Economic and Environmental Issue in Arkansas: A Policy Perspectiv

Measuring the Incidence of the New Food Tax in Arkansas:
A Computable General Equilibrium approach

Executive Summary

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Introduction

Arkansas has among the lowest property tax and highest sales tax rates in the country, the tax on food being especially distinguishable (Arkansas Advocates for Children and Families (AACF), Institute on Taxation and Economic Policy, 2003, and Center on Budget and Policy Priorities (CBPP), 2005). In 2005, Arkansas was among the seven states that continued to apply their sales tax fully to food purchased for home consumption without providing any offsetting relief for low-income families. Twenty-nine states and the District of Columbia exempt most food purchased for consumption at home from the state sales tax. Louisiana and New Mexico are the states that most recently eliminated their sales tax on food (CBPP, 2005). An earlier study conducted by the AACF in 2003 found that the tax burden imposed on Arkansans is regressive (the low income households pay a higher proportion of their income as taxes).

The state government recently passed legislation (Senate Bill 185, February 2007) to reduce the state portion of the tax on food purchases from 6 to 3 percent. This meant that consumers around the state would pay 6 instead of the current 9 percent tax on food and grocery-related items (average local government sales tax rate is 3%) beginning July 01, 2007. The government estimates a loss of revenue of approximately $250 million over a two- year period. While the major objective of the government is to reduce the food tax burden, it is also expected to make the tax structure more equitable. The premise is that low- income households would benefit more from the reduction in food tax than high-income households.

Based on the 2003 economic census (2003 estimates used to be consistent with all available data), the Arkansas food industry has sales of over $4 billion. There are over 1,350 food and beverage stores around the state of which 877 are grocery stores, 140 are specialty food stores and 337 are liquor stores. Further, the household food expenditures of low-, middle- and high-income groups vary not just by dollar amounts, but also by how the food dollars are spent: food-at-home versus food-away-from-home. The broad objective of this project was to conduct an economic analysis about how various constituent groups in Arkansas will be affected by the 50 percent tax reduction in the

states sales tax on food. Specifically, the objectives included using two approaches to estimate the incidence (food expenditure versus Computable General Equilibrium (CGE) framework) of a tax policy change on different segments of the society.

Methodology

The economic analysis for this study was conducted using two approaches. The first approach involved using household expenditure on food (referred to as expenditure approach hereafter) and the existing and proposed tax rates to estimate the net savings to household and the revenue loss to the government. Data on consumer expenditure for 2003 was obtained from the Bureau of Labor Statistics. The second part involved using a CGE framework to estimate the loss/gain in welfare to the households and government. In the CGE model, the main agents are households and government. There are two factors of production-labor and capital. Goods and services are consumed by three categories of households—low-, medium-, and high-income groups with household income (HI) used to designate households as follows; low: HI < \$35k, medium: 35k<HI<75K, and high: HI>75k respectively, as well as the government. Model revolves around simultaneously solving a set of non-linear equations for three central variables—commodity prices, output levels and income levels of household and government such that the economy is in equilibrium. Further, under this approach, all that is produced is consumed in the economy, there is no excess supply or excess demand of any goods, services and factors, and income equals expenditure for households, and government.

While the expenditure approach merely estimates the net savings to households, the CGE model uses economic principles and mathematical programming techniques to establish inter-linkages between all sectors (industries) and agents (households and government) and thus quantify the economy-wide impacts of any policy change. For example, a reduction in food tax makes food less-costly relative to the baseline, leading to an increase in household's disposable income, which in turn gets re-spent on other sectors including food. This also leads to changes in relative prices and output in other sectors. The government in this process re-collects some of the revenue it lost from reducing the

food tax. The CGE approach is a more accurate and reliable estimation technique compared to the expenditure approach for conducting policy analysis.

The starting point of the analysis involved building and balancing a Social Accounting Matrix (SAM) using the entropy optimization criterion in the Generalized Algebraic Modeling System (GAMS) software. In the balanced SAM[1], row total equals column total (income equals expenditure). Data for developing the SAM was obtained from IMPLAN[2]. The IMPLAN database of 528 industries was aggregated to 5 categories: manufacturing, food, trade, services and rest of the economy (ROE). Using the SAM (for 2003, the most recent year available), the CGE model was calibrated using GAMS/MPSGE[3] to reflect the benchmark equilibrium at the current tax rates. Tax rate for the 'food' sector was then changed to reflect the new policy. The model was then re-estimated to find the new equilibrium values of price, output and income. The total monetary gain or loss to households and government (measured by Hicksian equivalent variation (EV) and compensating variation (CV) were then estimated[4].

Key Findings

Based on findings of the expenditure approach, the total annual revenue loss due to the tax reduction to the government was approximately $118 million. The annual per household tax savings for low-, medium-, and high-income households (numbering 653,904, 412,218 and 151,188 respectively) would be $79.46, $111.78, and $135.09 respectively. Of the total savings, 44, 39 and 17 percent would go to low-, medium- and high-income households. As a percentage of the total food expenditure, and total household expenditure the low-, medium-, and high-income households would save 1.94, 1.71 and 1.49 percent and 0.35, 0.16 and 0.09 percent respectively.

The major findings of the CGE model are presented in Tables 1 and 2. From the EV and CV measures, it is evident that the low income group shows an increase in welfare due to

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[1] The Social Accounts (SAM) of a region tracks the monetary flows, both market and non-market between industries and institutions.

[2] Economic input-output modeling software.

