Distributional effects on excise taxes among Mexican households

Efectos distributivos de los impuestos especiales en los hogares de México

Luis Huesca Reynoso[1*], Linda Llamas Rembao[2],
Cuauhtémoc Calderón Villarreal[3]

[1]*Centro de Investigación en Alimentación y Desarrollo, México*
[2]*Universidad Estatal de Sonora, México*
[3]*Colegio de la Frontera Norte, México*

Abstract

This paper measures the effect of excise taxes on specific goods for Mexican households. A semi-parametric quantile approach with a functional relationship to explain the payments of excise taxes for five category goods is used (high-calorie food, alcohol, tobacco, gasoline and diesel and others), using household consumption microdata in per capita units and attributes of the household head as explanatory variables as well. Findings show an average tax elasticity of -0.30 as a response in consumption of such goods. In addition, quintile 1 bare a greater share of the tax burden and elasticities varies significantly along the quintiles, with gasoline as the product with the greatest variation. It is original because it offers an alternative way to estimate not only incidence but also redistributive impacts on the payment of excise taxes with a semi-parametric measure along the quintile distribution for each good taxed.

JEL Codes: H22, H23, D12, C14
Keywords: Tax burden; Excise taxes; Elasticity; Semi-parametric analysis

* Corresponding author.
E-mail address: lhuesca@ciad.mx (L. Huesca Reynoso).
Peer Review under the responsibility of Universidad Nacional Autónoma de México.

Resumen

En este trabajo se mide el efecto del impuesto especial en bienes específicos para los hogares en México. Se acude a un enfoque semiparamétrico por quintiles para explicar los pagos del impuesto para cinco categorías de bienes (alta densidad calórica, alcohol, tabaco, gasolina y diésel y otros), utilizando los microdatos de consumo de los hogares en unidades per cápita y los atributos del jefe del hogar como variables explicativas. Los resultados muestran una elasticidad promedio de -0.30 como respuesta al pago del impuesto especial en la canasta de consumo. Además, el quintil 1 presenta una mayor proporción de la carga tributaria como proporción de su consumo y las elasticidades varían significativamente a lo largo de los quintiles, donde la gasolina destaca como el producto de mayor variación. La originalidad del estudio radica en que ofrece una forma alternativa de estimar no solo la incidencia, sino también los impactos redistributivos sobre el pago de los impuestos especiales con una medida semiparamétrica a lo largo de la distribución por quintiles para cada bien gravado.

Códigos JEL: H22, H23, D12, C14
Palabras clave: Carga fiscal; Impuesto especial; Elasticidades; Análisis semi-paramétrico

---

Introduction

Inefficient tax collection systems are common in Latin American countries in regards to their level of development. In 2013, according to information by the Economic Commission for Latin America and the Caribbean (ECLAC), Chile, Mexico, Panama, the Dominican Republic and Venezuela showed the widest gap with respect to the world's average public revenues. Meanwhile, from 2000 to 2014 Argentina, Bolivia, Brazil, Ecuador and Nicaragua improved their collection of taxes as a percentage of Gross Domestic Product (GDP). Thus, ECLAC recommended a series of structural reforms for taxation on direct and indirect figures to reinforce both, collection and reducing informal sectors in most Latin American countries (ECLAC, 2016).

Since the 1970s, Mexican economy have required a true fiscal reform focused on income distribution improvement. Among the taxation figures to change were not only income taxes but also excise taxes in Mexico (IEPS henceforth). In 2016 revenues from taxes was worth 2.7 million of pesos, and it barely reached 13.5 points on GDP. The highest share on consumption taxes and public revenues came from income tax and Value Added Tax (VAT) with 52 and 29 percent respectively, while IEPS only accounted for 15 percent.

The structural reforms promoted by the Mexican government accentuated the tax system inequity by stimulating inequality between capital and income, as in most Latin American countries. From the 1950's, Kaldor (1964) states how the distinctive feature in the Mexican tax system lies in the extreme inequality and distributive injustice induced by multiple tax exemptions and omissions. At the present time, Mexican tax structure remains unchanged even though different tax reforms had taken place in the country over time; however, exemptions and omissions have not been completely removed so, it is expected that both, inequality and distributive injustice will continue or even could be worse. This argument cannot be generalized for all developing countries, however reviewing the Mexican case serves as a reference to other countries with similar economic and social context.

Mexican indirect taxation includes VAT and excise duty. In the period of 2012 to 2016, it accounted from 2.9 up to 5.9 points as a percentage of GDP, because of 2014 fiscal reforms and

the eradication of tax subsidy on gasoline and diesel. A greater share of excise duties within indirect taxes grew from 14 to 34 percent in the same years. Income taxes and VAT remain as the main fiscal sources of revenues, then, excise taxes are the third fiscal figure of importance. In 2016, it represented 15% of tax revenues, equivalent to 2 points of GDP.

Furthermore, recent reforms opened Mexico's oil sector to private investment which used to be an important source of government revenue. Consequently, 2014 Mexican tax system reform seeks to lower oil revenues dependence by increasing the tax burden, particularly from indirect taxes. In the context of a restrictive fiscal policy, Mexican government opted to diversify that tax structure and compensate oil revenues decline. However, changes to tax structure has not fulfilled its purpose, and the energy reform may expand fiscal deficit and public debt, as long as revenues from indirect taxes have been increasing at lower pace than expected.

According to literature, it is widely known that excise taxes are regressive, that is, lower income groups bear a greater share of tax burden than higher income groups. Therefore, an argument against raising excise taxes is that it will adversely affect the poor. However, levy an excise taxes on goods that produce negative externalities is justified since its purpose should contribute to alleviate the negative effect caused from consumption.

Providing answers to questions such as in which extent an excise tax could be increased without affecting the poor? Or depending of the type of good, what would be the effect of an excise tax increase on its consumption? This research seeks to provide insights for improving the maneuver on fiscal policy and, to design a better excise tax structure. Therefore, the objective of this research is to provide an empirical application by measuring the response to pay excise taxes on five category goods and considering consumption differences along income groups.

Our research presents the next order as follows. Second section shows a brief discussion about consumption and excise taxes and its new role of national impact on revenues as well as its nature on the tax burden on households. Third section shows the theoretical framework and explains the model with the mathematical notation to derive our estimates. Fourth section shows the empirical application and its results. We conclude in the fifth section with main insights and recommendations derived from our study.

Macroeconomic context

Mexican federal incomes tend to substitute from oil revenues to public revenues in the period 2012-2016. Table 1 shows how the most important federal revenues came from oil (i.e., non-tax revenues), accounting up to 8.9 points of GDP in 2012, while in 2014 it reached only 4 points of GDP. Meanwhile, public revenues (taxes) raised in an opposite side, where the growing trend of excise duties as a percentage of GDP, deserves special attention.

One of the most important changes on excise duties took place in 2014, to widen the tax burden by including several goods considered as a high-calorie food. In that year, these revenues became as significant as alcohol and tobacco and contributed to 28 % from total excise duties. In contrast, table 1 shows how the negative values for gasoline and diesel represented an excise tax subsidy from 2012-2014 and a tax revenue in 2016. The decreasing trend of negative values are due to changes in market prices regulation instead of tax reform.

