The incidence of the inclusion of food at home preparation in the sales tax base

BACKGROUND

Kansas is one of only fourteen states that includes food for at home preparation (groceries) in the state sales tax base and one of only seven that taxes them at the full retail sales tax rate (Tax Foundation, 2012). The taxing of groceries causes concern among several groups. One group are those who are concerned about rising obesity levels, especially among youth. They point out that **by taxing groceries, the state raises the price of groceries that households must pay.** They also point out that since the sales tax **is a tax levied on the value of purchases,** the effective cost of the tax increases with the purchase of higher dollar value food products. This may cause a substitution effect toward lower priced convenience foods, as it is often pointed out that these convenience foods are often cheaper than fresh foods. Even in the protein category, quality rises with price. This substitution effect may lead to higher rates of obesity and poor health.

A second group concerned with the inclusion of groceries in the sales tax base are those who are concerned with the incidence effects of the tax. The perception is that the **purchase of groceries consumes a higher portion of low-income households' disposable income.** Therefore the inclusion of groceries leads to lower income households paying a larger portion of their income in taxes.

For the case of a family of three living in a metropolitan area, we find that the incidence of taxing groceries is under 0.2 percent of household income for those with income greater than $150,000 per year, while it is over 5 percent of household income for those households with income less than $10,000 per year.

In this paper we examine the second concern. Using data from the U.S. Census Bureau and U.S. Bureau of Labor Statistics, we estimate the tax incidence of the inclusion of groceries in the sales tax base. We use "microdata" gathered from a representative survey of households to determine the pattern of consumption of groceries. Adjusting for a small shifting effect caused by business purchases of groceries, we find that the inclusion of groceries in the sales tax base is indeed regressive, especially over the lower-to-middle income range.

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LITERATURE REVIEW

In order to better frame our analysis, we consulted both the academic and professional literature on incidence analysis. In neither literature is there a mention of an analysis of the incidence of taxing groceries specifically. This is likely due to the limited use of these taxes. Within the academic literature the focus has been on the incidence of the retail sales tax as a whole. It is safe to say that **the majority of the literature on retail sales tax incidence finds it to be regressive on the whole**, with effective tax **rates falling as income increases** (Anderson, 2012). One caveat that is offered by some research is that ideally, the incidence should be viewed in terms of the lifetime effects of the tax. Over the course of an individual's and a family's life span, they find themselves in many different income groups. When people are young, they tend to be at the lower end of the income distribution. As they reach young adulthood, they tend to begin to move up the income ladder, reaching a peak in middle age. After retirement, their income falls again. These "lifetime incidence effects" tend to make the actual incidence of a tax on consumption less regressive than it would be viewed in a single year (see, for example, Fullerton and Rogers, 1991).

In the professional literature, there are several state and local governments that have attempted to assess the incidence of their tax systems. Arguably the most notable of these is the State of Minnesota, which has had an annual study of the incidence of the state and local taxes in the state ongoing for several years. Texas frequently assesses the incidence of their state and local taxes along with calculating the revenue loss from exemptions and deductions in their tax code. We examined the most recent reports from Minnesota (2015) and Texas (Combs, 2013), along with reports from Maryland, Wisconsin, and District of Columbia (Franchot, 2008; Wisconsin, 2004; Lee, 2014). Two things stand out in the professional literature of incidence studies. First is that there is a widely varying set of documentation available from most governments regarding the assumptions that the government used in estimating tax incidence. As several of the reports state, it is impossible to directly observe tax incidence. Models must be developed; these models contain many assumptions which can have an influence on the estimated tax incidence. Minnesota and the District of Columbia appear to have the most thorough documentation of assumptions, with Texas having the least. The second feature of these studies is that they all take into account "shifting behaviors" for indirect taxes (taxes which are not levied directly on individuals but on businesses, land, and other factors). These behaviors happen because economic agents will try to pass on or "shift" the economic incidence of a tax. As an example, let's say that we are analyzing the incidence of a business property tax. It might be tempting to say that businesses pay the tax. However, they will "shift forward" a portion of the tax to consumers of their products through higher prices and "shift backward" part of the tax to workers as lower wages. Therefore, an analysis of the final incidence of a tax must identify the group that ultimately bears the burden in proportion to their income after shifting behaviors are estimated.

