected in increased prices. However, when producer/retailer markets are not perfectly competitive, the tax may be passed through to consumers at different rates.⁵⁶

While tax incidence theory is well-established, there are relatively few studies that examine actual evidence regarding cost and/or tax pass-through rates in the sugar-sweetened beverage marketplace. A 100 percent pass-through rate, like that which was assumed in the results discussed in the main body of this paper, is a common assumption made in tax incidence studies.⁵⁷ Studies that do examine actual evidence of tax pass-through focus on a variety of goods ranging from clothing to alcohol.

A literature search revealed two studies that examined tax pass-through rates for non-alcoholic sugar-sweetened beverages. Besley and Rosen (1999)⁵⁸ examined prices for a group of commodity goods across several major U.S. cities. The study found that, for several commodities, including carbonated soft drinks, the amount of the tax is not only fully passed-through to consumers, but is “over-shifted” – that is, the price paid by the end consumer increases by an amount greater than the tax increase. The authors found that, for carbonated soft drinks specifically, price would increase by nearly 1.30 times the amount of the tax, implying that a 3 cents tax per 12 ounces for carbonated soft drink would result in a nearly 7 cents (3 cents + [1.30 x 3 cents]) increase in the price paid by end consumers. A study by Bergman and Lynngard (2009) using more recent data from Denmark found similar evidence that tax increases are “over-shifted” to consumers for carbonated soft drinks at a rate similar to or higher than that found by Besley and Rosen.⁵⁹ While the Besley and Rosen study is somewhat dated and the Bergman and Lynngard study covers a geographic region outside the U.S., each suggests that an excise tax on beverages could be accompanied by a substantial markup on retail prices.

⁵⁶ James M. Poterba, “Retail Price Reactions to Changes in State and Local Taxes,” *National Tax Journal*, Vol. 49, No. 2 (June 1996), pp. 165-176, at p.166.

⁵⁷ See, e.g., James M. Poterba, “Retail Price Reactions to Changes in State and Local Taxes,” *National Tax Journal*, Vol. 49, No. 2 (June 1996), pp. 165-176, at p.165; Todd Gabe, “Fiscal and Economic Impacts of Beverage Excise Taxes Imposed by Maine Public Law 629,” SOE Staff Paper #575 (October 2008), at 10.

⁵⁸ Timothy J. Besley and Harvey S. Rosen, “Sales Taxes and Prices: An Empirical Analysis,” *National Tax Journal*, Vol. 52 No. 2 (June 1999), pp. 157-178. The study used price data from 1982 through 1990.

⁵⁹ U. Michael Bergman and Niels Lynngard Hansen, “Excise Tax Pass-Through on Beverage Prices,” Working Paper, March 17, 2009. The study used price data from 1998, 2001 and 2003. Bergman and Hansen examined tax pass-through at the brand level, and found that, when tax increased, brand prices increased on average by 2.31 to 4.25 times the amount of the tax.

To be conservative, I use the common 100 percent pass-through rate assumption in the results discussed in the main body of this paper.

Estimated Impact on Consumption Quantity

I developed an estimate of the effect that the price change resulting from an excise tax would have on beverage consumption quantities based on a review of existing beverage market studies. This review identified numerous studies that examined how beverage consumption responded to price changes.⁶⁰ Of those, only one study – Dharmasena and Capps (2009)⁶¹ – included most of the wide variety of beverage categories listed in Exhibit 1 and also provided detailed information on substitution patterns between regular and diet carbonated soft drinks.⁶²

The figures presented in the Dharmasena and Capps study provide a basis for estimating how a given set of price changes would affect beverage consumption on a category-by-category basis. I employ the following steps to obtain my estimate:

⁶⁰ See, e.g., Dale Heien and Greg Pompelli, “The Demand for Alcoholic Beverages: Economic and Demographic Effects,” *Southern Economic Journal*, Vol. 55 No. 3 (Jan. 1989), pp. 759-770; Henry W. Kinnucan, Yuliang Miao, Hui Xiao and Harry M. Kaiser, “Effects of Advertising on U.S. Non-Alcoholic Beverage Demand: Evidence from a Two-Stage Rotterdam Model,” *Advertising and Differentiated Products*, Vol. 10 (2001), pp. 1-29; Stephen J. Hoch, Byung-Do Kim, Alan L. Montgomery and Peter E. Rossi, “Determinants of Store-Level Price Elasticity,” *Journal of Marketing Research*, Vol. 32, No. 1 (Feb. 1995), pp. 17-29; Yuqing Zheng and Harry M. Kaiser, “Estimating Asymmetric Advertising Response: An application to U.S. Nonalcoholic Beverage Demand,” *Journal of Agricultural and Applied Economics*, Vol. 40, No. 3 (2008), pp. 837-849; Yuqing Zheng and Harry M. Kaiser, “Advertising and U.S. Nonalcoholic Beverage Demand,” *Agricultural and Resource Economics Review*, Vol. 37, No. 2 (2008), pp. 147-159; Noel D. Uri, “The Demand for Beverages and Interbeverage Substitution in the United States,” *Bulletin of Economic Research*, Vol. 38, No. 1 (1986), pp. 77-85; S. Selvanathan and E.A. Selvanathan, “Consumption Patterns of Food, Tobacco and Beverages: a Cross-Country Analysis,” *Applied Economics*, Vol. 38 (2006), pp. 1567-1584; Geoffrey M. Pofahl, Oral Capps, Jr. and Annette Clauson, “Demand for Non-Alcoholic Beverages: Evidence from the ACNielsen Home Scan Panel,” Working Paper, May 2005; Steven T. Yen, Biing-Hwan Lin, David M. Smallwood and Margaret Andrews, “Demand for Nonalcoholic Beverages: The Case of Low-Income Households,” *Agribusiness*, Vol. 20, No. 3 (2004), pp. 309-321; Tirtha Dhar, Jean-Paul Chavas and Ronald W. Cotterill, “An Economic Analysis of Product Differentiation under Latent Separability,” Working Paper, May 15, 2003; Senarath Dharmasena and Oral Capps Jr., “Demand Interrelationships of At-Home Nonalcoholic Beverage Consumption in the United States,” selected paper prepared for presentation at the Agricultural & Applied Economics Association’s 2009 AAEA & ACCI Joint Annual Meeting, Milwaukee, Wisconsin, July 26-29, 2009, downloaded from <http://purl.umn.edu/49443> (June 16, 2009).

⁶¹ Senarath Dharmasena and Oral Capps Jr., “Demand Interrelationships of At-Home Nonalcoholic Beverage Consumption in the United States,” selected paper prepared for presentation at the Agricultural & Applied Economics Association’s 2009 AAEA & ACCI Joint Annual Meeting, Milwaukee, Wisconsin, July 26-29, 2009, downloaded from <http://purl.umn.edu/49443> (June 16, 2009).

⁶² Of the studies listed above, only one other study examines substitution patterns between diet and regular carbonated soft drinks. See Tirtha Dhar, Jean-Paul Chavas and Ronald W. Cotterill, “An Economic Analysis of Product Differentiation under Latent Separability,” Working Paper, May 15, 2003. However, that study was limited to only carbonated soft drinks consumption and did not examine the consumption of other forms of beverages. Further, the figures in that study appear to substantially overstate the market share of diet carbonated soft drinks. The budget share of the data used by Dhar, *et al.* appears to be more heavily weighted towards diet soft drinks than indicated by contemporaneous industry data (e.g., 52 percent diet in Dhar, *et al.* compared to 30 percent diet in industry sources). Additionally, the budget share of non-leading brand diet soft drinks in Dhar, *et al.* (31 percent) is much larger than the share indicated by contemporaneous industry data (12 percent). Dhar *et al.* relied on IRI Infoscan data for 1988-1992 from 46 U.S. major metropolitan marketing areas. Comparative industry data based on 1990 shares from Beverage Digest, 2009 Fact Book, Tables A1 to A4 and Table 29.

1. Tax rates for the proposed scenarios – 3 cents and 10 cents per 12 ounce, respectively – were calculated (in percentage terms) based on the 2008 consumption figures presented in Exhibit 1. I then used these percentage changes to calculate comparable relative price changes for the data used in the Dharmasena and Capps study.
2. The relative price increases were applied to the elasticity estimates presented in the Dharmasena and Capps paper to estimate a change in the quantity consumed for beverages on a category-by-category basis. This consumption impact was calculated for both taxed and non-taxed beverages in percentage change terms.⁶³
3. The estimated percentage changes in the consumption quantities for each of the beverage categories were applied to 2008 retail sales data. Retail sales data were provided by ABA for all beverage categories except milk, coffee and tea. Milk, coffee and tea retail sales data are from Bureau of Economic Activity (BEA) Consumer Expenditure Survey data for foods consumed off-premises (see Exhibit 2). Because retail values of milk, coffee and tea consumed on-premises is not available from ABA or BEA, this portion of retail sales for these three beverages is not included in this analysis. As a result, the total substitution effect of coffee, tea and milk is underestimated in this study.
4. Changes in total expenditures were calculated on a beverage-by-beverage basis by applying the resulting after-tax price and quantity estimates.

⁶³ These consumption estimates further account for a limitation associated with the empirical methodology employed by Dharmasena and Capps. Their analysis employed an econometric technique referred to as an almost ideal demand system (“AIDS”) model. AIDS models are widely utilized but incorporate a well-known restriction. The technique constrains the aggregate price elasticity for the product categories analyzed to -1.0. A study by Reed, *et al.* (2005) estimated the price elasticity of demand for certain food items (including non-alcoholic beverages) as a whole to be -0.74. Consequently, the estimates presented here reflect a rescaling (see, *e.g.*, David L. Edgerton, “Weak Separability and the Estimation of Elasticities in Multistage Demand Systems,” *American Journal of Agricultural Economics*, Vol. 79, No. 1 (Feb. 1997), pp. 62-79) to account for the more limited quantity response to an increase in beverage prices suggested by the Reed, *et al.* (2005) study.

The estimates of percentage change in consumption are summarized in Table 14 and described in detail in Exhibit 7. These estimates largely reflect the Dharmasena and Capps findings⁶⁴ that certain of the beverage categories subject to the excise tax are highly sensitive to price changes. For example, although prices for taxed beverages under a 3 cents tax per 12 ounces scenario increase by 4 to 6 percent, the sales quantity of those same beverages decreases by more than double that amount on a percentage basis.

Table 14
Estimated Change in 2008 Retail Price and Sales Quantity
(100% Pass-Through Rate)

Scenario	Change in Retail Price for Taxed Beverage Categories ⁶⁵ (%)	Change in Retail Sales Quantity (%)	
		Beverages Subject to SSB Tax	Beverages Not Subject to SSB Tax ⁶⁶
3 cent tax	4% to 6%	(13%)	1%
10 cent tax	13% to 21%	(43%)	5%

Source: Exhibits 3 and 7.

The results summarized in Tables 14 and 15 show that increased consumption of non-taxed beverages is not estimated to offset decreased consumption of taxed beverages. The net effect of a national beverage tax would be to decrease total beverage revenues by between \$10 billion and \$33 billion. By comparison, the total tax revenues are estimated to be between \$4 billion and \$9 billion, depending on the amount of the tax.