Before 2012, excise duties on gasolines and diesel should took place when revenues from international oil prices decreased (according to Mexican regulations). In this sense, Mexican government received non-tax revenues and sacrificed tax revenues from excise duties. Although

there was a crisis from oil revenues since 2005, excise duties on gasoline and diesel continued to be subsided and market prices in both goods were controlled by the Ministry of Finance as a strategy for inflation control. Until 2015, the Ministry of Finance eliminated the subsidy and excise duties on gasoline and diesel became a positive tax.

Table 1.
Federal revenues in Mexico (2012-2016). (Millions of pesos / percentage of GDP)

	2012		2014		2016	
	$	%	$	%	$	%
Oil revenues	1,386,406	8.9	1,221,164	7.1	789,148	4.0
Public revenues (a+b+c+e)	1,314,440	8.3	1,807,814	10.3	2,715,998	13.5
a) Direct tax	803,897	5.1	959,837	5.5	1,420,493	7.1
b) Value Added	579,987	3.7	667,085	3.8	791,700	3.9
c) Excise duties	-130,131	-0.8	111,647	0.6	411,390	2.0
i) High-Calorie Foods	70	0	31,973	0.2	40,282	0.2
ii) Alcohol	31,233	0.2	38,433	0.3	46,203	0.3
iii) Tobacco	33,426	0.2	34,532	0.2	38,097	0.2
iv) Gasoline & diesel	- 203,084	-1.3	- 12,847	-0.1	277,264	1.4
v) Others	8,224	0	19,556	0.1	9,543	0
d) Others	60,687	0.4	69,245	0.3	92,415	0.4

Source: Authors' elaboration based on Revenue Statistics from SHCP (2016)

As a result, the population is supporting a greater excise tax burden. In 2016, the contribution of each category to excise duties significantly changed, where gasoline and diesel stand out by representing 70% of total excise tax revenues (1.4 points of GDP), while the rest of goods reached 0.7 points to GDP as a whole.

Literature Review

In this section, we focus on the prevailing literature focused on indirect and excise taxation and its impact on specific products and services linked to the tax-burden on households.

The role exerted by consumption and excise taxes

According to Bird and Smart (2016) sales and excise taxes are generally understood as two distinct types of taxes that are common or appraised within the consumption concept. In this research we focus on excise taxes, which are priced in the market for specific goods and services, having regularly negative externalities for different causes, such as health problems, pollution, adulteration, debasement or similar result. Then, its main significance is linked to produce corrections of these externalities, and not only to see them as a potential tax for public revenues.

Although there is separate research done for specific goods accounting for the impact of excise taxes, few literatures estimating the combination of certain sort of groups can be found (as it is intended in this research).

Relevant empirical research on excise taxes

In the international context, excise taxes have been mainly designed for fuels such as gasoline and diesel. For developed countries, those taxes have been regressive (Dahl and Sterner 1991; Chernick and Reschvsky 1997; Walls and Hanson 1999; Santos and Catchesides 2005) and weakly regressive in the case of Poterba (1989) and Poterba (1991). However, in the case of Spain and by using data from the Family Budget Survey (EPF), Asensio et al. (2003) estimated a model for gasoline spending, as well as the consumption elasticities and the redistributive effects of a gasoline tax, finding that for low-income groups the tax is progressive and after a certain level of income and for certain localities the tax is regressive, meaning that the application of the consumption tax would tend not to be homogeneous throughout the country. On the other hand, for developing countries gasoline taxes tend to be progressive since most people with lower incomes have a low association to owning a car and their gasoline consumption is much lower, so their income is proportional to the demand for gasoline (Antón-Sarabia and Hernández-Trillo, 2014).

There are other types of products where excise taxes are levied and not less important, such as tobacco, alcohol and soft drinks, as well as other high-calorie food (Escario and Molina 2000; Jimenez et al. 2008; Waters et al. 2010; Llamas and Huesca, 2016; Rodríguez-Iglesias et al. 2017). Escario and Molina (2000) analyze tobacco excise taxes in Spain and determine that increasing taxes by 1% will reduce tobacco consumption in less than one percentage point of elasticity, that is, by 0.38% in the short term, which will result in 1.12% reduction in the cancer mortality rate. Meanwhile in the long term, the authors' estimation of the mortality rate will be reduced in the order of 8.81%. In the case of Argentina, Rodríguez-Iglesias et al. (2017) is the most recent research up to date on the tobacco issue. The authors reveal how fiscal policy must increase real price on tobacco otherwise, taxation can be neglected; that is, excise taxes could not be effective during times of high levels of inflation. This study found the need to increase tobacco taxes in Argentina in 100 percent, to be able to decrease consumption and maximize public revenues from tobacco.

For Mexico, Jimenez et al. (2008), estimated tax elasticities for tobacco finding that a 10 percent tax increase would reduce consumption by 6.4 percent along population. According to Waters et al. (2010), excise taxes on tobacco in Mexico as a percentage of the final price was 62.8% is considerably lower than other Latin-American countries such as Uruguay or Chile, where the equivalent figures were 68% and 76%, respectively. Excise tobacco tax in Mexico would have to increase from 160% up to 350% or at least 17 pesos more (as specific tax) to achieve a tax incidence similar to that of Chile.

For Mexican indirect taxation, Llamas and Huesca (2016) research follows an analytical approach to decompose both, the incidence and the progressive/regressive effect on household income distribution. Findings reveal that excise taxes are more regressive than VAT, with greater emphasis on high-calorie food. They conclude that families with lower level of income presents a higher tax burden for excise taxes than for VAT.

In general, from the literature revision we conclude that:

• A shifting process is observed towards a revenue system more relied on a greater burden upon indirect taxation (especially on excise-taxes).
• Literature highlights the great relevance of using excises taxes to correct imperfections

from the consumption of goods with negative externalities.
• In the Mexican case, poor households bear a greater tax burden of special taxes than their counterparts.

Methodology and data
Model and determinants of the willingness to work and pay taxes

In order to determine the impact of excise tax payments on consumption, we apply an empirical model based on a simple semi-log quintile specification.