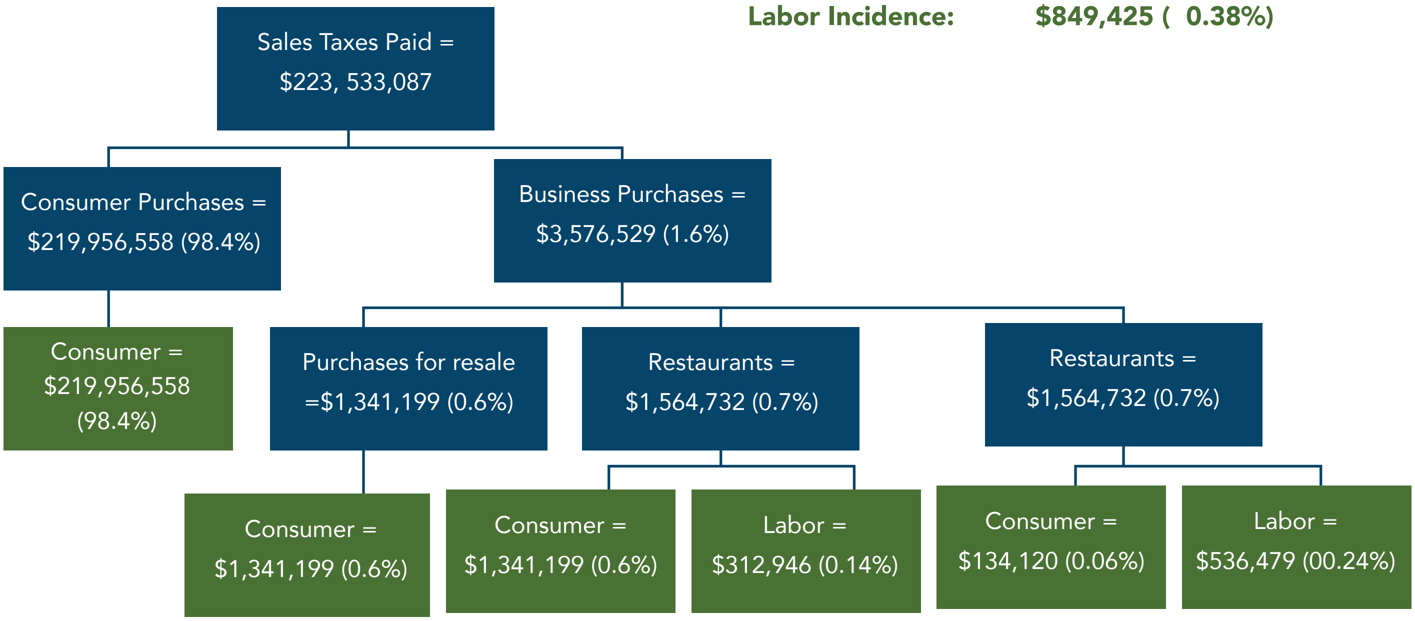
METHODOLOGY AND DATA

The first task in estimating the tax incidence for groceries is to determine which groups will bear the burden of the tax. As discussed above, we must estimate shifting effects for indirect taxes. For the direct consumption portion of the sales tax on groceries, the burden is directly on consumers – in other words households. We will use data on household consumption of groceries to estimate that burden directly. However, some of the sales tax on groceries falls on businesses that purchase and use them as an input to some business process. This is an indirect tax and we must estimate how these taxes are shifted.

In order to estimate shifting behaviors, we first obtained data from the 2007 Economic Census performed by the U.S. Census Bureau (2010). **The data is an estimate of purchases of products by classes of customers. Figure 1 shows the results of this analysis. The Census estimates that 98.4 percent of food and beverages were purchased by consumers,** with the other 1.6 percent split between various uses. So for the $223.5 million in **sales taxes paid on the purchase of food** (Kansas Department of Revenue, 2014), we estimate that just under $220 million is paid directly by consumers. The remaining $3.58 million (1.4%) is paid by businesses. Of that amount, business purchases for resale account for $1.34 million of the sales taxes. We assume that this is passed on to consumers directly, as with traditional sales of groceries. Restaurants account for just over $1.5 million of the business consumption figure. The prevailing assumption used in other incidence studies is that restaurants are able to pass on 80 percent of the increased cost of inputs to consumers. The remaining 20 percent is passed on to workers in the form of lower wages. The final category of business purchase of groceries is for business inputs, such as for feeding people at meetings or in break rooms. In most of the other state reports, 80 percent of taxes on business inputs are estimated to be shifted forward to workers and 20 percent passed on to consumers in the form of higher prices. We follow that standard in our estimates, producing a final estimate of $222,683,662 in sales taxes burden for consumers and $849,425 incurred by labor.