Table 15
Estimated Tax Revenues and Change in 2008 Retail Revenues
(100% Pass-Through Rate)

Scenario	Tax Revenues ⁶⁷ (\$billions)	Change in Retail Net Revenues ⁶⁸ (\$billions)	Change in Retail Net Revenues ⁶⁹ (%)
3 cent tax	\$4.0	(\$10.0)	(6%)
10 cent tax	\$8.8	(\$33.3)	(19%)

Source: Exhibit 7

While relying on the Dharmasena and Capps analysis was reasonable for conducting the demand analysis described above, the approach has a number of potential drawbacks.

- The data analyzed by Dharmasena and Capps covers 1998 through 2003 and may not reflect current marketplace dynamics.

⁶⁴ See Exhibit 5.

⁶⁵ Percentage change shown for taxed beverages only. Low end of range corresponds to change in price of isotonic and high end of the range corresponds to change in price of regular soft drinks. See Exhibit 3.

⁶⁶ 2008 sales quantity not available for coffee, tea and milk. Percentage change shown for all other non-taxed beverages listed in Exhibit 1.

⁶⁷ Includes incremental tax revenue raised by SSB tax only. Value is not shown net of other tax effects.

⁶⁸ Calculated as total after-tax retail sales (including pass-through of proposed excise tax) minus revenue generated by proposed SSB tax. Change shown net of decrease in taxed beverages and increase in non-taxed beverages.

⁶⁹ Calculated as total after-tax retail sales (including pass-through of proposed excise tax) minus revenue generated by proposed SSB tax. Change shown net of decrease in taxed beverages and increase in non-taxed beverages.

- The categories of beverages included in the Dharmasena and Capps analysis are not completely analogous to those categories of beverages that would be subject to the proposed tax. Some taxed goods, including ready-to-drink coffee and ready-to-drink tea, are not included in the Dharmasena and Capps study, while certain non-taxed goods such as milk and non-ready-to-drink coffee and tea are included in the Dharmasena and Capps study, but are not included in the BMC data provided by ABA. As mentioned above, the results described in this study under-estimate the substitution effects to non-taxed milk, coffee and tea as only off-premises consumption of these beverages is modeled. Additionally, this study does not estimate the potential substitution effects for non-beverage food products.
- The modeling technique used by Dharmasena and Capps, called almost ideal demand system (“AIDS”), is subject to certain restrictive assumptions that may not accurately model consumer behavior in the face of a national beverage tax. Additionally, the need to rescale the assumed aggregate demand elasticity used by Dharmasena and Capps study requires using results from a study that was not based on an analogous measurement of beverages.⁷⁰
- According to the cross-price elasticities reported by Dharmasena and Capps, diet carbonated soft drinks are complements (rather than substitutes) for regular carbonated soft drinks – implying that, all else equal, an *increase* in the price of regular soft drinks will *reduce* the quantity consumed of diet soft drinks. While this result may reflect short-term household purchasing and industry product promotion patterns (*e.g.*, beverage companies discount at the same time the price of both diet and regular carbonated soft drinks as part of a price promotion), it is possible that a long-term adjustment in consumer behavior could lead to substitution effects in the future that are not modeled in this study.
- As summarized in Exhibit 7, the relationships described by Dharmasena and Capps suggest the SSB tax will lead to only a limited amount of total substitution to non-taxed beverages. This result may run counter to 1) industry understanding of product substitutability and consumer behavior and 2) other demand studies.

Sensitivity to Pass-Through Rate Assumption

The results discussed in the main body of this paper use the common 100 percent pass-through rate assumption. In order to assess the sensitivity of these results to this assumption, I also estimated the effect on beverage demand of 230 percent, the rate estimated by Besley and Rosen.

Applying this 230 percent pass-through rate to a 3 cents tax per 12 ounces scenario results in an estimated 9 percent to 14 percent increase in the price of the taxed beverages⁷¹ and an estimated 11 percent decrease in total beverage industry retail revenues net of the proposed tax.⁷² A 10 cents tax per 12 ounces scenario results in an increase in the prices of the taxed beverages of approximately 30 percent to 48 percent⁷³ and an estimated 44 percent reduction in total beverage industry retail revenues net of the proposed tax.⁷⁴

⁷⁰ Reed, *et al.* included non-alcoholic beverages in “other food consumed at home,” a product composite that also included sugar and sweets, fats and oils, eggs, and miscellaneous foods. The same study included fluid milk (included in the Dharmasena and Capps analysis of beverages) in a “dairy” composite that also included butter, cheese and ice cream. The own-price elasticity for dairy was -0.86. The authors found that the product composites used in the study were statistically valid. No aggregate elasticity measures from an existing study for a set of beverages comparable to that used in Dharmasena and Capps have been identified to date.

⁷¹ See Exhibit 3.

⁷² See Exhibit 7.

⁷³ See Exhibit 3.

⁷⁴ See Exhibit 7.

The preceding results on the impact of the amount of the tax pass-through rate should be interpreted with extreme caution for a number of reasons. First, predictions of outcomes generally become less reliable as the assumed change becomes larger. Second, the rate of tax pass-through may not be uniform across all types of taxed beverages (as assumed here). Third, there are numerous potential drawbacks associated with relying on the Besley and Rosen markup figure. As noted, their analysis was conducted on data covering 1982 through 1990. The US beverage industry may have undergone significant structural changes since then. Further the 10 cents tax per 12 ounces scenario predicts a price change of nearly 50 percent, which is especially high. They are likely to be a different order of magnitude than the price fluctuations considered by either Besley and Rosen that underlie the pass-through rate analysis or by Dharmasena and Capps used in the consumption quantity analysis. Estimates reflecting extreme changes in price should be considered relatively less reliable than estimates examining smaller price changes. At the most, these results can be used to conclude that, if some level of “over-shifting” occurs, an excise tax on sugar-sweetened beverages, especially a large one, could have a substantial effect on beverage consumption.

Appendix 2: IMPLAN Overview

As noted above, the economic impact analyses were conducted using the IMPLAN economic modeling system.⁷⁵ IMPLAN uses a series of models and data tables describing regional economic interactions such as trade flows and social accounting,⁷⁶ as well as multipliers,⁷⁷ to estimate the effect of a stimulus on the economy as a whole.⁷⁸ IMPLAN was originally developed by the USDA Forest Service in cooperation with the Federal Emergency Management Agency and the USDI Bureau of Land Management.⁷⁹ The IMPLAN system has been in use since 1979 and continues to be widely used by universities, government agencies, corporations, and private consultants to conduct economic impact analyses involving a wide range of issues and industries.

The IMPLAN data and accounts closely follow the accounting conventions used in the “Input-Output Study of the U.S. Economy” by the U.S. Bureau of Economic Analysis and the format recommended by the United Nations. IMPLAN is largely based upon data from the U.S. Bureau of Economic Analysis and U.S. Bureau of Labor Statistics.

The region data used in the input-output models in this study are for 2007, which is the most current year available. The economic impacts are reported in 2008 dollars.

IMPLAN Data Sources

IMPLAN employment data are based on three datasets: Covered Employment and Wages, Regional Economic Information System, and County Business Patterns. According to IMPLAN:

- *Covered Employment and Wages* is “one of the most important [data sets] used in the IMPLAN database development. This data [set] provides the industry structure for the states and counties. The data [set] is provided by the U.S. Department of Labor as part of the Unemployment Insurance CEW – Covered Employment and Wages Program”;
- *Regional Economic Information System* is “Bureau of Economic Analysis’s (BEA) Regional Economic Information System (REIS) data. This data set is the most inclusive available and provides information on sectors such as agriculture, construction and railroads not directly available through other series such as CEW. The REIS data series also provides information on self-employment and proprietary income”; and
- *County Business Patterns* “is a program run by the U.S. Department of Census. There are three primary data sources for County Business Patterns: the Bureau of Census Economic Census, Bureau of Census Annual Survey of Manufacturers, and the Internal Revenue Service Quarterly Payroll File (FICA).”⁸⁰

According to IMPLAN, output data are estimated “from a multitude of sources. IMPLAN output data come ... from similar sources as used by the BEA in developing the benchmark [input-output]. Most output data [are] from the BEA’s output series and the Annual Survey of Manufacturers. Other sectors

⁷⁵ Minnesota IMPLAN Group, Inc. (MIG), IMPLAN System 2.0 (region data and software).

⁷⁶ Social accounting reflects non-industrial interactions, such as tax payments.

⁷⁷ Multipliers describe the economic response of one industry to a stimulus in another industry.

⁷⁸ MIG, Inc., *IMPLAN Pro Version 2.0 Manual* (3rd ed, Feb. 2004), pp. 96-105.

⁷⁹ Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc.

⁸⁰ MIG, Inc., *IMPLAN Pro Version 2.0 Manual* (3rd ed, Feb. 2004), pp. 231-247.

use information from other various surveys and censuses. In some cases, there are no census or surveys available. In these cases, earnings data derived above are used along with earnings to output ratios from the BLS growth model are used to estimate the missing output.”⁸¹

Multipliers are calculated by IMPLAN based on industry relationship and production function information collected by IMPLAN.⁸²

Key IMPLAN Assumptions

IMPLAN models make the following assumptions:

- constant returns to scale: if additional output is required, all inputs increase proportionately;
- no supply constraints: an industry has unlimited access to raw materials and its output is limited only by the demand for its products;
- fixed commodity input structure: price changes do not cause a firm to buy substitute goods, changes in the economy will affect the industry’s output but not the mix of commodities and services it requires to make its products;
- homogenous sector output: the proportions of all the commodities produced by that industry remain the same, regardless of total output. An industry won’t increase the output of one product without proportionately increasing the output of all its other products; and
- industry technology: assumes that an industry uses the same technology to produce all its products, industry has a primary or main product and all other products are byproducts of the primary product.⁸³

⁸¹ MIG, Inc., IMPLAN Pro Version 2.0 Manual (3rd ed, Feb. 2004), pp. 253.

⁸² For a complete discussion of multiplier calculations, see MIG, Inc., IMPLAN Pro Version 2.0 Manual (3rd ed, Feb. 2004), pp. 163-174.

⁸³ MIG, Inc., IMPLAN Pro Version 2.0 Manual (3rd ed, Feb. 2004), pp. 103.

Appendix 3: Robert Hahn CV

Robert W. Hahn

Smith School
University of Oxford
Oxford, UK

Center for Business and Public Policy
Georgetown University
Washington, D.C.