The usual empirical approach analyzes agent behavior through a demand schedule with its corresponding elasticities to estimate the marginal efficiency of any given tax. We consider qth as k subgroups of goods with conditional θ quantile functions of consumption C_{ik} given a vector of x' exogenous variables as $Q_\theta\left(c_{ik} \mid x_i^{'}\right)$, which implies a simplified equation of the form:

$$Q_\theta\left(c_{ik} \mid x_i^{'}\right) = \alpha_0^\theta + \alpha_1^\theta x{'}_i^\theta + F_{u_i}^{-1}\left(\theta\right) \tag{1}$$

As the error term u_i satisfies $E\left(c_{ik} \mid x_i^{'}\right) = 0 \forall Q_\theta$ it is analogous to consider the distribution function of u_i as F_{ui} to avoid heteroskedastic errors. Then, we write the consumption in terms of the vector of exogenous variables in a quintile semiparametric log linear equation as follows:

$$\log c_{ik}^\theta = \alpha_0 + \alpha_1 \log y_i^\theta + \alpha_2 \sum_{k=1}^{5} \log t_{ik}^\theta + \alpha_3 S_i^\theta + \alpha_4 dch_i^\theta + \alpha_5 dsize_i^\theta + \alpha_6 dzone_i^\theta + u_i^\theta \tag{2}$$

Where the log of per capita consumption for the basket of goods is expressed in net terms (purged from taxes to avoid endogeneity) as C_{ik}. The log of net per capita monetary income is represented by $\log y_i^\theta$, while $\log t_{ik}^\theta$ is the log of tax payments to obtain elasticities from the excise tax which adds up to five k-subgroups of goods as $k=$ 1: High-calorie food; 2: Alcohol; 3: Tobacco; 4: Gasoline & diesel; and 5: Others. The vector of explanatory variables are: S_i^θ standing for schooling of the household head; a set of dummy variables which includes households with children dch_i^θ; $dsize_i^\theta$ taking the value of one for those households with a number of members greater than its mean; $dzone_i^\theta$ taking the value of one for urban households and the error term for each quintile as u_i^θ. Thus, we likewise replicate this equation to estimate the impact of excise taxes on consumption in both, the north border and the rest of the country.

In order to analyze changes for excise taxes in our model marginal effects (ME) are estimated, as the partial derivative that measures the impact of a change in the tax pressure for each Q_θ - quintile on specific k subgroups of goods - from its corresponding excise tax t_{ik}^θ. In the next equation, we first obtain the effective excise tax as the average for the tax payments on each category as follows:

$$\overline{t}_{ik}^\theta = \left(\frac{t_{ik}^\theta}{c_{ik}^\theta}\right) \tag{3}$$

Taking the partial derivative for any quintile given the effective excise tax rate with respect to the discrete change on the tax pressure on each category for a k- good we obtain:

$$\frac{\partial Q \mid \overline{t}_{ik}^{\theta}}{\partial \overline{t}_{ik_{0 \to 1}}^{\theta}} = \alpha_{ik}^{\theta} \qquad (4)$$

From the expression (4) we follow the assumption that the marginal change for each quintile in the household i will change by a greater (or lower) magnitude of the average effective excise tax within the quintile distribution. In order to do so, we estimate an ordered logit model where the dependent variable identifies the q-quintiles, and the covariate as a discrete variable that measures the change from a value of cero (no tax pressure) to a value of one (greater tax pressure) when its value from expression (3) is higher than the mean ratio. Remaining in the same quintile of the F distribution upon its corresponding change we formulate the hypothesis stating that for a rational household with ordered preferences on consumption, an increase in income (quantile position) will imply a greater excise tax burden –not necessarily progressive-, and lower quintiles would seem to bare a lower share of this burden. For the purposes of this model, we assume the existence of constant returns to scale between the levels of per capita income along the quintiles (that is, an additional level of income is paid at its corresponding level of per capita income rate) as well as a consumer behavior depending on the subgroups of goods.

Methodology and formulating the excise tax

We use the National Survey of Households' Income and Expenditures (ENIGH by its initials in Spanish) for the year 2016. Excise duties were calculated according to Mexican tax regulations and five commodities regrouped were made to facilitate estimates comprehension in section V.[1] Households' incomes, expenditures and taxes are expressed in Mexican per capita pesos at current prices. Expenditures made at the informal market were not taken in consideration; therefore, it was necessary to distinguish between formal and informal expenditures by using the place of purchase provided in the survey.

The attributes of the household described in equation 2, were taken from the survey. Also, we distinguish the states located at the northern border from the rest of the country (that is, Baja California, Chihuahua, Coahuila, Nuevo León, Sonora and Tamaulipas) due to a major proximity to United States that could exert an influence in consumption patterns. Hereafter, to ease further explanations this paper will make reference to the northern border and the rest of the country, as region 1 and region 2, correspondingly.

Hence, the ENIGH 2016 survey indicates a sample of 70 187 representing 33.4 million of households, from which 18.7 percent are located at region 1 and 81.3 percent in region 2 (see table 2). Therefore, quintiles were constructed according to each corresponding weigh by each subsample, using households' monetary income (disposable income). It can be seen how per capita income for the country as a whole is somehow in the middle level with a yearly amount of $45 462 pesos, meanwhile region 1 shows a higher income level ($54 054 pesos) than region 2 ($42 722 pesos). Also, standard deviation is higher in the former region as a result of greater inequality of earnings amongst its population.

---

[1] The production, sale or importation of specific products such as gasoline, alcoholic beverages, tobacco, high-calorie food (e.g. energy and carbonated drinks, confectionery products, snacks, chocolate, puddings, custards, peanut butter, ice creams, among others) as well as certain types of services (telecommunications, lottery and gambling) are excise taxed in Mexico.

Figure 1 presents the per capita annual excise tax payments for all the five categories of goods. The greater share of revenues in general, comes from the upper two quantiles (4 and 5). Tobacco, gasoline and alcohol are the products more purchased by the population in both regions, and in a lesser extent are those of high calorie intake of food as well as other products. Per capita tax payments are somehow dispersing, as a result of different consumption patterns among the tax-payers in the distribution.

Table 2.
Basic statistics of the database, Mexico 2016. (Yearly Mexican pesos per capita)

| Variable	Sample	Mean	Std. Dev	Min	Max
Disposable income:					
Mexico	70,187	45,462.87	142,203.20	35.80	22,340,716.00
Northern border	16,972	54,054.43	202,914.90	136.92	17,883,024.00
Rest of the country	53,215	42,722.74	116,227.50	35.80	22,340,716.00
Excise taxes:					
Northern border (Region 1)					
High-Calorie Foods	14,694	40.96	59.79	0.01	1,301.92
Alcohol	1,134	654.72	993.25	3.32	9,572.10
Tobacco	1,236	1,078.32	1,577.42	10.28	27,541.50
Gasoline & diesel	9,596	125.70	144.44	0.90	3,820.83
Others	11,001	37.19	593.26	0.50	60,387.48
Rest of the country (Region 2)					
High-Calorie Foods	43,262	40.83	57.87	0.00	2,099.02
Alcohol	2,358	588.47	1,140.63	2.32	15,665.02
Tobacco	2,667	854.42	1,272.27	6.32	18,424.59
Gasoline & diesel	21,947	97.54	117.23	0.33	2,820.14
Others	36,195	27.11	174.33	0.15	25,439.47

