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Tax-benefit incidence of value added tax on food and medicine to fund progressive social expenditure

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Abstract

In 2009, the Mexican Congress received a proposal of a generalized 2% increase in the statutory VAT rate, including currently untaxed food and medicine. Whereas opponents emphasized the regressive effect, supporters argued that progressivity of the compensatory expenditures included in the bill more than compensated the bottom income quintiles. In this paper I present a tax-benefit incidence of this proposal using national survey data on household's income and consumption. Despite the regressive effect of the tax increase, the data shows that the progressive expenditure offsets this effect. Overall the proposal was progressive. This finding undermines the arguments in favor of keeping food and medicines exempt of VAT to prevent a regressive effects. This result also contributes to the debate about the regressive effects of a single VAT to all consumption and no exemptions. To illustrate that, I analyze the redistributive effect of this policy. The result is that the increase in public expenditure can offset the regressive effect of this policy.

Keywords: Value added tax, tax-benefit incidence.
JEL Classification: H20, H22, H27.

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INTRODUCTION

Latin America is the most unequal region in the world with an average Gini coefficient of 0.51—well above the world average of 0.41. This has led Latin American governments to pursue income redistribution as one of the main goals of tax and expenditure policy.[1] Mexico is not the exception to this rule, with a Gini coefficient of 0.48, [2] the Mexican federal government has been struggling to reduce income inequality with a broad social expenditure agenda.

Despite substantial progress to reduce income inequality a considerable income gap between rich and poor households still persists.[3] The top decile earns 37.62% of total pre-tax income whereas the bottom percentile only 1.22% (Table A.1, column A). Congress has been interested in the contribution of taxes and expenditure to narrow down this gap to the point that every year requires the Minister of Finance a report on this matter.[4]

For that reason, equity is one of the main criteria in the evaluation of any tax reform. Despite the importance of this normative principle, no serious analysis has been carried out upon its approval in the Mexican congress. Instead, tax reform proposals have been labeled as progressive or regressive base on a first appearance and its approval. On example of this is the 2009 tax reform proposal, referred as Poverty Tax Act (*Iniciativa de Ley de la Contribucion para el Combate de la Pobreza*). The proposal consisted in removing the current Value Added Tax (VAT) zero-rating on food and medicines with a 2% tax in order to expand a broad social expenditure agenda. The federal government goals were to increase the federal government revenue and to increase the progressivity of the combined effect of fiscal and expenditure policy. Congress rejected it considering the regressive effect of taxation without considering the progressive effect of the social spending expansion.

Despite the proposal represented a substantial fraction of resources (0.6% of GDP), no study has analyzed the redistributive effect on income distribution. In this paper I provide preliminary evidence of the reform's redistribution impact based on national survey data on

[1] For instance, Garcia and Salvato (2005) for Venezuela, Gasparin (1999) for Argentina and Haughton (1999) in the case of Peru. In all these papers the finding is that government intervention is progressive

[2] ENIGH (2008). Gini coefficient of the reconstructed pre-tax income. See footnote 1 in Table 1.

[3] It is remarkable the effort made by social programs like Progresa -Oportunidades. According to Corbacho and Schwarts (2000) the Gini coefficient in Mexico in 1992 was 0.57.

[4] The report prepared by the Minister of Finance every year is *Distribución del pago de impuestos y recepción del gasto publico por deciles de hogares y personas*. From here on I refer this as Minister of Finance (2010).

household income and consumption from Encuesta Nacional de Ingreso y Gasto de los Hogares (ENIGH). The estimation is mainly focused on the final effect on the imputed income net of taxes and expenditure. The main result of my paper is that the proposal was indeed progressive: the regressivity of the 2% VAT on food and medicines is compensated by the expenditure package proposed: mainly a increase in education and the expansion of social programs like Oportunidades, a program that assists 25 million of low-income people with conditional cash-transfers to promote school attendance and medical checkups.

The contribution of this paper is that it is the first tax-benefit analysis of this proposal. This is importance considering that the tax on food and medicines is one of the alternatives in the current tax reform debate. The main lesson is that the regressive tax increase on food can be offset by progressive expenditure expansion. This result gives political leverage as most of the opponents based their argument on the lack of compensatory mechanisms to mitigate the regressive effects. Likewise, this paper gives insights about future development in Mexican tax policy debate of broaden the VAT base removing all the current exemptions.