EDUCATION

- 1977-81 California Institute of Technology, Pasadena, California
M.S., 1979, Ph.D., Social Science, 1981
- 1976-77 Stanford Graduate School of Business, Stanford, California
- 1971-75 Brown University, Providence, Rhode Island
B.A., Mathematical Economics, 1975
M.A., Economics, 1975
Languages: Spanish
Honors: Phi Beta Kappa

EMPLOYMENT

- 2008- Senior Visiting Fellow, Smith School, University of Oxford
- 2009- Senior Fellow, Center for Business and Public Policy, Georgetown University, Washington, D.C.
- 2003-08 Executive Director, AEI-Brookings Joint Center for Regulatory Studies, Washington, D.C.
- 1998-02 Co-founder and Director, AEI-Brookings Joint Center for Regulatory Studies, Washington, D.C.
- 1999-08 Non-resident Senior Fellow, Brookings Institution, Washington, D.C.
- 1989-07 Resident Scholar, American Enterprise Institute, Washington, D.C.
- 1997-02 Research Associate, Harvard University, Cambridge, Massachusetts
- 1990-01 Adjunct Professor of Economics, Carnegie Mellon, Pittsburgh, Pennsylvania

- 1991-94 Adjunct Research Faculty, Harvard University, Cambridge, Massachusetts
- 1987-89 Senior Staff Economist, Council of Economic Advisers, Washington, D.C.
- 1985-90 Associate Professor of Economics, Carnegie Mellon, Pittsburgh, Pennsylvania
- 1982-85 Assistant Professor of Economics, Carnegie Mellon, Pittsburgh, Pennsylvania
- 1981-82 Research Fellow, California Institute of Technology, Pasadena, California
- 1981 Instructor, Pitzer College, Claremont, California
- 1978 Economist, Council on Environmental Quality, Washington, D.C. (summer)
- 1976 Economist, World Bank, Washington, D.C. (summer)
- 1975-76 Division Staff, MITRE Corporation, McLean, Virginia
- 1973-75 Math Teacher, Transitional High School, Providence, Rhode Island

PUBLIC SERVICE AND ACADEMIC ACTIVITIES

- 1983- Co-founder of the Community Preparatory School, Providence, Rhode Island
- 2009- Editorial Board – *Journal of Prediction Markets*
- 2008- Editorial Board - *Policy and Internet*
- 2006- Editorial Board - *Review of Environmental Economics and Policy*
- 2005- Columnist - *Economists' Voice*
- 2000- Editorial Board - *Milken Review*
- 2000- Research Advisory Board - Committee for Economic Development
- 2001- Editorial Advisory Board - *Regulation*
- 1994-99 Board of Directors, Annapolis Center
- 1989-93 Editorial Council - *Journal of Environmental Economics and Management*

1990-92 Cochairman of the U.S. Alternative Fuels Council

PROFESSIONAL AFFILIATIONS

American Economic Association

Association for Public Policy Analysis and Management

Association of Environmental and Resource Economists

AWARDS

American Association for the Advancement of Science Fellowship

Barr Award for Outstanding Research in Applied Public Economics

Brookings Fellowship

Caltech McDonnell Award for best graduating student in Social Science

Premier's Fellowship, New South Wales, Australia

SELECTED RESEARCH PROJECTS AND FOUNDATION SUPPORT

Agency for International Development, “Government Regulation of the Marketing and Processing of Crops in Uganda”

Electric Power Research Institute, “Organizational Aspects of Power Pooling”

Electric Power Research Institute, “Markets in Transferable Property Rights”

Environmental Protection Agency, “An Examination of EPA's Controlled Trading Options”

Environmental Protection Agency, “An Evaluation of Mechanisms for Complying with the Ozone Standard”

Environmental Protection Agency, “Designing Markets in Tradable Allowances for Reducing Acid Deposition”

Environmental Protection Agency, “Promoting Conservation Through Price Rationalization”

Environmental Protection Agency, “Evaluation of Economic Incentives for Hazardous Waste Management”

Environmental Protection Agency, “Economic and Environmental Analysis of Alternative Fuels”

Matsushita Foundation, “Educational Development”

Mott Foundation, “AEI-Brookings Joint Center for Regulatory Studies”

National Science Foundation, Decision, Risk and Management Science, “The Emergence of Markets for Controlling Risks”

National Science Foundation, Regulation and Policy Analysis, “Spot Markets for Electricity”

National Science Foundation, Decision, Risk and Management Science, “Markets for Controlling Environmental Risks”

New South Wales Government, Australia, “Economic Approaches for Protecting Environmental and Natural Resources: From Theory to Practice”

Office of Technology Assessment, “Designing Economic Incentives for the Clean Air Act”

Rhode Island Foundation, “Options for Alternative Education”

Smith Richardson Foundation, “AEI-Brookings Joint Center for Regulatory Studies”

World Bank, “The Benefits and Costs of Regulation in Developing Countries”

World Bank, “Application of Economic Incentives to Environmental Problems in Developing Countries”

SELECTED PUBLICATIONS¹

Recent Working Papers

“Clearing The Way for an Important New Business Management Tool,” with Robert Litan and Cass Sunstein, in preparation.

¹ Most of my recent scholarly publications can be found at www.reg-markets.org or www.ssrn.com.

- “Optimal Liquidity Provision for Decision Makers,” with Paul C. Tetlock, Working Paper, AEI-Brookings Joint Center, revised 2008.
- “The Economics of Allowing More U.S. Oil Drilling,” with Peter Passell, *Energy Journal*, revise and resubmit.
- “Designing Smarter Regulation with Improved Benefit-Cost Analysis.”
- “Regulatory Decision Making: Does Process Change Improve Substance?,” with Paul C. Tetlock, revised November 2007.
- “Factoring Economic Inefficiency into Policy Design: An Application to Climate Change,” with David Anthoff, 2009.
- “Government Failure and Market Failure: On the Inefficiency of Environmental and Energy Policy,” with David Anthoff, 2009, *Oxford Review of Economic Policy*, in preparation.
- “Regulation of Telecommunications: Some Lessons for the Future” with Lewis Evans, in preparation.
- “Rethinking Energy Policy,” with Daniel Ahn, in preparation.
- “An Economic Perspective on a U.S. National Broadband Strategy,” with Scott Wallsten, forthcoming, *Policy and Internet*.

Academic Journals

- “Climate Policy: Separating Fact from Fantasy,” *Harvard Environmental Law Review* (2009) 33, 557-591.
- “Greenhouse Gas Auctions and Taxes: Some Practical Considerations,” *Review of Environmental Economics and Policy*, Summer 2009 (forthcoming).
- “A Statement on the Appropriate Role for Research and Development in Climate Policy,” with Kenneth J. Arrow, Linda Cohen, Paul A. David, Charles Kolstad, Lee Lane, W. David Montgomery, Richard R. Nelson, Roger Noll and Anne E. Smith, *Economists’ Voice* (February 2009): 1-4.
- “Climate Policy and the Art of the Possible,” *Milken Institute Review*, Second Quarter (2009): 36-47.
- “The Benefits and Costs of Ethanol: An Evaluation of the Government’s Analysis,” with Caroline Cecot, *Journal of Regulatory Economics*, (2009) 35, no. 3, 275-295.

- “Has Economic Analysis Improved Regulatory Decisions?,” with Paul C. Tetlock, *Journal of Economic Perspectives* 22, no. 1 (Winter 2008): 67-84.
- “The Promise of Prediction Markets,” with Kenneth J. Arrow, Robert Forsythe, Michael Gorham, Robin Hanson, John O. Ledyard, Saul Levmore, Robert Litan, Paul Milgrom, Forrest D. Nelson, George R. Neumann, Marco Ottaviani, Thomas C. Schelling, Robert J. Shiller, Vernon L. Smith, Erik Snowberg, Cass R. Sunstein, Paul C. Tetlock, Philip E. Tetlock, Hal R. Varian, Justin Wolfers, and Eric Zitzewitz, *Science* 320, no. 5878 (May 2008): 877-878.
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- “Legislating Life’s Value,” with Peter Passell, *Regulation* 31, no. 4 (2008).
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- “Ethanol: Law, Economics and Politics,” *Stanford Law and Policy Review* 19, no. 2 (2008).
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- “The FCC’s \$19 Billion Baby,” with Allen Ingraham, *Regulation* 31, no. 3 (2008).
- “Regulation after Bush,” with Peter Passell, *The Economists’ Voice* 5, no. 4, Article 5 (2008).
- “The Rush to Re-Regulate” with Peter Passell, *The Economists’ Voice* 5, no. 3, Article 5 (2008).
- “Time to Change U.S. Climate Policy,” with Peter Passell, *The Economists’ Voice* 4, no. 5, Article 2 (2007).
- “Better that the Fed Regulates Subprime Mortgages” with Peter Passell, *The Economists’ Voice* 5, no. 1, Article 4 (2008).
- “Microsoft: Predator or Prey” with Peter Passell, *The Economists’ Voice* 5, no. 2, Article 4 (2008).

- “How Well Does the U.S. Government Do Cost-Benefit Analysis?” with Patrick M. Dudley, *Review of Environmental Economics and Policy* 1, 2 (Summer 2007): 192-211.
- “Are Drivers Who Use Cell Phones Inherently Less Safe?,” with James E. Prieger, *Applied Economics Quarterly* 53, 4 (2007): 327-352.
- “Assessing Bias in Patent Infringement Cases: A Review of International Trade Commission Decisions,” with Hal Singer, *Harvard Journal of Law and Technology* 21, 2 (Spring 2008): 457-508.
- “The Myth of Net Neutrality and the Threat to Internet Innovation,” with Robert Litan, *Milken Institute Review*, First Quarter (2007): 28-35; revised and updated as “The Myth of Network Neutrality and What We Should Do About It,” for the *International Journal of Communication* 1 (2007): 595-606.
- “The Economics of Wireless Net Neutrality,” with Robert Litan and Hal Singer, *Journal of Competition Law and Economics* 3, 3 (2007): 399-451.
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- “Regulating the Raters: The Law and Economics of Ratings Firms” with Harold Furchtgott-Roth and Anne Layne-Farrar, *Journal of Competition Law and Economics* 3, no. 1 (2007): 49-96.
- “The Law and Economics of Software Security,” with Anne Layne-Farrar, *Harvard Journal of Law and Public Policy* 30, no. 1 (Fall 2006): 284-353.
- “The Impact of Driver Cell Phone Use on Accidents,” with James E. Prieger, *Advances in Economics & Policy* 6, no. 1, Article 9 (2006): 1-37.
- “A New Approach for Regulating Information Markets,” with Paul C. Tetlock, *Journal of Regulatory Economics* 29, (2006): 265-281.
- “The Move toward a Cashless Society: A Closer Look at Payment Instrument Economics” with Daniel Garcia Swartz and Anne Layne-Farrar, *Review of Network Economics* 5, no. 2 (June 2006): 175-198.