Source: Authors' estimations using ENIGH, 2016.
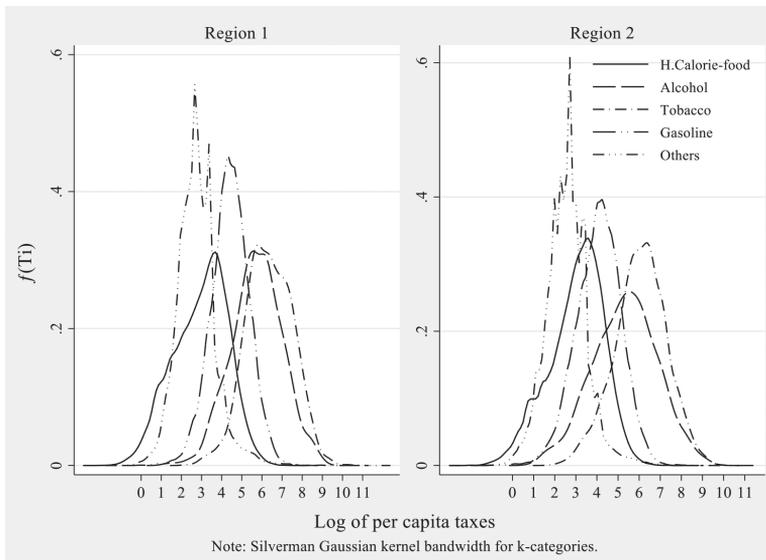
Figure 1. Densities of excise taxes in Mexico by category, 2016 (mxn yearly pesos)
Source: Authors' estimation using ENIGH, 2016.

Empirical Results

Households located at region 1 exhibit higher income and consumption levels as well as greater expenditure share with respect to its counterpart. Table 3 shows household expenditures taxed with excise duties, as a share of total disposable incomes. Lower quintiles allocate a higher proportion of their income to consume the 5-category goods (i.e., high-calorie food, alcohol, tobacco, gasoline and diesel and other excise taxed goods), this implies that excise duties are more regressive in region 1 than region 2. Shares are above the average for quintiles 1, 2, 3 and 4; it is to be thought that, an increase of the tax rate would affect these households by worsening the tax burden supported or discourage consumption. Next section we discuss in detail such situations.

Table 3.
Income and expenditures levels by quintile population, Mexico 2016. (Per capita pesos per year)

	Region 1			Region 2		
Quantiles	Disposable Income ($)	5 Category Expenditures ($)	Share (%)	Disposable Income ($)	5 Category Expenditures ($)	Share (%)
1	13,807	3,914	28	9,001	2,415	27
2	26,151	5,625	22	18,078	3,517	19
3	38,672	7,523	19	27,789	4,886	18
4	59,600	10,806	18	44,607	7,503	17
5	185,127	23,441	13	134,904	19,357	14
Total	64,668	10,262	16	46,873	7,535	16

Source: Authors' estimations using ENIGH, 2016.

According to our database, 50 percent of revenue contribution from excise tax payments derives only from quintile 5, where consumption level in region 2 is higher than region 1; however, consumption within quintile 1 is higher at region 1 than region 2 for all category goods. Also, important regional differences on consumption from high-calorie food and tobacco is observed among the poor. This reveals the importance of identify to which extent, excise taxes could revert tobacco and non-basic food consumption and prevent future health problems. Next section presents the empirical results to confirm responses to pay taxes on consumption for each of the categories by quintiles of population.

Table 4.
Shares and means of expenditures by quintile population, Mexico 2016.
(Shares in % and means in per capita pesos per year)

Quintiles	High-Calorie Food		Alcohol		Tobacco		Gasoline & diesel		Others	
	Mean	Share	Mean	Share	Mean	Share	Mean	Share	Mean	Share
Region 1										
1	1,183	14	2,081	6	1,048	8	2,432	5	1,888	7
2	1,397	17	1,522	6	1,446	11	3,029	9	2,784	11
3	1,571	19	1,986	12	1,457	15	4,088	14	3,537	14
4	1,877	22	3,011	23	2,138	23	5,690	22	5,056	20
5	2,412	28	5,066	54	3,224	43	10,694	51	11,850	47
Total	1,685	100	3,262	100	2,018	100	5,913	100	5,032	100

Region 2										
1	790	11	1,349	5	745	4	1,548	3	1,490	6
2	972	15	1,421	7	823	8	1,820	6	2,134	9
3	1,157	18	1,782	10	1,048	13	2,554	10	2,932	13
4	1,472	23	2,372	18	1,645	27	3,610	19	4,380	19
5	2,063	31	4,667	60	2,640	49	7,842	62	11,843	52
Total	1,294	100	2,889	100	1,612	100	4,461	100	4,562	100

Source: Authors' estimations using ENIGH, 2016.

Econometric results

We run quintile regressions using equation (2) from the previous section modeling the level of consumption in log terms according to the corresponding selected exogenous variables. In the Appendix we include tables A1 and A2 which shows the full set of coefficients from the models estimated for both regions. For a sake of space, figure 2 illustrates the coefficients of excise tax elasticities included in our models, according to each category except that for others. Also, confidence intervals were included for statistical robustness. Narrower confidence intervals are shown for a statistical significance above 95 percent and wider confidence intervals for a statistical significance above 90 percent (see quintile 5 for alcohol and tobacco). It is important to recall that elasticity in our model corresponds to a proportion of the price for the good, acting as a price elasticity of the demand.

In general, all elasticities are partially inelastic (coefficients range $-1 < \log t^\theta_{ik} < 0$) which tells how this sort of taxes reduces consumption for each category. According to Peck (2013) in developing countries, the poor are comprised in quintiles 1 and 2 while the rich are in the quintile 5. By comparing both regions, similar trend were found across quantiles for high calorie food and alcohol with small differences. For both regions, the increasing trend of elasticities shows a lower response of consumption as we move towards upper quintiles when the excise tax rises (except for tobacco). Region 2 depicts less inelastic coefficients along the quintiles for gasoline and diesel.

Now we proceed to a detailed analysis for each category. For high-calorie food, an excise tax increase equivalent to 10 percent, would reduce consumption by 2.7 percent for quintile 1 and 1.06 percent for quintile 5 in region 1, -i.e. quintile 1 decreases it consumption 2.5 times more than quintile 5-; for the rest of the country, reductions are 3.0 and 0.7 percent, respectively (difference between quintiles is 4.2 times greater).