Figure 1. Estimation of Tax Incidence Shifting Effects.

Consumer Incidence: $222,683,662 (99.62%)
Labor Incidence: $849,425 (0.38%)



The labor burden imposed by the sales tax is very small and so to simplify, we estimated it to be proportionate to income. The vastly more important question for the relative tax incidence is the burden imposed on consumers. To measure this, we use data from the Consumer Expenditure Survey, a large-scale representative household survey carried out by the U.S. Census Bureau on behalf of the Bureau of Labor Statistics.

We obtained Public Use Microdata on the Diary portion of the 2013 survey (U.S. Bureau of Labor Statistics, 2015). There were over 12,000 households in four waves of the 2013 Diary survey. We gathered the data shown in Table 1 for each household.

The survey consists of two portions, an Interview portion that asks broad questions about expenditure and income and is completed by all respondents, and a Diary portion where some respondents track their spending on various items of expenditure.

Table 1. Variables Included in the Analysis of Grocery Consumption. Sample Size (N) = 12,335.

Variable	Mean	Standard Deviation
Food for at Home Consumption (weekly expenditures)	$76.33	$85.72
Income before Taxes (annual)	$49,778.35	$60,434.08
Family Size	2.43	1.43
Age of Reference Person	50.72	17.20
Highest Education of Reference Person Hours per Week	13.30	1.80
worked by Reference Person	40.37	11.79
Household Located in MSA (Metropolitan Statistical Area)	87.15%	
Race of Reference Person		
Caucasian	81.33%	
African-American	11.71%	
Native American	0.45%	
Asian	4.91%	
Native Hawaiian or Other Pacific Islander	0.24%	
Multi-Race	1.35%	

The variable Food for at Home Consumption is the dependent variable for our analysis. **The average household in the survey spent just over $75 per week in consumption of groceries, which equates to almost $4,000 per year.** The means of the variables are roughly as expected. In order to determine how much was spent on groceries by households at different income levels, we ran a linear regression analysis of Food for at Home Consumption on Income before Taxes, including several other variables to control for things like household size and location of the household in a metropolitan area. Linear regression analysis allows us the simultaneously measure the effect of our variable of interest (Income before Taxes) while controlling for the effects of other variables (Wooldridge, 2006). We limited the analysis to households in the Midwest region, producing an effective sample size of 2,885 households.1 The results of the regression analysis are shown in Table 2.

The estimated effects of each of the variables is listed in the table above the thick horizontal line. Interpreting the results, our analysis indicates that **for each $1,000 in household income before taxes, weekly expenditures on groceries increase by $0.19.** Households in metropolitan areas spend slightly less, on average than those located outside. Family size has a significant effect on average spending. Many of the variables, including Age, Highest Education, Hours per Week Worked, and Race proved to be "not statistically significant" in the regression analysis. What this means is that the variation detected in the estimated effect of these variables was very high compared to the base estimate of the effect. In other words, it was not possible in this dataset to tell whether Age, Race, etc. had a positive effect on the amount spent on groceries or whether, in fact, it had a negative effect. Those variables were dropped in the final model.

The coefficients for each of the variables comes from the regression results in Table 2. To take one example, we estimated that a family of 4 residing in an MSA with a household income of

Table 2. Results of Linear Regression Analysis. Dependent Variable is Weekly Expenditures on Food for at Home Consumption. N=2885.

Variable	Coefficient	Robust Std. Error	t-Statistic	P>1
Constant	34.340	4.840	7.090	0.000
Income Before Tax (000s) In MSA	0.190	0.000	5.520	0.000
Family Size	-11.396	3.193	-3.570	0.000
F(3, 2881)	19.977	1.447	13.800	0.000
Prob >	96.39			
F R-squared	0.000			
Root MSE	0.151			

*- Initial regression results indicated the presence of heteroscedastic errors, so Davidson-MacKinnon (1993) robust standard errors were used.