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Appendix 4: Exhibits

EXHIBIT 1

**U.S. BEVERAGE RETAIL SALES
TOTAL 2008 (PACKAGED AND FOUNTAIN)**

	Revenue		Quantity			Average Price		Estimated Quantity Share Subject to Tax
	\$ Millions	% of Total	Millions of Gallons	12 oz. Portions (Millions)	% of Total	Per Gallon	Per 12 oz. Portion	
	[A]		[B]	[C]		[D]	[E]	
Carb. Soft Drinks	\$71,655	50.2%	14,249	151,995	53.7%	\$5.03	\$0.47	-
Regular CSDs	\$50,550	35.4%	9,853	105,099	37.1%	\$5.13	\$0.48	100%
Diet CSDs	\$21,105	14.8%	4,396	46,896	16.6%	\$4.80	\$0.45	0%
Energy Drinks	\$7,808	5.5%	363	3,867	1.4%	\$21.54	\$2.02	100%
RTD Coffee	\$1,030	0.7%	45	479	0.2%	\$22.95	\$2.15	100%
Bottled Water	\$18,554	13.0%	5,593	59,661	21.1%	\$3.32	\$0.31	-
PET	\$15,425	10.8%	5,231	55,794	19.7%	\$2.95	\$0.28	0%
Domestic Sparkling	\$2,461	1.7%	201	2,143	0.8%	\$12.25	\$1.15	0%
Imports	\$668	0.5%	162	1,724	0.6%	\$4.14	\$0.39	0%
Value-Added Water	\$3,446	2.4%	548	5,846	2.1%	\$6.29	\$0.59	-
Flavored	\$500	0.3%	125	1,328	0.5%	\$4.01	\$0.38	0%
Enhanced	\$2,947	2.1%	424	4,518	1.6%	\$6.96	\$0.65	100%
Sports Beverages	\$7,563	5.3%	1,320	14,082	5.0%	\$5.73	\$0.54	98%
Fruit Beverages	\$27,917	19.5%	3,550	37,868	13.4%	\$7.86	\$0.74	-
100% Juices	\$19,235	13.5%	1,933	20,623	7.3%	\$9.95	\$0.93	0%
Fruit Drinks	\$8,682	6.1%	1,617	17,246	6.1%	\$5.37	\$0.50	100%
RTD Tea	\$4,834	3.4%	891	9,501	3.4%	\$5.43	\$0.51	85%
Total	\$142,809	100.0%	26,559	283,299	100.0%	\$5.38	\$0.50	
<i>Total Subject to SSB Tax</i>	<i>\$82,537</i>	<i>57.8%</i>	<i>14,352</i>	<i>153,085</i>	<i>54.0%</i>	<i>\$5.75</i>	<i>\$0.54</i>	
<i>Total Not Subject to SSB Tax</i>	<i>\$60,271</i>	<i>42.2%</i>	<i>12,208</i>	<i>130,214</i>	<i>46.0%</i>	<i>\$4.94</i>	<i>\$0.46</i>	

Notes & Sources:

[A], [B] Based on Beverage Marketing Corporation data provided by the American Beverage Association in consultation with the Beverage Marketing Corporation.

[C] = [B] * 32 / 3. 1 Gallon = 128 oz.

[D] = [A] / [B].

[E] = [A] / [C].

[F] Based on information provided by the American Beverage Association in consultation with the Beverage Marketing Corporation.

EXHIBIT 2

PERSONAL CONSUMPTION EXPENDITURES COFFEE, TEA AND MILK 2008

<u>Beverage</u>	<u>2008 Revenue (\$ Millions)</u>
Fresh Milk	\$19,835
Coffee, Tea and Beverage Materials	\$10,423

Notes & Sources:

From Table 2.4.5U. Personal Consumption Expenditures by Type of Product, downloaded from www.bea.gov, July 30, 2009.

Includes food for off-premise consumption only.

EXHIBIT 3

ESTIMATED EFFECT OF SSB TAX ON BEVERAGE PRICE

	2008 Pre-Tax Avg. Price per Gallon	Assumed Tax per Gallon	Assumed Pass- Through Rate	2008 After-Tax Avg. Price per Gallon	% Change
	[A]	[B]	[C]	[D]	[E]
<i>Scenario 1: Tax of \$.03 per 12 oz. with 100% pass-through</i>					
Isotonics	\$8.09	\$0.32	1.0	\$8.41	4.0%
Regular Soft Drinks	\$5.13	\$0.32	1.0	\$5.45	6.2%
Diet Soft Drinks	\$4.80	\$0	1.0	\$4.80	0%
High Fat Milk	N/A	\$0	1.0	N/A	0%
Low Fat Milk	N/A	\$0	1.0	N/A	0%
Fruit Drinks	\$5.37	\$0.32	1.0	\$5.69	6.0%
Fruit Juices	\$9.95	\$0	1.0	\$9.95	0%
Bottled Water	\$3.33	\$0	1.0	\$3.33	0%
Coffee	N/A	\$0	1.0	N/A	0%
Tea	N/A	\$0	1.0	N/A	0%
<i>Scenario 2: Tax of \$.10 per 12 oz. with 100% pass-through</i>					
Isotonics	\$8.09	\$1.07	1.0	\$9.15	13.2%
Regular Soft Drinks	\$5.13	\$1.07	1.0	\$6.20	20.8%
Diet Soft Drinks	\$4.80	\$0	1.0	\$4.80	0%
High Fat Milk	N/A	\$0	1.0	N/A	0%
Low Fat Milk	N/A	\$0	1.0	N/A	0%
Fruit Drinks	\$5.37	\$1.07	1.0	\$6.44	19.9%
Fruit Juices	\$9.95	\$0	1.0	\$9.95	0%
Bottled Water	\$3.33	\$0	1.0	\$3.33	0%
Coffee	N/A	\$0	1.0	N/A	0%
Tea	N/A	\$0	1.0	N/A	0%

EXHIBIT 3

ESTIMATED EFFECT OF SSB TAX ON BEVERAGE PRICE

	2008 Pre-Tax Avg. Price per Gallon	Assumed Tax per Gallon	Assumed Pass- Through Rate	2008 After-Tax Avg. Price per Gallon	% Change
	[A]	[B]	[C]	[D]	[E]
Scenario 3: Tax of \$.03 per 12 oz. with 230% pass-through					
Isotonics	\$8.09	\$0.32	2.3	\$8.82	9.1%
Regular Soft Drinks	\$5.13	\$0.32	2.3	\$5.87	14.3%
Diet Soft Drinks	\$4.80	\$0	2.3	\$4.80	0%
High Fat Milk	N/A	\$0	2.3	N/A	0%
Low Fat Milk	N/A	\$0	2.3	N/A	0%
Fruit Drinks	\$5.37	\$0.32	2.3	\$6.11	13.7%
Fruit Juices	\$9.95	\$0	2.3	\$9.95	0%
Bottled Water	\$3.33	\$0	2.3	\$3.33	0%
Coffee	N/A	\$0	2.3	N/A	0%
Tea	N/A	\$0	2.3	N/A	0%

**Scenario 4: Tax of \$.10 per 12 oz.
with 230% pass-through**

Isotonics	\$8.09	\$1.07	2.3	\$10.54	30.3%
Regular Soft Drinks	\$5.13	\$1.07	2.3	\$7.58	47.8%
Diet Soft Drinks	\$4.80	\$0	2.3	\$4.80	0%
High Fat Milk	N/A	\$0	2.3	N/A	0%
Low Fat Milk	N/A	\$0	2.3	N/A	0%
Fruit Drinks	\$5.37	\$1.07	2.3	\$7.82	45.7%
Fruit Juices	\$9.95	\$0	2.3	\$9.95	0%
Bottled Water	\$3.33	\$0	2.3	\$3.33	0%
Coffee	N/A	\$0	2.3	N/A	0%
Tea	N/A	\$0	2.3	N/A	0%

Notes & Sources:

[A] Calculated as weighted average per gallon prices from Exhibit 1; 2008 data classified categories as follows:

Isotonics includes Energy Drinks, RTD Coffee, Enhanced Value-Added Water, 98% of Sports Beverages, and 85% of RTD Tea.

Bottled Water includes PET (NJSW), Domestic Sparkling, Imports, and Flavored Water. Regular Soft Drinks, Diet Soft Drinks,

Fruit Drinks, and Fruit Juices assumed equivalent to Regular CSDs, Diet CSDs, Fruit Drinks, and 100% Juices, respectively.

[B] Scenario-specific tax per 12 oz. converted to gallons by multiplying by 32 / 3. Isotonics, Regular Soft Drinks, and Fruit Drinks assumed taxed.

[D] = [A] + ([B] * [C]).

[E] = ([D] - [A]) / [A].

EXHIBIT 4

**ESTIMATED EFFECT OF SSB TAX ON BEVERAGE SALES QUANTITIES
BASED ON UNCOMPENSATED DEMAND ELASTICITIES ESTIMATED IN DHARMASENA AND CAPPS (2009)**

	Dharmasena and Capps Prices				Dharmasena and Capps Quantities		
	Initial	Tax	Final	% Change	Initial	Final	% Change
	(\$/Gallon)	(\$/Gallon)	(\$/Gallon)		(Gallon/Month)	(Gallon/Month)	
	[A]	[B]	[C]	[D]	[E]	[F]	[G]
<i>Scenario 1: Tax of \$.03 per 12 oz. with 100% pass-through</i>							
Isotonics	\$2.55	\$0.10	\$2.65	4.0%	0.03	0.02	(24.6%)
Regular Soft Drinks	\$1.38	\$0.09	\$1.47	6.2%	0.91	0.81	(11.0%)
Diet Soft Drinks	\$1.38	\$0	\$1.38	0%	0.56	0.54	(2.8%)
High Fat Milk	\$1.60	\$0	\$1.60	0%	0.53	0.54	1.2%
Low Fat Milk	\$1.59	\$0	\$1.59	0%	0.38	0.38	0.8%
Fruit Drinks	\$1.91	\$0.11	\$2.02	6.0%	0.23	0.22	(3.2%)
Fruit Juices	\$2.45	\$0	\$2.45	0%	0.45	0.47	5.4%
Bottled Water	\$0.78	\$0	\$0.78	0%	0.35	0.36	3.4%
Coffee	\$0.61	\$0	\$0.61	0%	0.93	0.95	2.1%
Tea	\$0.78	\$0	\$0.78	0%	0.34	0.35	2.9%
<i>Scenario 2: Tax of \$.10 per 12 oz. with 100% pass-through</i>							
Isotonics	\$2.55	\$0.34	\$2.89	13.2%	0.03	0.01	(81.9%)
Regular Soft Drinks	\$1.38	\$0.29	\$1.67	20.8%	0.91	0.58	(36.5%)
Diet Soft Drinks	\$1.38	\$0	\$1.38	0%	0.56	0.51	(9.5%)
High Fat Milk	\$1.60	\$0	\$1.60	0%	0.53	0.55	4.1%
Low Fat Milk	\$1.59	\$0	\$1.59	0%	0.38	0.39	2.6%
Fruit Drinks	\$1.91	\$0.38	\$2.29	19.9%	0.23	0.21	(10.8%)
Fruit Juices	\$2.45	\$0	\$2.45	0%	0.45	0.53	18.0%
Bottled Water	\$0.78	\$0	\$0.78	0%	0.35	0.39	11.3%
Coffee	\$0.61	\$0	\$0.61	0%	0.93	0.99	6.8%
Tea	\$0.78	\$0	\$0.78	0%	0.34	0.37	9.7%

EXHIBIT 4

**ESTIMATED EFFECT OF SSB TAX ON BEVERAGE SALES QUANTITIES
BASED ON UNCOMPENSATED DEMAND ELASTICITIES ESTIMATED IN DHARMASENA AND CAPPS (2009)**