Recall that excise taxes are useful to reduce negative externalities from consumption. The lesser response from quintile 5 implies that consumption on high-calorie food will not be reduced significantly even when the tax burden is higher. These results are useful for alternative studies which examine the association between the socioeconomic status with the prevalence of metabolic syndrome, diabetes or obesity, observing a higher risk of metabolic syndrome for low socioeconomic strata (quintile 1) in Brazil and Mexico, while findings for India goes in the opposite way, where a direct association between high socioeconomic position (quintile 5) and metabolic syndrome has been found (Alemán-Mateo et al. 2018; Marquezine et al. 2008, respectively).
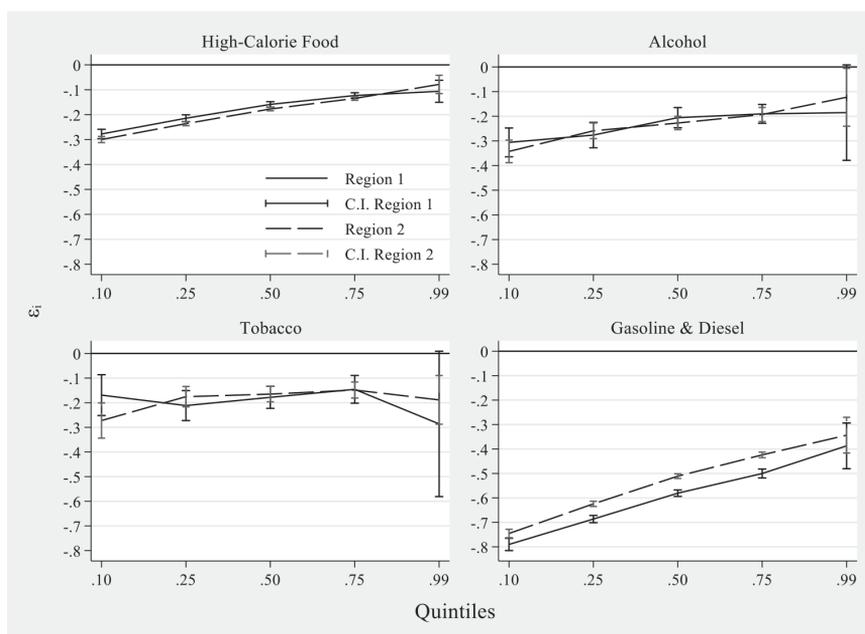
Figure 2. Excise tax elasticities in Mexico, 2016.
Source: Authors' estimations using ENIGH, 2016.

Also, higher risk of diseases from alcohol and tobacco consumption are associated to low income strata (Warner, 2014; Sesma et al., 2002); for that reason, greater elasticities from the poor in such products would be a positive finding. In regards to alcohol, estimates indicate a higher response of consumption from the poor in comparison to the rich for both regions. To be more precise, tax elasticities for quintile 1 depicts that consumption would be reduced by 3.0 and 3.4 percent for both, regions 1 and 2 respectively, as a consequence of a 10 percent tax increase; while elasticities for the rich are 1.8 and 1.2, respectively.

Tax elasticities for tobacco shifted in opposite direction for region 1. Indeed, the upper quintile tends to respond more than the poor, indicating that it discourages much more consumption of the richest groups. An excise tax increase equivalent to 10 percent would reduce consumption by 2.8 percent in such quintile. Only in region 2 tax elasticities for quintile 1 are slightly higher than quintile 5 (2.7 versus 1.8).

Since it would be expected to discourage the consumption of lower quintiles, the results allow to shed light on other factors that may affect the low impact on elasticity. Indeed, the policy of increasing the excise tax on tobacco would imply that revenues will increase at the expense of the poorest, hence it can be seen the importance of targeting its revenues for a transfer in order to deal with externalities as a matter of importance within this category. For tobacco, we can conclude that the less responsive to its excise tax along lower quintiles, gives insights for the presence of tobacco as normal goods, at least in region 1.

Furthermore, empirical results for tobacco can be compared with international evidence. Price inelasticity for tobacco ranges reduction in consumption from 0.25 to 0.50 in high-income countries, while in middle and low income countries is around 0.80; in countries such

as Argentina, Brazil, Chile and Uruguay it ranges from 0.27 to 0.55 (Waters et al., 2010). For comparative purposes, recall that our results should be interpreted as a proportion of the price elasticity for tobacco. In such case, our estimations remain lower than price elasticities referred in the literature. However, our partial-price inelasticity is similar to those estimated for high-income countries, where quintile 5 displays a coefficient of 0.28 in region 1 and quintile 1 a coefficient of 0.27 in region 2. A special case is found in Jimenez et al. (2008), where his estimates for elasticities in tobacco are higher. For instance, a 10 percent tax increase would reduce consumption by 6.4 percent in Mexico (in average).

Another category with greater importance on public revenues is gasoline and diesel. Both goods presents an excise tax elasticities with consumption as being more sensitive to an increase on its excise tax than in the rest of the categories. So, also this sort of excise tax exerts a greater effect reducing consumption in the gasoline. Along the quintiles, it can be noticed how the reduction of consumption upon an increase in the excise tax on gasoline and diesel is higher in region 1 than region 2. If the excise tax increase by 10 percent, reductions in consumption for the poor would be by 7.9 and 7.4 percent -at regions 1 and 2, respectively-; while for the rich, consumption would decrease by 3.8 and 3.4 percent, in each area. With significance confidence, tax effect in both regions on the poor are greater than its counterparts, as long as the elasticity intervals crosses each other.

Last but not least, the fifth category of goods refers to telecommunication and gambling services and those presented an estimation of elasticities to close to alcohol and coefficients of consumption propensity slightly higher to the later product (see tables A1 and A2 in Appendix). The trend of elasticities over this category of products presents statistical significance and respond more for the region 2 as a result of the lower economic capacity in comparison with the border region.

Summarizing, as expected excise taxes exert a greater effect on decreasing the consumption of the poor for high-calorie food, alcohol and gasoline and diesel; on the other hand, tobacco has shown a similar pattern regardless of the socioeconomic strata. Between regions, the most important difference is found for gasoline and diesel, averaging one point less in elasticity.

We also proceed to compute a test for equality of coefficients from excise taxes and presents the results in table 5. It can be seen that the null hypothesis is rejected for all categories; however, variations in coefficients across the quintiles, is not statistically significant for tobacco at region 1.

Table 5.
Equality coefficients test from excise taxes.
$H_0 : (t_{ik}^\theta q10 = t_{ik}^\theta q25 = t_{ik}^\theta q50 = t_{ik}^\theta q75 = t_{ik}^\theta q99)$

Category	Region 1	Region 2
High-calorie food	54.66	195.16
	(0.0000)	(0.0000)
Alcohol	2.75	5.63
	(0.027)	(0.0002)
Tobacco	1.34	3.56
	(0.2518)	(0.0066)
Gasoline & diesel	110.35	287.48
	(0.0000)	(0.0000)
Others	11.84	39.75
	(0.0000)	(0.0000)

Note: The level of significance in parentheses.
Source: Authors' estimations using ENIGH, 2016.

Now, we end up with calculations to obtain marginal effects from equations (3) and (4) and presents the output in figure 3. Recall that ME measures the impact of a unit of change in the tax pressure for each quintile on specific subgroups of goods. A positive (negative) trend implies a greater (lesser) tax pressure across the quintiles. It should be expected that trends on ME would become more positive as we move to a higher quintile because of a greater tax burden and a more progressive taxation scheme.

Main findings shows that lower quintiles bare a higher tax burden than its counterpart, with the exception for the groups of high calorie food and gasoline. Ranking the products, the observed ME are higher for tobacco and alcohol in detriment of low income groups (quintiles 1 and 2).