$40,000 would spend $110.63 per week on groceries. We then converted the weekly expenditures to annual figures and multiplied by the 6.15% sales tax rate on groceries to determine the household tax burden caused from buying groceries. So, for the aforementioned family of four their weekly expenditures on groceries project to $5,753 spent annually. This would make their tax burden due to consumption of taxed groceries equal to $353.81 per year, or about 0.9% of their income. We then add the households' estimated labor incidence from the first portion of the analysis to find their total tax incidence.

We can use the results of our model to predict weekly spending on groceries using the following equation:

*Spending = 34.34 + 19.977 * Family Size – 11.396 * lnMSA+ 0.00019 * Income*

RESULTS

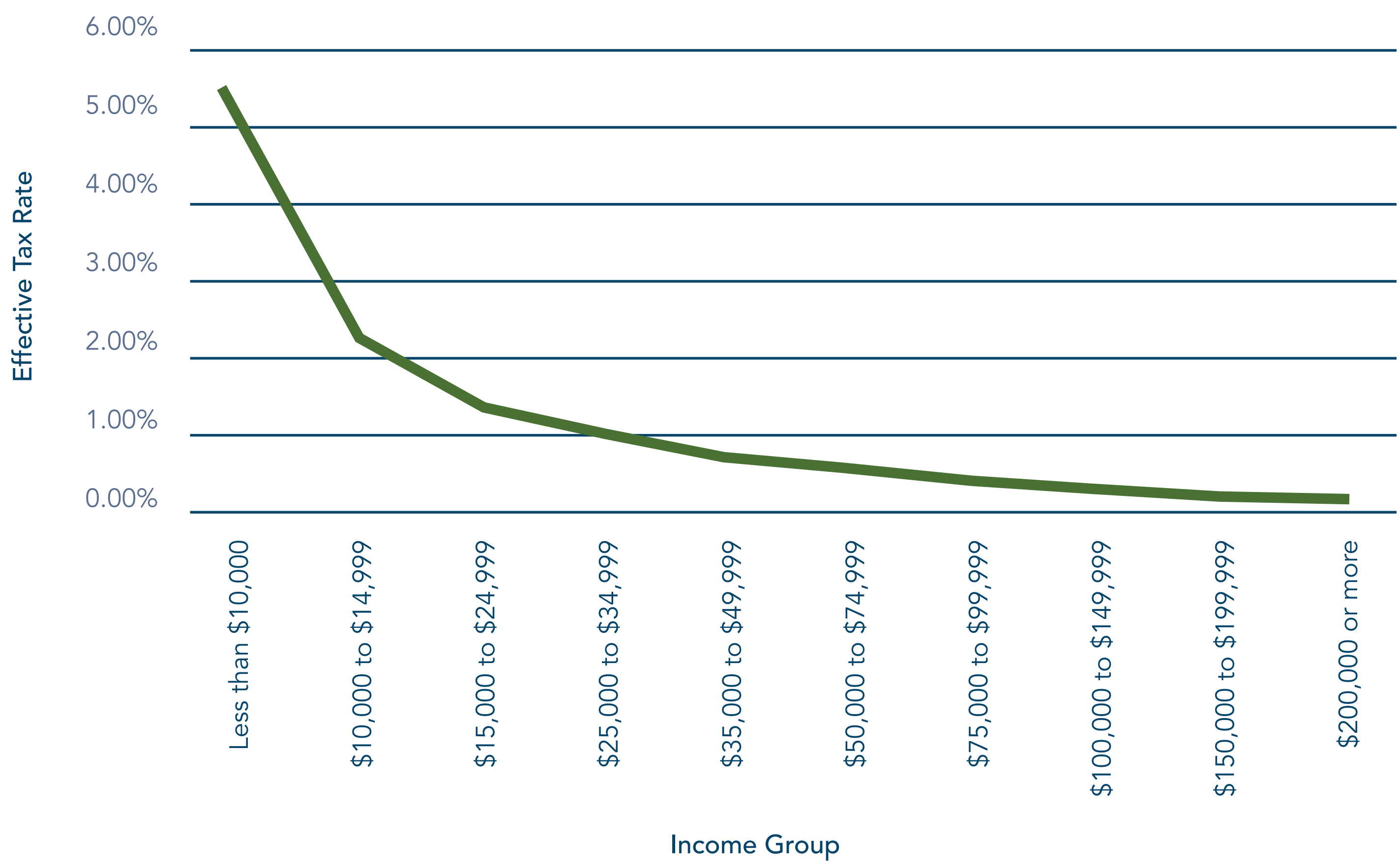
We extended this analysis to households within various income classes, various family sizes, and located in and outside of MSAs. Table 3 shows the results of this analysis. The top half of the table shows the results for families of various sizes located within an MSA. The bottom half shows similar estimates for families located outside of MSAs. In all family size groups, the estimated tax incidence is higher for families located outside of MSAs. Tax incidence also increases with family size. Larger families bear a larger burden of the tax as a percentage of income compared to smaller families.