	Dharmasena and Capps Prices				Dharmasena and Capps Quantities		
	Initial	Tax	Final	% Change	Initial	Final	% Change
	(\$/Gallon)	(\$/Gallon)	(\$/Gallon)		(Gallon/Month)	(Gallon/Month)	
	[A]	[B]	[C]	[D]	[E]	[F]	[G]
<i>Scenario 3: Tax of \$.03 per 12 oz. with 230% pass-through</i>							
Isotonics	\$2.55	\$0.10	\$2.78	9.1%	0.03	0.01	(56.5%)
Regular Soft Drinks	\$1.38	\$0.09	\$1.58	14.3%	0.91	0.68	(25.2%)
Diet Soft Drinks	\$1.38	\$0	\$1.38	0%	0.56	0.52	(6.6%)
High Fat Milk	\$1.60	\$0	\$1.60	0%	0.53	0.54	2.8%
Low Fat Milk	\$1.59	\$0	\$1.59	0%	0.38	0.39	1.8%
Fruit Drinks	\$1.91	\$0.11	\$2.17	13.7%	0.23	0.21	(7.5%)
Fruit Juices	\$2.45	\$0	\$2.45	0%	0.45	0.51	12.4%
Bottled Water	\$0.78	\$0	\$0.78	0%	0.35	0.38	7.8%
Coffee	\$0.61	\$0	\$0.61	0%	0.93	0.97	4.7%
Tea	\$0.78	\$0	\$0.78	0%	0.34	0.36	6.7%
<i>Scenario 4: Tax of \$.10 per 12 oz. with 230% pass-through</i>							
Isotonics	\$2.55	\$0.34	\$3.32	30.3%	0.03	(0.03)	(188.4%)
Regular Soft Drinks	\$1.38	\$0.29	\$2.04	47.8%	0.91	0.15	(84.0%)
Diet Soft Drinks	\$1.38	\$0	\$1.38	0%	0.56	0.44	(21.8%)
High Fat Milk	\$1.60	\$0	\$1.60	0%	0.53	0.58	9.4%
Low Fat Milk	\$1.59	\$0	\$1.59	0%	0.38	0.40	5.9%
Fruit Drinks	\$1.91	\$0.38	\$2.78	45.7%	0.23	0.17	(24.9%)
Fruit Juices	\$2.45	\$0	\$2.45	0%	0.45	0.64	41.4%
Bottled Water	\$0.78	\$0	\$0.78	0%	0.35	0.44	26.1%
Coffee	\$0.61	\$0	\$0.61	0%	0.93	1.08	15.7%
Tea	\$0.78	\$0	\$0.78	0%	0.34	0.42	22.4%

Notes & Sources:

- [A], [E] Sample means from Senarath Dharmasena and Oral Capps, Jr., Demand Interrelationships of At-Home Non-Alcoholic Beverage Consumption in the United States, 2009, at Table 1.
- [B] = [D] * [A].
- [C] = [A] + [B].
- [D] Product-specific percentages from [E] from Exhibit 3. Tax calculated to result in a comparable % change in Dharmasena and Capps prices to that estimated to result from an SSB tax and 2008 prices. Time period analyzed by Dharmasena and Capps covers 1998 through 2003.
- [F] Quantities predicted using percent change in price in [D], and coefficient estimates and sample means of initial quantities and prices from Senarath Dharmasena and Oral Capps, Jr., Demand Interrelationships of At-Home Non-Alcoholic Beverage Consumption in the United States, 2009, at Table 5.
- Assumes aggregate beverage industry elasticity of -0.74, *see* Albert J. Reed, J. William Levendahl, and Charles Hallahan, The Generalized Composite Commodity Theorem and Food Demand Estimation, Amer. J. Agr. Econ. 87(1) 28, 33-35, Tables 1 & 3 (Feb. 2005).
- [G] = ([F] - [E]) / [E].

EXHIBIT 5

**OWN- AND CROSS-PRICE ELASTICITY ESTIMATES
BASED ON UNCOMPENSATED DEMAND ELASTICITIES ESTIMATED IN DHARMASENA AND CAPPS (2009)**

Elasticities

	Isotonics	Regular Soft Drinks	Diet Soft Drinks	High Fat Milk	Low Fat Milk	Fruit Drinks	Fruit Juices	Bottled Water	Coffee	Tea
Isotonics	-5.961	-0.203	1.321	0.315	-0.785	-1.402	1.286	0.633	2.100	0.092
Regular Soft Drinks	0.000	-2.190	-0.696	0.291	0.164	-0.192	0.893	-0.025	0.177	0.071
Diet Soft Drinks	0.106	-0.969	-1.125	0.182	0.077	0.298	0.035	0.264	-0.081	-0.057
High Fat Milk	0.039	0.550	0.241	-0.839	0.233	-0.324	-0.380	-0.092	-0.012	-0.224
Low Fat Milk	-0.067	0.436	0.143	0.315	-0.855	-0.236	-0.430	-0.544	0.419	-0.242
Fruit Drinks	-0.158	-0.433	0.515	-0.629	-0.293	-0.178	-0.190	0.412	-0.377	0.095
Fruit Juices	0.087	1.150	0.109	-0.274	-0.186	-0.037	-0.933	-0.297	-0.184	-0.088
Bottled Water	0.110	0.147	0.645	-0.128	-0.672	0.545	-0.725	-0.093	-0.764	0.585
Coffee	0.249	0.567	-0.042	0.004	0.480	-0.293	-0.371	-0.615	-0.517	-0.092
Tea	0.035	0.427	-0.089	-0.623	-0.425	0.191	-0.335	0.785	-0.173	-0.544

Reweighted Elasticities

	Isotonics	Regular Soft Drinks	Diet Soft Drinks	High Fat Milk	Low Fat Milk	Fruit Drinks	Fruit Juices	Bottled Water	Coffee	Tea
Isotonics	-4.4111	-0.1502	0.9775	0.2331	-0.5809	-1.0375	0.9516	0.4684	1.5540	0.0681
Regular Soft Drinks	0.0002	-1.6206	-0.5150	0.2153	0.1214	-0.1421	0.6608	-0.0185	0.1310	0.0525
Diet Soft Drinks	0.0781	-0.7171	-0.8325	0.1347	0.0570	0.2205	0.0259	0.1954	-0.0599	-0.0422
High Fat Milk	0.0286	0.4070	0.1783	-0.6209	0.1724	-0.2398	-0.2812	-0.0681	-0.0089	-0.1658
Low Fat Milk	-0.0499	0.3226	0.1058	0.2331	-0.6327	-0.1746	-0.3182	-0.4026	0.3101	-0.1791
Fruit Drinks	-0.1166	-0.3204	0.3811	-0.4655	-0.2168	-0.1317	-0.1406	0.3049	-0.2790	0.0703
Fruit Juices	0.0645	0.8510	0.0807	-0.2028	-0.1376	-0.0274	-0.6904	-0.2198	-0.1362	-0.0651
Bottled Water	0.0811	0.1088	0.4773	-0.0947	-0.4973	0.4033	-0.5365	-0.0688	-0.5654	0.4329
Coffee	0.1841	0.4196	-0.0311	0.0030	0.3552	-0.2168	-0.2745	-0.4551	-0.3826	-0.0681
Tea	0.0259	0.3160	-0.0659	-0.4610	-0.3145	0.1413	-0.2479	0.5809	-0.1280	-0.4026

Notes & Sources:

Elasticities shown are uncompensated demand elasticities that assume an aggregate elasticity of -1.0 from Senarath Dharmasena and Oral Capps, Jr., Demand Interrelationships of At-Non-Alcoholic Beverage Consumption in the United States, 2009, at Table 5.

Elasticities are reweighted using an aggregate demand elasticity of -0.74, based on the own-price elasticity of demand for "Other Food (Home)" from Albert J. Reed, J. William Levendahl, and Charles Hallahan, The Generalized Composite Commodity Theorem and Food Demand Estimation, Amer. J. Agr. Econ. 87(1) 28, 33-35, Tables 1 & 3 (Feb. 2005).

EXHIBIT 6

ESTIMATED EFFECT OF SSB TAX ON BEVERAGE QUANTITY AND REVENUE

	2008 Pre-Tax Quantity	Predicted % Change in Quantity	2008 After-Tax Quantity	After-Tax Avg. Price per Gallon	After-Tax Revenue Including Tax
	[A]	[B]	[C]	[D]	[E]
<i>Scenario 1: Tax of \$.03 per 12 oz. with 100% pass-through</i>					
Isotonics (Subject to Tax)	2,882	(24.6%)	2,174	\$8.41	\$18,274
Regular Soft Drinks	9,853	(11.0%)	8,774	\$5.45	\$47,820
Diet Soft Drinks	4,396	(2.8%)	4,271	\$4.80	\$20,504
Milk	N/A	1.0%	N/A	N/A	\$20,041
Fruit Drinks	1,617	(3.2%)	1,564	\$5.69	\$8,901
Fruit Juices	1,933	5.4%	2,038	\$9.95	\$20,274
Bottled Water	5,718	3.4%	5,912	\$3.33	\$19,703
Coffee and Tea	N/A	2.3%	N/A	N/A	\$10,661
Other Beverages ¹ (Not Subject to Tax)	160	1.4%	162	\$5.48	\$889

	2008 Pre-Tax Quantity	Predicted % Change in Quantity	2008 After-Tax Quantity	After-Tax Avg. Price per Gallon	After-Tax Revenue Including Tax
	[A]	[B]	[C]	[D]	[E]
<i>Scenario 2: Tax of \$.10 per 12 oz. with 100% pass-through</i>					
Isotonics (Subject to Tax)	2,882	(81.9%)	521	\$9.15	\$4,770
Regular Soft Drinks	9,853	(36.5%)	6,255	\$6.20	\$38,765
Diet Soft Drinks	4,396	(9.5%)	3,979	\$4.80	\$19,101
Milk	N/A	3.5%	N/A	N/A	\$20,521
Fruit Drinks	1,617	(10.8%)	1,442	\$6.44	\$9,281
Fruit Juices	1,933	18.0%	2,281	\$9.95	\$22,698
Bottled Water	5,718	11.3%	6,366	\$3.33	\$21,215
Coffee and Tea	N/A	7.6%	N/A	N/A	\$11,218
Other Beverages ¹ (Not Subject to Tax)	160	4.8%	168	\$5.48	\$918

EXHIBIT 6

ESTIMATED EFFECT OF SSB TAX ON BEVERAGE QUANTITY AND REVENUE

	2008 Pre-Tax Quantity [A]	Predicted % Change in Quantity [B]	2008 After-Tax Quantity [C]	After-Tax Avg. Price per Gallon [D]	After-Tax Revenue Including Tax [E]
Scenario 3: Tax of \$.03 per 12 oz. with 230% pass-through					
Isotonics (Subject to Tax)	2,882	(56.5%)	1,253	\$8.82	\$11,055
Regular Soft Drinks	9,853	(25.2%)	7,371	\$5.87	\$43,239
Diet Soft Drinks	4,396	(6.6%)	4,108	\$4.80	\$19,722
Milk	N/A	2.4%	N/A	N/A	\$20,308
Fruit Drinks	1,617	(7.5%)	1,496	\$6.11	\$9,135
Fruit Juices	1,933	12.4%	2,174	\$9.95	\$21,625
Bottled Water	5,718	7.8%	6,165	\$3.33	\$20,545
Coffee and Tea	N/A	5.3%	N/A	N/A	\$10,971
Other Beverages ¹ (Not Subject to Tax)	160	3.3%	165	\$5.48	\$905

	2008 Pre-Tax Quantity [A]	Predicted % Change in Quantity [B]	2008 After-Tax Quantity [C]	After-Tax Avg. Price per Gallon [D]	After-Tax Revenue Including Tax [E]
Scenario 4: Tax of \$.10 per 12 oz. with 230% pass-through					
Isotonics (Subject to Tax)	2,882	(188.4%)	(2,548)	\$10.54	(\$26,855)
Regular Soft Drinks	9,853	(84.0%)	1,578	\$7.58	\$11,970
Diet Soft Drinks	4,396	(21.8%)	3,436	\$4.80	\$16,495
Milk	N/A	8.0%	N/A	N/A	\$21,415
Fruit Drinks	1,617	(24.9%)	1,215	\$7.82	\$9,502
Fruit Juices	1,933	41.4%	2,734	\$9.95	\$27,199
Bottled Water	5,718	26.1%	7,209	\$3.33	\$24,025
Coffee and Tea	N/A	17.6%	N/A	N/A	\$12,256
Other Beverages ¹ (Not Subject to Tax)	160	11.1%	178	\$5.48	\$973

Notes & Sources:

¹ Includes 2% of Sports Beverages and 15% of RTD Tea. See Exhibit 1.