Differences along the quintiles for high-calorie food as well as gasoline and diesel are lower by more than 5 points of change. Furthermore, regional analysis shows how lower quintiles in the region 2 faces a greater tax incidence than region 1, but it is relevant to remark how region 2 seems to start having less pressure for high-calorie food where marginal changes are near cero. We confirm the hypothesis that higher quintiles do not necessarily bare a greater tax burden, at least for two products clearly: tobacco and alcohol. In this regard, a rise of government tax revenues derived from an increase in excise duties would be at the expense of putting more pressure on the poor for tobacco and alcohol.
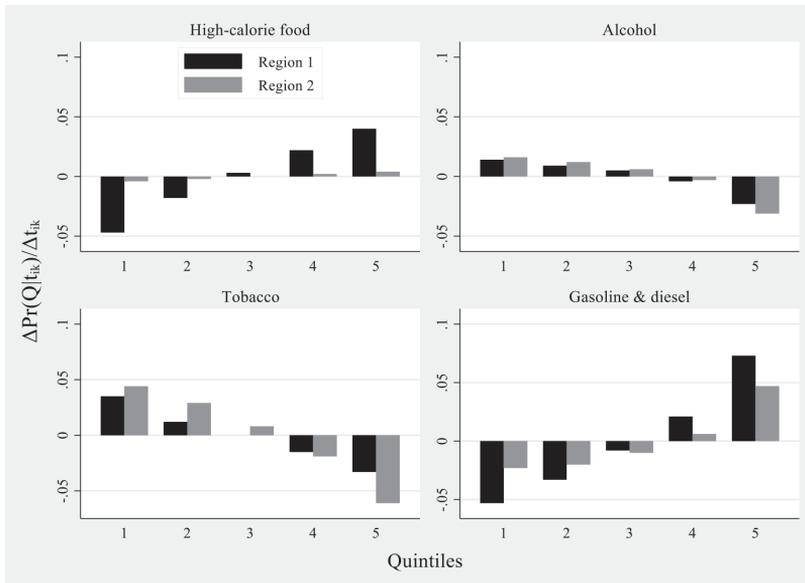
Figure 3. Marginal effect of excise tax pressure by quintiles in Mexico, 2016.
Source: Authors' estimations using ENIGH, 2016.

Finally, some fiscal policy recommendations can be derived from this study. First, gasoline and diesel excise taxation exerts a greater effect reducing consumption of these goods. Also, as long as there is a higher density of population in region 2, the slightly lower tax elasticity would imply that a greater tax collection from the rest of the country should be targeted to fight

pollution other environmental positive proposals. Second, there is a higher margin to increase excise taxes for high-calorie food for region 2 due to its lower marginal effect from a higher tax pressure. Third, excise tax revenues should be earmarked for budgetary purposes, therefore revenues must be allocated to alleviate negative externalities. In the present those revenues are not earmarked for destination on the use to fight health problems (diabetes, lung cancer, addictions, among others).

Conclusions

The purpose of excise duties is to reduce the externalities caused by the consumption of goods such as high-calorie food, alcohol, tobacco and gasoline. Excise taxes have become more relevant in the context of lower oil revenues. Our study estimates excise tax elasticities and its marginal effects in tax pressure, for five category of products along the quantiles of population. Calculations were made for the northern border and the rest of the country as well.

Findings reveal that excise taxes appear to be inelastic as expected. In some categories, a higher response of consumption in the basket were found in quintile 1 (the poor) with respect to quantile 5, being tobacco an exception, where the tax burden grows more in region 1.

An excise tax increase will discourage the consumption of the poorest groups especially on high-calorie food, alcohol, gasoline and diesel in greater proportion than the richer quintiles as the elasticities are more negative. Tobacco and alcohol have a tax pressure at the expense of the poorest. This suggest that higher excise taxes do not necessarily imply a greater burden for the richest on tobacco in region 1, where indirect taxation could affect more to lower quantiles since their consumption is not affected by higher taxes on tobacco.

According to the tax pressure, despite the pattern found from elasticities, we confirm that the poor are baring a greater pressure as higher marginal changes are observed in lower quintiles, particularly for tobacco and alcohol in both regions, as well as the high-calorie food in the region 2 (rest of the country); meanwhile, gasoline and diesel shows the opposite trend, that is, more progressive whereas the same condition happens in both areas.

In order to mitigate negative externalities for the poor (i.e., obesity, diabetes, lung cancer, alcoholism) among others such as environmental pollution, our study suggest that Mexican government should give more importance to allocate excise tax revenues, so that those resources can be targeted to its precise purpose to correct those externalities. Taxation policies exert a regressive effect in detriment of the poorest, as long as fiscal policy yield a limited impact from excise taxes, causing insufficient public funds as well as slightly effects on the negative externalities, due to the distorting nature of the budgeting process in the political Mexican arena.

References

Alemán-Mateo H., López-Teros, M. Urquídez-Romero R., & Huesca-Reynoso, L. (2018). Prevalence of metabolic syndrome and its determinants in older Mexican non-diabetic adults. *Nutrición Hospitalaria,* 35(2), 294-304. http://dx.doi.org/10.20960/nh.1518

Antón-Sarabia, A., & Hernández-Trillo, F. (2014). Optimal gasoline tax in developing, oil-producing countries: The case of Mexico. *Energy Policy*, 67, 564-571. https://doi.org/10.1016/j.enpol.2013.11.058

Asensio, J., Matas, A., & Raymond, J. L. (2003). Petrol expenditure and redistributive effects of its taxation in Spain. *Transportation Research Part A: Policy and Practice*, 37(1), 49-69. https://doi.org/10.1016/S0965-8564(02)00005-8

Bird, R. M., & Smart, M. (2016). Taxing consumption in Canada: Rates, revenues, and redistribution. Available at: https://ssrn.com/abstract=2747459 o http://dx.doi.org/10.2139/ssrn.2747459

Chernick, H., & Reschovsky, A. (1997). Who pays the gasoline tax?. *National Tax Journal*, 50(2), 233-259. Available at: https://www.jstor.org/stable/41789255

Dahl, C., & Sterner, T. (1991). Analysing gasoline demand elasticities: a survey. *Energy economics,* 13(3), 203-210. https://doi.org/10.1016/0140-9883(91)90021-Q

Economic Commission for Latin America and the Caribbean [ECLAC] (2016), *Economic Survey of Latin America and the Caribbean 2016: The 2030 Agenda for Sustainable Development and the challenges of financing development,* CEPAL LC/G.2684-P, Santiago. Available at: https://repositorio.cepal.org/handle/11362/40327

ENIGH (2016). Encuesta Nacional de Ingresos y Gastos de los Hogares 2016. Microdata. Available at: http://inegi.org.mx

Escario, J. J., & Molina, J. A. (2000). Estimating anticipated and nonanticipated demand elasticities for cigarettes in Spain. *International Advances in Economic Research*, 6(4), 782-793. https://doi.org/10.1007/BF02295388

Jimenez-Ruiz, J. A., Sáenz de Miera, B., Reynales-Shigematsu, L. M., Waters, H., & Hernandez-Avila, M. (2008). The impact of taxation on tobacco consumption in Mexico. *Tobacco control,* 17(2), 105-110. http://dx.doi.org/10.1136/tc.2007.021030

Kaldor, N. (1964). Las reformas al sistema fiscal en México. *Comercio Exterior*, 14(4), 265-267. https://doi.org/10.1136/tc.2007.021030