Table 3. Estimates of Tax Incidence. Figures are Estimated Taxes Paid as a Percentage of Household Income.

Families in MSA					
Income/Family Size	Family Size 1	Family Size 2	Family Size 3	Family Size 4	Family Size 5
Less than $10,000	2.82%	4.10%	5.37%	6.65%	7.93%
$10,000 to $14,999	1.17%	1.68%	2.19%	2.70%	3.21%
$15,000 to $24,999	0.76%	1.08%	1.40%	1.72%	2.04%
$25,000 to $34,999	0.53%	0.74%	0.96%	1.17%	1.38%
$35,000 to $49,999	0.40%	0.55%	0.70%	0.85%	1.00%
$50,000 to $74,999	0.29%	0.40%	0.50%	0.60%	0.70%
$75,000 to $99,999	0.23%	0.30%	0.38%	0.45%	0.52%
$100,000 to $149,999	0.18%	0.23%	0.29%	0.34%	0.39%
$150,000 to $199,999	0.15%	0.19%	0.22%	0.26%	0.30%
$200,000 or more	0.13%	0.15%	0.18%	0.20%	0.23%

Families not in MSA					
Income/Family Size	Family Size 1	Family Size 2	Family Size 3	Family Size 4	Family Size 5
Less than $10,000	3.55%	4.83%	6.10%	7.38%	8.66%
$10,000 to $14,999	1.46%	1.97%	2.49%	3.00%	3.51%
$15,000 to $24,999	0.94%	1.26%	1.58%	1.90%	2.22%
$25,000 to $34,999	0.65%	0.87%	1.08%	1.29%	1.50%
$35,000 to $49,999	0.48%	0.63%	0.78%	0.93%	1.08%
$50,000 to $74,999	0.35%	0.45%	0.56%	0.66%	0.76%
$75,000 to $99,999	0.27%	0.34%	0.42%	0.49%	0.56%
$100,000 to $149,999	0.21%	0.26%	0.31%	0.37%	0.42%
$150,000 to $199,999	0.17%	0.21%	0.25%	0.28%	0.32%
$200,000 or more	0.14%	0.17%	0.19%	0.22%	0.25%

Figure 2 shows the graphical results for the typical household in the survey, with a family size of 3 located in an MSA (the median family size is 3 for the survey and the majority of survey households are located in an MSA). Both Table 3 and Figure 2 suggest that the sales tax on groceries is highly regressive in the lower-to-low middle income ranges, and becomes roughly proportional after that. **A household in the lowest income group pays anywhere from 2.7 percent to 8.4 percent more of their income in taxes on groceries than does a household in the highest income level.** For the typical household, the figure is 5.2 percent. This suggests a high level of overall regressivity in the taxation of groceries.



CONCLUSIONS

We estimated the incidence effects of the inclusion of groceries in the Kansas state sales tax base. Correcting for a slight shifting effect caused by business purchases of goods and using publicly available microdata on spending patterns, **we find that the effect of the inclusion of groceries is to increase the overall regressivity of the sales tax.** We also find that the regressivity is more pronounced with larger family sizes and for those families that live outside of an MSA. **As policymakers enter into discussions about what to tax, if vertical equity is a policy goal then they should consider cutting the tax on groceries or exempting them from the sales tax altogether.** One limitation that should be noted about the study is that we analyze only one year of data. Keeping in mind the lessons of Fullerton and Rogers and others, the lifetime incidence of the tax may be slightly less regressive than our results indicated. However, using the same methodology of most existing tax incidence studies, we find a fairly high level of regressivity. The lifetime effects would have to be very large in order to offset the single year effects.

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