[A] = [B] from Exhibit 1. Other Beverages includes 2% of Sports Beverages and 15% of RTD Tea.

[B] = [G] from Exhibit 4. Other Beverages calculated as $([C] - [A]) / [A]$ for Diet Soft Drinks, Fruit Juices, and Bottled Water."

[C] = $[A] * (1 + [B])$.

[D] = [D] from Exhibit 3. Other Beverages calculated as $([A] \text{ from Exhibit 1} * (1 - [F] \text{ from Exhibit 1})) / ([B] \text{ from Exhibit 1} * (1 - [F] \text{ from Exhibit 1}))$ for Sports Beverages and RTD Tea.

[E] = $[C] * [D]$. Milk and Coffee and Tea = $(1 + [B]) * \text{Revenues from Exhibit 2}$.

EXHIBIT 7

**ESTIMATED EFFECT OF SSB TAX ON U.S. BEVERAGE RETAIL SALES
BY TAXED CATEGORY**

	Pre-Tax		After-Tax			Effect of SSB Tax					
	Quantity (Millions of Gallons) [A]	Revenue (\$ Millions) [B]	Quantity (Millions of Gallons) [C]	Revenue Including Tax (\$ Millions) [D]	Revenue Excluding Tax (\$ Millions) [E]	Quantity % Change [F]	Revenue Including Tax % Change [G]	Revenue Excluding Tax % Change [H]	Total Revenue Including Tax (\$ Millions) [I]	Total Revenue Excluding Tax (\$ Millions) [J]	Tax Revenue (\$ Millions) [K]
Scenario 1: Tax of \$.03 per 12 oz. with 100% pass-through											
Subject to SSB Tax	14,352	\$82,537	12,512	\$74,995	\$70,991	(12.8%)	(9.1%)	(14.0%)	(\$7,543)	(\$11,546)	\$4,004
Not Subject to SSB Tax ¹	12,208	\$90,529	12,384	\$92,072	\$92,072	1.4%	1.7%	1.7%	\$1,542	\$1,542	\$0
Total	26,559	\$173,067	24,895	\$167,066	\$163,062	(6.3%)	(3.5%)	(5.8%)	(\$6,000)	(\$10,004)	\$4,004
Scenario 2: Tax of \$.10 per 12 oz. with 100% pass-through											
Subject to SSB Tax	14,352	\$82,537	8,218	\$52,816	\$44,049	(42.7%)	(36.0%)	(46.6%)	(\$29,721)	(\$38,488)	\$8,766
Not Subject to SSB Tax ¹	12,208	\$90,529	12,794	\$95,672	\$95,672	4.8%	5.7%	5.7%	\$5,142	\$5,142	\$0
Total	26,559	\$173,067	21,013	\$148,487	\$139,721	(20.9%)	(14.2%)	(19.3%)	(\$24,579)	(\$33,345)	\$8,766
Scenario 3: Tax of \$.03 per 12 oz. with 230% pass-through											
Subject to SSB Tax	14,352	\$82,537	10,120	\$63,429	\$60,190	(29.5%)	(23.2%)	(27.1%)	(\$19,108)	(\$22,347)	\$3,238
Not Subject to SSB Tax ¹	12,208	\$90,529	12,612	\$94,077	\$94,077	3.3%	3.9%	3.9%	\$3,548	\$3,548	\$0
Total	26,559	\$173,067	22,732	\$157,506	\$154,267	(14.4%)	(9.0%)	(10.9%)	(\$15,561)	(\$18,799)	\$3,238
Scenario 4: Tax of \$.10 per 12 oz. with 230% pass-through											
Subject to SSB Tax	14,352	\$82,537	245	(\$5,383)	(\$5,645)	(98.3%)	(106.5%)	(106.8%)	(\$87,920)	(\$88,182)	\$261
Not Subject to SSB Tax ¹	12,208	\$90,529	13,557	\$102,363	\$102,363	11.1%	13.1%	13.1%	\$11,834	\$11,834	\$0
Total	26,559	\$173,067	13,802	\$96,980	\$96,719	(48.0%)	(44.0%)	(44.1%)	(\$76,087)	(\$76,348)	\$261

Notes & Sources:

¹ Includes Fresh Milk, Coffee, Tea and Beverage Materials from Exhibit 2 in columns [B], [D] and [E].

[A] = [A] from Exhibit 6. Quantity data not available for Fresh Milk, Coffee, Tea and Beverage Materials.

[B] Subject to SSB Tax = [A] from Exhibit 1. Not subject to SSB Tax = ([A] from Exhibit 1 + Fresh Milk, Coffee, Tea and Beverage Materials from Exhibit 2).

[C] = [C] from Exhibit 6.

[D] = [E] from Exhibit 6.

[E] = [D] - [K].

[F] = (([C] - [A]) / [A]).

[G] = (([D] - [B]) / [B]).

[H] = (([E] - [B]) / [B]).

[I] = [D] - [B].

[J] = [E] - [B].

[K] = [C] * Tax rate per gallon for each scenario (see [B] from Exhibit 3).

EXHIBIT 8

**ESTIMATED EFFECT OF SSB TAX ON U.S. BEVERAGE RETAIL SALES
BY BEVERAGE TYPE**

	Pre-Tax		After-Tax			Effect of SSB Tax					
	Quantity	Revenue	Quantity	Revenue	Revenue	Quantity	Revenue	Revenue	Total Revenue	Total Revenue	Tax Revenue
	(Millions of Gallons)	(\$ Millions)	(Millions of Gallons)	Including Tax (\$ Millions)	Excluding Tax (\$ Millions)	% Change	Including Tax % Change	Excluding Tax % Change	Including Tax (\$ Millions)	Excluding Tax (\$ Millions)	(\$ Millions)
	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]
Scenario 1: Tax of \$.03 per 12 oz. with 100% pass-through											
Soft Drinks ¹	24,626	\$123,573	22,857	\$116,090	\$112,086	(7.2%)	(6.1%)	(9.3%)	(\$7,483)	(\$11,487)	\$4,004
100% Juices ²	1,933	\$19,235	2,038	\$20,274	\$20,274	5.4%	5.4%	5.4%	\$1,039	\$1,039	\$0
Fresh Milk	N/A	\$19,835	N/A	\$20,041	\$20,041	N/A	1.0%	1.0%	\$206	\$206	\$0
Coffee, Tea and Beverage Materials	N/A	\$10,423	N/A	\$10,661	\$10,661	N/A	2.3%	2.3%	\$238	\$238	\$0
Total	26,559	\$173,067	24,895	\$167,066	\$163,062	(6.3%)	(3.5%)	(5.8%)	(\$6,000)	(\$10,004)	\$4,004
Scenario 2: Tax of \$.10 per 12 oz. with 100% pass-through											
Soft Drinks ¹	24,626	\$123,573	18,731	\$94,050	\$85,284	(23.9%)	(23.9%)	(31.0%)	(\$29,523)	(\$38,289)	\$8,766
100% Juices ²	1,933	\$19,235	2,281	\$22,698	\$22,698	18.0%	18.0%	18.0%	\$3,462	\$3,462	\$0
Fresh Milk	N/A	\$19,835	N/A	\$20,521	\$20,521	N/A	3.5%	3.5%	\$686	\$686	\$0
Coffee, Tea and Beverage Materials	N/A	\$10,423	N/A	\$11,218	\$11,218	N/A	7.6%	7.6%	\$795	\$795	\$0
Total	26,559	\$173,067	21,013	\$148,487	\$139,721	(20.9%)	(14.2%)	(19.3%)	(\$24,579)	(\$33,345)	\$8,766
Scenario 3: Tax of \$.03 per 12 oz. with 230% pass-through											
Soft Drinks ¹	24,626	\$123,573	20,559	\$104,602	\$101,364	(16.5%)	(15.4%)	(18.0%)	(\$18,971)	(\$22,210)	\$3,238
100% Juices ²	1,933	\$19,235	2,174	\$21,625	\$21,625	12.4%	12.4%	12.4%	\$2,389	\$2,389	\$0
Fresh Milk	N/A	\$19,835	N/A	\$20,308	\$20,308	N/A	2.4%	2.4%	\$473	\$473	\$0
Coffee, Tea and Beverage Materials	N/A	\$10,423	N/A	\$10,971	\$10,971	N/A	5.3%	5.3%	\$548	\$548	\$0
Total	26,559	\$173,067	22,732	\$157,506	\$154,267	(14.4%)	(9.0%)	(10.9%)	(\$15,561)	(\$18,799)	\$3,238
Scenario 4: Tax of \$.10 per 12 oz. with 230% pass-through											
Soft Drinks ¹	24,626	\$123,573	11,068	\$36,110	\$35,848	(55.1%)	(70.8%)	(71.0%)	(\$87,463)	(\$87,725)	\$261
100% Juices ²	1,933	\$19,235	2,734	\$27,199	\$27,199	41.4%	41.4%	41.4%	\$7,964	\$7,964	\$0
Fresh Milk	N/A	\$19,835	N/A	\$21,415	\$21,415	N/A	8.0%	8.0%	\$1,580	\$1,580	\$0
Coffee, Tea and Beverage Materials	N/A	\$10,423	N/A	\$12,256	\$12,256	N/A	17.6%	17.6%	\$1,833	\$1,833	\$0
Total	26,559	\$173,067	13,802	\$96,980	\$96,719	(48.0%)	(44.0%)	(44.1%)	(\$76,087)	(\$76,348)	\$261

Notes & Sources:

¹ Includes the following beverages from Exhibit 1: Diet and Regular Carbonated Soft Drinks, Energy Drinks, RTD Coffee, Bottled Water, Value-Added Water, Sports Beverages, Fruit Drinks, and RTD Tea. These beverages are classified under NAICS31211. See <http://www.census.gov/naics/2007/def/NDEF312.htm> (accessed July 13, 2009). Includes packaged and fountain beverages.