Llamas, L., & Huesca, L. (2016). Impacto redistributivo de la reforma fiscal en contribuyentes y las finanzas públicas en México. *Finanzas Públicas*, 9(21), 189-242. https://doi.org/10.13140/rg.2.2.15839.25760

Marquezine, G. F., Oliveira, C., Pereira A., Krieger, J., & Mill, J. (2008). Metabolic syndrome determinants in an urban population from Brazil: social class and gender-specific interaction. *International journal of cardiology*, 129(2), 259-265. https://doi.org/10.1016/j.ijcard.2007.07.097

Peck, R. M. (2013) Economics of Tobacco Toolkit, Tool 6: Equity Issues, Tobacco and the Poor, World Bank, Washington, DC. © World Bank. Available at: https://openknowledge.worldbank.org/handle/10986/16265

Poterba, J. (1989). Lifetime incidence and the distributional burden of excise taxes. *The American Economic Review*, 79(2), 325-330. https://doi.org/10.3386/w2833

Poterba, J. (1991). Is the gasoline tax regressive? *Tax policy and the economy*, 5, 145-164. https://doi.org/10.1086/tpe.5.20061803

Rodríguez-Iglesias, G., Schoj, V., Chaloupka, F., Champagne, B., González-Rozada, M. (2017). Analysis of cigarette demand in Argentina: the impact of price changes on consumption and government revenues. *Salud Pública de México*, 59(1), 95-101. https://doi.org/10.21149/7861

Santos, G., & Catchesides, T. (2005). Distributional consequences of gasoline taxation in the United Kingdom. *Transportation Research Record: Journal of the Transportation Research Board,* 1924, 103-111. https://doi.org/10.3141/1924-13

Sesma-Vázquez, S., Campuzano-Rincón, J. C., Carreón-Rodríguez, V. G., Knaul, F., López-Antuñano, F. J., & Hernández-Avila, M. (2002). El comportamiento de la demanda de tabaco en México: 1992-1998. *Salud Pública de México,* 44, s82-s92. Available at: http://www.scielo.org.mx/pdf/spm/v44s1/a13v44s1.pdf

SHCP (2016). Cifras SAT: Padrón por tipo de contribuyente. Available at: http://www.sat.gob.mx/cifras_sat/Paginas/datos/vinculo.html?page=giipTipCon.html

Walls, M., & Hanson, J. (1999). Distributional aspects of an environmental tax shift: the case of motor vehicle emissions taxes. *National Tax Journal,* 52(1), 53-65. https://doi.org/10.3386/w7059

Warner, K. E. (2014). Death and taxes: using the latter to reduce the former. *Tobacco Control,* 23(1), i4-i6. http://dx.doi.org/10.1136/tobaccocontrol-2013-051079

Waters, H., Sáenz de Miera, B., Ross, H., & Reynales Shigematsu, L. M. (2010). La Economía del Tabaco y los Impuestos al Tabaco en México. Available at: http://www.who.int/fctc/reporting/party_reports/mexico_annex2_economy_of_tobacco_and_taxes_in_mexico.pdf

Appendix

Table A1
Model of consumption and excise-tax elasticities by quintile 2016
(Northern border)

	Quintiles				
Regressions by category	q10	q25	q50	q75	q99
High-Calorie Foods (n=14,469)					
logy_pc	0.529*	0.601*	0.628*	0.631*	0.508*
	(32.13)	(49.86)	(65.54)	(64.87)	(13.16)
logt_1	-0.277*	-0.214*	-0.159*	-0.123*	-0.106*
	(-28.79)	(-30.42)	(-28.32)	(-21.63)	(-4.70)
dchildren	0.0750*	0.0576*	0.0122	-0.0435*	-0.205*
	(2.48)	(2.60)	(0.69)	(-2.43)	(-2.89)
dsize	-0.0593*	-0.0874*	-0.108*	-0.140*	-0.348*
	(-1.97)	(-3.96)	(-6.15)	(-7.87)	(-4.93)
dzone	-0.160*	-0.122*	-0.0963*	-0.0973*	-0.111+
	(-6.02)	(-6.27)	(-6.22)	(-6.19)	(-1.77)
_cons	1.182*	1.120*	1.513*	2.060*	4.770*
	(6.82)	(8.84)	(15.01)	(20.13)	(11.75)
Alcohol (n=1,128)					
logy_pc	0.367*	0.415*	0.516*	0.517*	0.353*
	(9.37)	(11.98)	(18.78)	(20.15)	(2.71)
logt_2	-0.306*	-0.276*	-0.206*	-0.190*	-0.185+
	(-10.27)	(-10.49)	(-9.86)	(-9.76)	(-1.88)
dchildren	0.0939	0.0709	0.0184	0.00783	-0.195
	(1.13)	(0.97)	(0.32)	(0.14)	(-0.71)
dsize	-0.0443	-0.0743	-0.0769	-0.133*	0.227
	(-0.53)	(-1.01)	(-1.32)	(-2.44)	(0.82)
dzone	-0.0834	-0.0319	-0.0482	-0.0992*	-0.0576
	(-1.19)	(-0.51)	(-0.98)	(-2.16)	(-0.25)
_cons	2.589*	2.584*	2.331*	2.857*	5.580*
	(6.15)	(6.94)	(7.90)	(10.37)	(4.00)
Tobacco (n=1,220)					
logy_pc	0.531*	0.535*	0.555*	0.615*	0.369*
	(10.15)	(13.93)	(19.61)	(17.32)	(1.98)
logt_3	-0.169*	-0.211*	-0.178*	-0.146*	-0.286+
	(-4.00)	(-6.82)	(-7.79)	(-5.08)	(-1.90)
dchildren	0.398*	0.272*	0.190*	0.125+	-0.0843
	(3.73)	(3.48)	(3.29)	(1.73)	(-0.22)
dsize	-0.235*	-0.0949	-0.167*	-0.252*	-0.136
	(-2.16)	(-1.19)	(-2.84)	(-3.42)	(-0.35)
dzone	-0.0618	-0.0736	-0.0289	-0.0393	-0.0799
	(-0.72)	(-1.16)	(-0.62)	(-0.67)	(-0.26)
_cons	1.068+	1.190*	1.689*	1.747*	4.749*
	(1.91)	(2.90)	(5.58)	(4.60)	(2.39)
Gasoline & diesel (n=9,508)					
logy_pc	-0.0132	0.0715*	0.159*	0.250*	0.401*
	(-0.91)	(8.38)	(20.75)	(23.52)	(7.38)
logt_4	-0.790*	-0.686*	-0.581*	-0.500*	-0.387*
	(-61.80)	(-91.51)	(-86.15)	(-53.51)	(-8.12)
dchildren	0.0259	0.0113	0.0236*	0.0226	0.0457
	(1.15)	(0.86)	(2.00)	(1.38)	(0.55)