[3] GAMS Algorithm supplement for undertaking general equilibrium analysis.

[4] The EV asks: How much money is a particular change (that has taken place between the benchmark and counterfactual) equivalent to? The CV asks: By how much is it necessary to compensate the individual for the change that has occurred?

the EV being positive and the CV being negative (0.000867 and – 0.000866). The medium income group is marginally better off given the magnitude of the EV and CV (0.000015 and -0.000015). The high-income group is clearly worse off with a marginal decline in welfare (EV= - 0.000471 and CV = 0.000471). While this may be surprising, given the variation in the food and non-food consumption habits of the three income groups, the high-income group suffers a loss due to the higher percentage of expenditures on activities that became relatively more costly as a result of the shifts in demand due to the tax changes. Overall, the society is better off as a result of the reduction in food tax; the net monetary benefit to society is roughly $12 million. The government also had a decline in welfare as a result of the new policy and loses approximately $62 million (this compares to $118 million in the expenditure analysis). The EV and CV for government were estimated to be - 0.004320 and 0.004339 respectively.

Table 1. Equivalent and Compensating Variation of Households and Government

Agents	Benchmark Million $	Counterfactual Million $	Difference Million $	EV	CV	Remarks	Percent
Low	23970.630	23991.404	20.774	0.000867	-0.000866	Welfare Increase	0.087%
Med	27873.893	27874.324	0.431	0.000015	-0.000015	Welfare Increase	0.002%
High	19345.835	19336.727	-9.108	-0.000471	0.000471	Welfare decrease	-0.047%
Society	71190.358	71202.455	12.097	0.000170	-0.000170	Welfare Increase for society as a whole	0.017%
Govt	14338.551	14276.61	-61.941	-0.004320	0.004339	Welfare decrease	-0.432%

Table 2. Change in relative prices and actual output of the major sectors

Sectors	Baseline Prices of Output Exp/Imp	Domestic output price CF	Domestic Output Baseline (Million $)	Domestic Output CF (Million $)	Export Price CF	Export Baseline (Million $)	Export CF (Million $)	Import Price CF	Imports Baseline (Million $)	Imports CF (Million $)
ROE	1.00	1.000	23,089	23,112	1.001	6,390	6,409	1.001	11,589	11,601
MANF	1.00	1.001	23,770	23,770	1.001	57,893	57,893	1.001	57,777	57,777
FOOD	1.00	0.967	4,027	4,039				1.001	941	942
TRDE	1.00	1.001	3,610	3,610	1.001	2,335	2,333	1.001	1,513	1,513
SERV	1.00	1.001	34,279	34,279	1.001	521	521	1.001	9,003	9,003

CF: Counterfactual

As shown in Table 2, due to the new reduced-food tax, relative food prices decline by 3.33 percent. As a result, domestic food output increased by 0.3 percent ($12 million) and food imports increased by 0.2 percent ($1 million). Domestic output price in manufacturing, trade and services sectors increased by 0.1 percent each. Export prices in all the sectors increase by 0.01 percent. Rest of the economy exports increase by 0.01 percent ($19 million) along with increase in domestic output by $23 million. Trade sector exports declined by 0.1 percent ($2 million). Import prices in all sectors increase by 0.1 percent each, and rest of the economy imports increased by 0.1 percent ($12 million).

Table 3 gives a comparison of the two approaches evaluated in the study. In contrast to $79.50 in income benefits for the low-income group under the food expenditure approach, the CGE model estimates $32 in benefits. The middle-income group has a benefit of about $1 in the CGE model compared to $112 annually under the expenditure approach. The high-income group loses about $60 in the CGE analysis compared to an annual gain of $135 under the food expenditure approach. The differences are due to the significant advantages that the CGE model offers. As mentioned earlier, this framework helps capture the re-spending that takes place within the economy as a result of changes in the relative price of food and the new output, income and price levels that bring the economy back to equilibrium.

Table 3: Net Income Impact as opposed to Tax savings

Agents	Tax Savings ($)	Household Income (Million $)	Number of Households	Per HH Income ($) Baseline	Per HH Income ($) CF	CGE Model		Expenditure Analysis	
						Per HH Savings ($)	Per HH Savings (%)	Per HH Savings ($)	Per HH Savings (%)
Low	20,774,000	23,971	653,904	22,786	22,818	31.77	0.139	79.50	0.35
Med	431,000	27,874	412,218	71,105	71,106	1.05	0.001	111.78	0.16
High	-9,108,000	19,346	151,188	147,530	147,469	-60.24	-0.041	135.09	0.09
Society	12,097,000	71,190	1,217,310	54,641	54,651	9.94	0.018	97.34	0.17

CF: Counterfactual

Conclusion

Clearly, the techniques used in analyzing policy changes have a major implication on measuring the effectiveness of public policy. This could make a huge difference on deriving meaningful conclusions on the impact of the same policy and the implications this could have on different households, businesses and government at the state level. Based on the CGE analysis, the food tax reduction leads to an overall economic benefit for the state of Arkansas. However, there is also considerable variation on the impact the society as a result of the change in policy. The low-income group benefits more, but there is also net loss of revenue from higher-income groups who potentially do not benefit very much from the tax reduction. Future research could examine other potential tax policies like complete abolition of the food tax, other instruments such as the Earned Income Tax Credit (EITC), taxing groceries fully and then, offering credits or rebates to offset some of the taxes paid on food for home consumption by some portions of the population need to be evaluated.