² Fruit juices are classified under NAICS 311421. See <http://www.census.gov/naics/2007/def/ND311421.htm> (accessed July 13, 2009). '100% Juices' on Exhibit 1 include shelf-stable and chilled juices, and exclude vegetable juices and powdered/concentrated fruit juice, per Beverage Marketing Corporation.

[A] 100% Juices from Exhibit 1. Soft Drinks = Total from Exhibit 1 - 100% Juices.

[B] 100% Juices from Exhibit 1. Soft Drinks = Total from Exhibit 1 - 100% Juices. Fresh Milk, Coffee, Tea and Beverage Materials from Exhibit 2.

[C] 100% Juices = [A] * (1 + [G] from Exhibit 4). Soft Drinks = Total from Exhibit 7 - 100% Juices.

[D] 100% Juices, Fresh Milk, Coffee, Tea and Beverage Materials = [E] from Exhibit 6. Soft Drinks = Total [D] from Exhibit 7 - 100% Juices - Fresh Milk - Coffee, Tea and Beverage Materials.

[E] = [D] - [K].

[F] = ([C] - [A]) / [A].

[G] = ([D] - [B]) / [B].

[H] = ([E] - [B]) / [B].

[I] = [D] - [B].

[J] = [E] - [B].

[K] From Exhibit 7. 100% Juices, Fresh Milk, Coffee, Tea and Beverage Materials are not subject to the SSB Tax.

EXHIBIT 9

ECONOMIC IMPACT ANALYSIS OF SSB TAX IMPLAN INPUTS

Scenario 1: Tax of \$0.03 per 12 oz. with 100% Pass-Through			
IMPLAN Sector	Industry	Effect on Output (Retail Sales)	Change in Output ¹ (\$ Millions)
54	Fruit and vegetable canning, pickling, and drying	Increase in Sale of Non-Taxable Beverages	\$1,039
70	Soft drink and ice manufacturing	Net Decrease in Sale of Taxable Beverages	(\$11,487)
55	Fluid milk and butter manufacturing	Increase in Sale of Non-Taxable Beverages	\$206
66	Coffee and tea manufacturing	Increase in Sale of Non-Taxable Beverages	\$238
Net Total			(\$10,004)

Scenario 2: Tax of \$0.10 per 12 oz. with 100% Pass-Through			
IMPLAN Sector	Industry	Effect on Output (Retail Sales)	Change in Output ¹ (\$ Millions)
54	Fruit and vegetable canning, pickling, and drying	Increase in Sale of Non-Taxable Beverages	\$3,462
70	Soft drink and ice manufacturing	Net Decrease in Sale of Taxable Beverages	(\$38,289)
55	Fluid milk and butter manufacturing	Increase in Sale of Non-Taxable Beverages	\$686
66	Coffee and tea manufacturing	Increase in Sale of Non-Taxable Beverages	\$795
Net Total			(\$33,345)

Notes & Sources:

¹Excludes revenue generated by price increase associated with the SSB tax.

Change in Output for Sectors 54 and 70 from Exhibit 8. Change in Output for Sectors 55 and 66 from Exhibit 8. Amounts shown in millions of 2008 dollars and are rounded to the nearest million. Sector numbers and descriptions provided by IMPLAN.

EXHIBIT 10**ECONOMIC IMPACT ANALYSIS OF SSB TAX
NET IMPACT EXCLUDING SSB TAX REVENUE
SUMMARY RESULTS****Scenario 1: Tax of \$.03 per 12 oz. with 100% Pass-Through**

Effect	Output (\$ Millions)	Jobs (Thousands)	Wages (\$ Millions)	State/Local Taxes (\$ Millions)	Federal Taxes (\$ Millions)	Total Taxes (\$ Millions)
Direct	\$ (10,003)	(62)	\$ (2,345)	\$ (667)	\$ (604)	\$ (1,271)
Indirect	\$ (12,447)	(46)	\$ (2,465)	\$ (452)	\$ (759)	\$ (1,211)
Total	\$ (22,450)	(108)	\$ (4,810)	\$ (1,118)	\$ (1,363)	\$ (2,481)

Scenario 2: Tax of \$0.10 per 12 oz. with 100% Pass-Through

Effect	Output (\$ Millions)	Jobs (Thousands)	Wages (\$ Millions)	State/Local Taxes (\$ Millions)	Federal Taxes (\$ Millions)	Total Taxes (\$ Millions)
Direct	\$ (33,341)	(208)	\$ (7,816)	\$ (2,222)	\$ (2,013)	\$ (4,235)
Indirect	\$ (41,487)	(152)	\$ (8,217)	\$ (1,506)	\$ (2,530)	\$ (4,036)
Total	\$ (74,828)	(359)	\$ (16,032)	\$ (3,728)	\$ (4,543)	\$ (8,271)

Notes & Sources:

Output, Wages, and Taxes are in millions of 2008 dollars and are rounded to the nearest million.

Jobs rounded to the nearest 1,000. Totals may not sum due to rounding.

Direct effect on output as developed in demand analysis. Direct effect on jobs and wages estimated using IMPLAN. Indirect effect on output, jobs, and wages estimated using IMPLAN. See Appendix 2 for discussion of IMPLAN assumptions and limitations.

EXHIBIT 11

**ECONOMIC IMPACT ANALYSIS OF SSB TAX
NET IMPACT EXCLUDING SSB TAX REVENUE
IMPACT OF DIRECT EFFECTS: \$0.03 TAX**

Scenario 1: Tax of \$.03 per 12 oz. with 100% Pass-Through

Effect	Output (\$ Millions)	Jobs (Thousands)	Wages (\$ Millions)	Taxes (\$ Millions)
Direct	\$ (10,003)	(62)	\$ (2,345)	\$ (1,271)
Indirect	\$ (12,447)	(46)	\$ (2,465)	\$ (1,211)
Total	\$ (22,450)	(108)	\$ (4,810)	\$ (2,481)

Predicted Effect on Direct Industry

	Output (\$ Millions)	Jobs (Thousands)	Wages (\$ Millions)
<u>2008 Industry Total</u>			
Soft drink and ice manufacturing	\$ 67,792	107	\$ 7,285
Wholesale trade businesses	\$ 1,207,350	6,487	\$ 429,751
Retail Stores - Food and beverage	\$ 182,406	3,104	\$ 76,238
Other	\$ 848,078	4,299	\$ 230,711
Total	\$ 2,305,626	13,997	\$ 743,985
<u>Predicted Change</u>			
Soft drink and ice manufacturing	\$ (5,982)	(9)	\$ (644)
Wholesale trade businesses	\$ (1,460)	(8)	\$ (521)
Retail Stores - Food and beverage	\$ (2,481)	(41)	\$ (1,039)
Other	\$ 655	0	\$ 29
Total	\$ (9,268)	(58)	\$ (2,175)
<u>After Tax</u>			
Soft drink and ice manufacturing	\$ 61,809	98	\$ 6,641
Wholesale trade businesses	\$ 1,205,890	6,479	\$ 429,230
Retail Stores - Food and beverage	\$ 179,925	3,063	\$ 75,199
Other	\$ 848,734	4,299	\$ 230,740
After Tax	\$ 2,296,358	13,939	\$ 741,810
<u>% Change</u>			
Soft drink and ice manufacturing	-8.8%	-8.6%	-8.8%
Wholesale trade businesses	-0.1%	-0.1%	-0.1%
Retail Stores - Food and beverage	-1.4%	-1.3%	-1.4%
Other	0.1%	0.0%	0.0%
Total	-0.4%	-0.4%	-0.3%

Notes & Sources:

Output, Wages, and Taxes are in millions of 2008 dollars and are rounded to the nearest million.

Jobs rounded to the nearest 1,000. Totals may not sum due to rounding.

Direct effect on output as developed in demand analysis. Direct effect on jobs and wages estimated using IMPLAN. Indirect effect on output, jobs and wages estimated using IMPLAN. See Appendix 2 for discussion of IMPLAN assumptions and limitations.

Direct industry 2008 total statistics from IMPLAN. See Appendix 2 for a discussion of IMPLAN data sources.

EXHIBIT 12**ECONOMIC IMPACT ANALYSIS OF SSB TAX
IMPACT OF DIRECT EFFECTS: \$0.03 TAX
BY INDUSTRY****Scenario 1: Tax of \$.03 per 12 oz. with 100% Pass-Through**

Industry	Output (\$ Millions)	Jobs (Thousands)	Wages (\$ Millions)
Soft drink and ice manufacturing	\$ (6,391)	(10)	\$ (688)
Retail - Food and beverage	\$ (2,677)	(44)	\$ (1,121)
Wholesale trade	\$ (1,570)	(8)	\$ (560)
Truck transportation	\$ (81)	(1)	\$ (23)
Other ¹	\$ 3	(0)	\$ (14)
Fluid milk and butter manufacturing	\$ 70	0	\$ 7
Coffee and tea manufacturing	\$ 112	0	\$ 11
Fruit and vegetable canning, pickling, and drying	\$ 532	1	\$ 43
Total	\$ (10,003)	(62)	\$ (2,345)

Notes & Sources:

¹ Includes all industries where the absolute value of the impact on Output is less than \$50 million.

Total direct effect on output as developed in demand analysis. Direct effect on jobs and wages and industry breakout of direct effect on output estimated using IMPLAN. See Appendix 2 for discussion of IMPLAN assumptions and limitations.

EXHIBIT 13

**ECONOMIC IMPACT ANALYSIS OF SSB TAX
IMPACT OF INDIRECT EFFECTS: \$0.03 TAX
BY INDUSTRY**

Scenario 1: Tax of \$0.03 per 12 oz. with 100% Pass-Through

Impact of Indirect Effects	Output (\$ Millions)	Jobs (Thousands)	Wages (\$ Millions)
Flavoring syrup and concentrate manufacturing	\$ (2,308)	(1)	\$ (97)
Aluminum product manufacturing from purchased aluminum	\$ (771)	(1)	\$ (79)
Wholesale trade	\$ (642)	(3)	\$ (229)
Management of companies and enterprises	\$ (616)	(3)	\$ (289)
Plastics bottle manufacturing	\$ (569)	(1)	\$ (81)
Real estate	\$ (430)	(3)	\$ (32)
Paperboard container manufacturing	\$ (330)	(1)	\$ (61)
Electric power generation, transmission, and distribution	\$ (236)	(0)	\$ (34)
Truck transportation	\$ (226)	(2)	\$ (64)
Petroleum refineries	\$ (220)	(0)	\$ (5)
Plastics material and resin manufacturing	\$ (202)	(0)	\$ (13)
Other basic organic chemical manufacturing	\$ (202)	(0)	\$ (10)
Wet corn milling	\$ (178)	(0)	\$ (12)
Monetary authorities and depository credit intermediation	\$ (164)	(1)	\$ (38)
Telecommunications	\$ (151)	(0)	\$ (26)
Soft drink and ice manufacturing	\$ (132)	(0)	\$ (14)
Oil and gas extraction	\$ (123)	(0)	\$ (10)
Cable and other subscription programming	\$ (119)	(0)	\$ (6)
Petrochemical manufacturing	\$ (115)	(0)	\$ (7)
Alumina refining and primary aluminum production	\$ (115)	(0)	\$ (11)
Fruit and vegetable canning, pickling, and drying	\$ (116)	(0)	\$ (9)
Insurance carriers	\$ (109)	(0)	\$ (26)
Maintenance and repair construction of nonresidential maintenance and repair	\$ (108)	(1)	\$ (38)
Advertising and related services	\$ (107)	(1)	\$ (38)
Other ¹	\$ (4,159)	(27)	\$ (1,232)
Total	\$ (12,447)	(46)	\$ (2,465)

Notes & Sources:

¹ Includes all industries where the absolute value of the impact on Output is less than \$100 million.