dsize	-0.0741*	-0.0694*	-0.109*	-0.153*	-0.277*
	(-3.24)	(-5.18)	(-9.01)	(-9.17)	(-3.26)
dzone	-0.0567*	-0.0374*	-0.000215	-0.0113	-0.203*
	(-2.81)	(-3.16)	(-0.02)	(-0.77)	(-2.69)
_cons	4.952*	4.763*	4.546*	4.251*	4.364*
	(36.35)	(59.60)	(63.31)	(42.69)	(8.60)
Others (n=10,856)					
logy_pc	0.432*	0.486*	0.483*	0.483*	0.379*
	(18.38)	(30.93)	(39.46)	(42.63)	(8.46)
logt_5	-0.381*	-0.340*	-0.298*	-0.269*	-0.192*
	(-20.08)	(-26.79)	(-30.10)	(-29.41)	(-5.31)
dchildren	0.170*	0.128*	0.0649*	0.0212	-0.167*
	(4.56)	(5.13)	(3.35)	(1.18)	(-2.35)
dsize	-0.0252	-0.0440+	-0.107*	-0.142*	-0.202*
	(-0.68)	(-1.78)	(-5.53)	(-7.97)	(-2.87)
dzone	-0.116*	-0.0933*	-0.0613*	-0.0811*	-0.0732
	(-3.59)	(-4.32)	(-3.65)	(-5.22)	(-1.19)
_cons	1.948*	2.014*	2.675*	3.223*	5.691*
	(8.37)	(12.95)	(22.07)	(28.77)	(12.84)

Note: t statistics in parentheses, $^{+} p < 0.10$, $^{*} p < 0.05$
Source: Authors' estimations using ENIGH, 2016.

Table A2
Model of consumption and excise-tax elasticities by quintile 2016
(Rest of the country)

	Quintiles				
Regressions by category	q10	q25	q50	q75	q99
High-Calorie Foods (n=42,219)					
logy_pc	0.528*	0.583*	0.631*	0.639*	0.510*
	(53.21)	(87.33)	(107.63)	(107.78)	(17.33)
logt_1	-0.300*	-0.236*	-0.177*	-0.135*	-0.0785*
	(-47.65)	(-55.66)	(-47.64)	(-35.84)	(-4.20)
dchildren	0.0468*	0.0345*	-0.00275	-0.0320*	-0.125*
	(2.53)	(2.76)	(-0.25)	(-2.89)	(-2.28)
dsize	-0.0841*	-0.100*	-0.145*	-0.189*	-0.362*
	(-4.56)	(-8.05)	(-13.30)	(-17.11)	(-6.61)
dzone	-0.109*	-0.0581*	-0.0443*	-0.0215*	0.0259
	(-6.44)	(-5.10)	(-4.43)	(-2.13)	(0.52)
_cons	0.827*	0.955*	1.190*	1.734*	4.607*
	(8.16)	(13.97)	(19.85)	(28.60)	(15.30)
Alcohol (n=2,321)					
logy_pc	0.403*	0.473*	0.512*	0.522*	0.530*
	(11.22)	(19.08)	(24.04)	(23.42)	(5.76)
logt_2	-0.343*	-0.259*	-0.227*	-0.193*	-0.123*
	(-14.67)	(-16.08)	(-16.44)	(-13.33)	(-2.05)
dchildren	-0.0595	-0.0260	-0.0643	-0.0798+	0.00488
	(-0.78)	(-0.50)	(-1.43)	(-1.70)	(0.03)
dsize	0.127+	-0.0206	-0.101*	-0.183*	-0.491*
	(1.68)	(-0.40)	(-2.27)	(-3.92)	(-2.54)
dzone	0.00573	-0.0474	-0.0420	-0.00930	-0.179
	(0.09)	(-1.03)	(-1.06)	(-0.22)	(-1.05)
_cons	1.704*	1.947*	2.197*	2.737*	4.385*
	(4.59)	(7.60)	(9.99)	(11.89)	(4.61)

Tobacco (n=2,629)					
logy_pc	0.389*	0.511*	0.581*	0.583*	0.609*
	(7.97)	(18.11)	(27.19)	(26.26)	(9.04)
logt_3	-0.272*	-0.175*	-0.165*	-0.148*	-0.188*
	(-7.47)	(-8.31)	(-10.32)	(-8.94)	(-3.74)
dchildren	-0.0124	-0.0189	-0.00819	-0.0487	-0.0124
	(-0.13)	(-0.34)	(-0.19)	(-1.11)	(-0.09)
dsize	-0.0235	-0.0736	-0.136*	-0.200*	-0.272*
	(-0.24)	(-1.32)	(-3.23)	(-4.58)	(-2.05)
dzone	-0.0228	-0.0646	-0.0816*	-0.0150	0.0399
	(-0.27)	(-1.30)	(-2.17)	(-0.38)	(0.34)
_cons	1.716*	1.635*	1.508*	2.034*	2.624*
	(3.39)	(5.58)	(6.81)	(8.84)	(3.75)
Gasoline & diesel (n=21,599)					
logy_pc	0.000919	0.112*	0.202*	0.274*	0.377*
	(0.09)	(16.96)	(34.64)	(38.93)	(8.40)
logt_4	-0.745*	-0.624*	-0.511*	-0.424*	-0.343*
	(-84.83)	(-114.14)	(-106.00)	(-72.60)	(-9.23)
dchildren	0.00289	0.00300	-0.00282	-0.0164	-0.0972
	(0.17)	(0.29)	(-0.31)	(-1.47)	(-1.37)
dsize	-0.0685*	-0.0937*	-0.132*	-0.188*	-0.358*
	(-3.98)	(-8.75)	(-13.98)	(-16.41)	(-4.91)
dzone	-0.0560*	-0.0218*	-0.0125	0.00494	-0.0558
	(-3.49)	(-2.19)	(-1.43)	(0.46)	(-0.82)
_cons	4.948*	4.581*	4.430*	4.369*	4.939*
	(49.53)	(73.69)	(80.84)	(65.82)	(11.68)
Others (n=35,302)					
logy_pc	0.372*	0.440*	0.494*	0.497*	0.425*
	(27.46)	(49.97)	(69.56)	(67.82)	(13.84)
logt_5	-0.475*	-0.398*	-0.343*	-0.295*	-0.244*
	(-42.34)	(-54.58)	(-58.36)	(-48.61)	(-9.62)
dchildren	0.164*	0.134*	0.0830*	0.0377*	-0.0322
	(7.61)	(9.57)	(7.34)	(3.23)	(-0.66)
dsize	-0.0459*	-0.108*	-0.124*	-0.174*	-0.318*
	(-2.13)	(-7.73)	(-11.00)	(-14.88)	(-6.51)
dzone	-0.145*	-0.105*	-0.0986*	-0.0636*	-0.0878+
	(-7.33)	(-8.15)	(-9.50)	(-5.94)	(-1.96)
_cons	2.049*	2.106*	2.234*	2.815*	5.005*
	(15.62)	(24.67)	(32.49)	(39.64)	(16.83)

Note: t statistics in parentheses, $^+ p < 0.10$, $^* p < 0.05$
Source: Authors' estimations using ENIGH, 2016.