Indirect effect on output, jobs and wages estimated using IMPLAN. See Appendix 2 for discussion of IMPLAN assumptions and limitations.

EXHIBIT 14

**ECONOMIC IMPACT ANALYSIS OF SSB TAX
NET IMPACT EXCLUDING SSB TAX REVENUE
IMPACT OF DIRECT EFFECTS: \$0.10 TAX**

Scenario 2: Tax of \$0.10 per 12 oz. with 100% Pass-Through

Effect	Output (\$ Millions)	Jobs (Thousands)	Wages (\$ Millions)	Taxes (\$ Millions)
Direct	\$ (33,341)	(208)	\$ (7,816)	\$ (4,235)
Indirect	\$ (41,487)	(152)	\$ (8,217)	\$ (4,036)
Total	\$ (74,828)	(359)	\$ (16,032)	\$ (8,271)

Predicted Effect on Direct Industry

	Output (\$ Millions)	Jobs (Thousands)	Wages (\$ Millions)
<u>2008 Industry Total</u>			
Soft drink and ice manufacturing	\$ 67,792	107	\$ 7,285
Wholesale trade businesses	\$ 1,207,350	6,487	\$ 429,751
Retail Stores - Food and beverage	\$ 182,406	3,104	\$ 76,238
Other	\$ 848,078	4,299	\$ 230,711
Total	\$ 2,305,626	13,997	\$ 743,985
<u>Predicted Change</u>			
Soft drink and ice manufacturing	\$ (19,941)	(31)	\$ (2,147)
Wholesale trade businesses	\$ (4,868)	(26)	\$ (1,736)
Retail Stores - Food and beverage	\$ (8,268)	(137)	\$ (3,463)
Other	\$ 2,186	2	\$ 97
Total	\$ (30,892)	(193)	\$ (7,250)
<u>After Tax</u>			
Soft drink and ice manufacturing	\$ 47,850	76	\$ 5,138
Wholesale trade businesses	\$ 1,202,482	6,461	\$ 428,015
Retail Stores - Food and beverage	\$ 174,138	2,967	\$ 72,776
Other	\$ 850,264	4,301	\$ 230,807
After Tax	\$ 2,274,735	13,804	\$ 736,736
<u>% Change</u>			
Soft drink and ice manufacturing	-29.4%	-28.7%	-29.5%
Wholesale trade businesses	-0.4%	-0.4%	-0.4%
Retail Stores - Food and beverage	-4.5%	-4.4%	-4.5%
Other	0.3%	0.0%	0.0%
Total	-1.3%	-1.4%	-1.0%

Notes & Sources:

Output, Wages, and Taxes are in millions of 2008 dollars and are rounded to the nearest million.

Jobs rounded to the nearest 1,000. Totals may not sum due to rounding.

Direct effect on output as developed in demand analysis. Direct effect on jobs and wages estimated using IMPLAN. Indirect effect on output, jobs and wages estimated using IMPLAN. See Appendix 2 for discussion of IMPLAN assumptions and limitations.

Direct industry 2008 total statistics from IMPLAN. See Appendix 2 for a discussion of IMPLAN data sources.

EXHIBIT 15**ECONOMIC IMPACT ANALYSIS OF SSB TAX
IMPACT OF DIRECT EFFECTS: \$0.10 TAX
BY INDUSTRY****Scenario 2: Tax of \$0.10 per 12 oz. with 100% Pass-Through**

Impact of Direct Effects	Output (\$ Millions)	Jobs (Thousands)	Wages (\$ Millions)
Soft drink and ice manufacturing	\$ (21,304)	(33)	\$ (2,294)
Retail - Food and beverage	\$ (8,924)	(148)	\$ (3,737)
Wholesale trade	\$ (5,234)	(28)	\$ (1,867)
Truck transportation	\$ (269)	(2)	\$ (76)
Other Federal Government enterprises	\$ (65)	(1)	\$ (54)
Other ¹	\$ 75	0	\$ 8
Fluid milk and butter manufacturing	\$ 234	0	\$ 23
Coffee and tea manufacturing	\$ 374	1	\$ 38
Fruit and vegetable canning, pickling, and drying	\$ 1,772	3	\$ 144
Total	\$ (33,341)	(208)	\$ (7,816)

Notes & Sources:

¹ Includes all industries where the absolute value of the impact on Output is less than \$50 million.

Total direct effect on output as developed in demand analysis. Direct effect on jobs and wages and industry breakout of direct effect on output estimated using IMPLAN. See Appendix 2 for discussion of IMPLAN assumptions and limitations.

EXHIBIT 16

**ECONOMIC IMPACT ANALYSIS OF SSB TAX
IMPACT OF INDIRECT EFFECTS: \$0.10 TAX
BY INDUSTRY**

Scenario 2: Tax of \$0.10 per 12 oz. with 100% Pass-Through

Impact of Indirect Effects	Output (\$ Millions)	Jobs (Thousands)	Wages (\$ Millions)
Flavoring syrup and concentrate manufacturing	\$ (7,694)	(2)	\$ (324)
Aluminum product manufacturing from purchased aluminum	\$ (2,570)	(4)	\$ (264)
Wholesale trade	\$ (2,140)	(11)	\$ (763)
Management of companies and enterprises	\$ (2,052)	(8)	\$ (964)
Plastics bottle manufacturing	\$ (1,897)	(5)	\$ (270)
Real estate	\$ (1,433)	(9)	\$ (108)
Paperboard container manufacturing	\$ (1,100)	(3)	\$ (205)
Electric power generation, transmission, and distribution	\$ (786)	(1)	\$ (113)
Truck transportation	\$ (752)	(6)	\$ (213)
Petroleum refineries	\$ (733)	(0)	\$ (17)
Plastics material and resin manufacturing	\$ (674)	(0)	\$ (44)
Other basic organic chemical manufacturing	\$ (672)	(0)	\$ (34)
Wet corn milling	\$ (594)	(0)	\$ (41)
Monetary authorities and depository credit intermediation	\$ (546)	(2)	\$ (127)
Telecommunications	\$ (504)	(1)	\$ (86)
Soft drink and ice manufacturing	\$ (440)	(1)	\$ (47)
Oil and gas extraction	\$ (408)	(1)	\$ (35)
Cable and other subscription programming	\$ (398)	(0)	\$ (20)
Petrochemical manufacturing	\$ (384)	(0)	\$ (25)
Alumina refining and primary aluminum production	\$ (383)	(0)	\$ (38)
Fruit and vegetable canning, pickling, and drying	\$ (386)	(1)	\$ (31)
Insurance carriers	\$ (362)	(1)	\$ (88)
Maintenance and repair construction of nonresidential maintenance and repair	\$ (359)	(3)	\$ (127)
Advertising and related services	\$ (356)	(3)	\$ (127)
Management, scientific, and technical consulting services	\$ (323)	(2)	\$ (139)
Natural gas distribution	\$ (318)	(0)	\$ (31)
Securities, commodity contracts, investments, and related activities	\$ (313)	(1)	\$ (131)
Other ¹	\$ (12,909)	(85)	\$ (3,805)
Total	\$ (41,487)	(152)	\$ (8,217)

Notes & Sources:

¹ Includes all industries where the absolute value of the impact on Output is less than \$300 million.

Indirect effect on output, jobs and wages estimated using IMPLAN. See Appendix 2 for discussion of IMPLAN assumptions and limitations.

EXHIBIT 17

IMPLAN INDIRECT OUTPUT MULTIPLIERS

Rank (by Indirect Multiplier)*	Description	Indirect Multiplier
1	Cheese manufacturing	2.1
2	Poultry processing	2.0
3	Animal (except poultry) slaughtering- rendering	1.9
4	Dry- condensed- and evaporated dairy product	1.9
5	Fluid milk and butter manufacturing	1.8
6	Fats and oils refining and blending	1.8
7	Ice cream and frozen dessert manufacturing	1.8
8	Leather and hide tanning and finishing	1.8
9	Soft drink and ice manufacturing	1.8
10	Sugar cane mills and refining	1.8
384	Wholesale trade businesses	0.6
399	Retail Stores - Food and beverage	0.5

Notes & Sources:

Multipliers from IMPLAN; reported as \$ indirect output/\$ direct output.

See Appendix 2 for a discussion of IMPLAN data sources.

*Out of approximately 440 industries.

EXHIBIT 18

IMPLAN INDIRECT JOBS MULTIPLIERS

Rank (by Indirect Multiplier)*	Description	Indirect Multiplier
1	Beet sugar manufacturing	15.6
2	Animal (except poultry) slaughtering- rendering	13.6
3	Sugar cane mills and refining	13.0
4	Cheese manufacturing	11.4
5	Flour milling and malt manufacturing	10.7
6	Cattle ranching and farming	10.7
7	Wet corn milling	10.6
8	Fluid milk and butter manufacturing	10.6
9	Poultry and egg production	10.4
10	Dry- condensed- and evaporated dairy product	10.0
79	Soft drink and ice manufacturing	5.8
357	Wholesale trade businesses	3.6
384	Retail Stores - Food and beverage	3.3

Notes & Sources:

Multipliers from IMPLAN; reported as indirect jobs/\$ millions direct output.

See Appendix 2 for a discussion of IMPLAN data sources.

*Out of approximately 440 industries.

EXHIBIT 19

IMPLAN INDIRECT WAGES MULTIPLIERS

Rank (by Indirect Multiplier)*	Description	Indirect Multiplier
1	Funds- trusts- and other financial vehicles	0.5
2	Sound recording industries	0.4
3	Poultry processing	0.4
4	Insurance carriers	0.4
5	Computer storage device manufacturing	0.4
6	Irradiation apparatus manufacturing	0.4
7	Sugar cane mills and refining	0.4
8	Transport by water	0.3
9	Light truck and utility vehicle manufacturing	0.3
10	Heavy duty truck manufacturing	0.3
35	Soft drink and ice manufacturing	0.3
360	Wholesale trade businesses	0.2
394	Retail Stores - Food and beverage	0.1

Notes & Sources:

Multipliers from IMPLAN; reported as \$ indirect wages/\$ direct output.

See Appendix 2 for a discussion of IMPLAN data sources.

*Out of approximately 440 industries.