In the first section, I show in detail the 2009 proposal: the tax increased and expenditure expansion proposed. In the second section, I describe the methodology, definitions and the data used in the tax benefit incidence analysis. In the third section, I present the results of the analysis starting with the tax incidence of the VAT on food and medicines and then I proceed to analyze the expenditure (benefit) incidence of the proposed compensatory expenditure. In the fourth section, I set the guideline of a more extensive reform pursing the tax rate harmonization and finally and in the last section I show my main conclusions.

1. The Value Added Tax and the 2009 Presidential Reform.

Since the nineties, the Mexican federal government has not generated enough tax revenue to cover the expenditure programs. On one hand, the government largely relies on oil revenue from the state-owned company *Petroleos Mexicanos* (PEMEX). This source of revenue has been declining due to the exhaustion of Cantarell, the main offshore oil field in the Gulf of Mexico. Indeed since 2000, national oil production has been falling to the point that in 2010 it was 14 percent below the 2000 levels: half a million barrels less.[5] On the other hand, the federal

[5] http://www.shcp.gob.mx/sitios/UnidadCSV/Documentos/index.html.

government non-oil tax revenue increase has not been enough to compensate this shortfall. The problem is that exemptions and loopholes that drastically reduce the potential income and consumption tax revenue. For instance, the Value Added Tax (VAT) revenue (3.7 percent of GDP), is below countries with lower GDP per capita, e.g. Bolivia (5.6) or Colombia (6.3) or Ecuador (6.4). [6]

The low VAT revenue is due to the differentiated VAT rates leave out a significant share of consumption untaxed. In 2009, there were three VAT rates: a 15% rate for general consumption, a reduced border VAT 10% [7]and zero rates for food and medicine. Additionally, other goods like transportation, medical services, books, magazines and rent payments, etc. were exempted of the VAT[8]. The zero-rating on food accounts for most of tax revenue forgone due to exemptions as it represents a fiscal expenditure of 10 billions USD (1.1 percent of GDP).[9]

For that reason, one of the strategies to increase the non-oil tax revenue has been to increase the VAT on food and medicines pursuing a harmonization of the VAT to a single rate with no exemptions. The 2009 proposal was a first step towards this direction as it increased 2% the VAT rate on all consumption. This implied an increase of the statutory VAT rate from 15% to 17% for most of the goods and a 2% VAT on food and medicine.[10]

The proposal faced strong opposition in Congress based on concerns about the regressive effect on the poorest households. People at the bottom of the income distribution spend 44.3% of their income on food and medicine whereas those at the top spend 15.7%.[11] The main fear was that an increase of the VAT on these products would result in poor households bearing the largest tax burden increase. The proposal was controversial to the point that Congress only authorized an increase of 1% in the statutory rate but keeping food and medicine untaxed at the current zero VAT rate.[12]

[6] Barreix (2007).
[7] REPECOS *Regimen de Pequeños Contribuyentes* and a reduced VAT rate (10%) in the Border Strip with the USA and Guatemala.
[8] The main difference between zero vat and exempt good is it classification in the law. In terms of its budgetary impact, both categories represent fiscal expenditure.
[9] http://www.shcp.gob.mx/INGRESOS/Ingresos_pres_gasto/presupuesto_gasto_fiscales_2010.pdf
[10] Presidencia de la Republica (2009).
[11] ENIGH (2008).
[12] In 2010, the VAT increased to 16% for the previously 15% VAT and to 11% in the border strip with the USA and Guatemala.

Despite the regressive effect of taxation, the federal government argued that the final effect on households' disposable income was progressive due to an expansion of progressive taxation that would compensate low-income households. The federal government estimated that the reform would generate 71 billions pesos (USD 5 billion or 0.6% of GDP) that were going to fund social expenditure to mitigate the regressive effects of the tax increase. The expenditure announced, shown in detail in Table 1, was distributed among: cash-in kind transfer programs under the *Programa de Apoyo Alimentario and Desarrollo Humano Oportunidades* (39%), Education: Scholarships through *Oportunidades* and Public School programs (34%) and Health: an extension of the *Seguro Popular* and other programs (27%) a health program focused on low income people.

Table 1. Expenditure proposal as compensatory mechanism

	Concept	Millions pesos	%
	Total	**71,775**	**100%**
I	**EDUCATION**	**24,492**	**34%**
	Scholarships Oportunidades	***19,711***	***27%***
	Oportunidades Componente Educativo	18,921	26%
	Programa Albergues Escolares Indigenas	789	1%
	Investment in Public Schools	***4,781***	***7%***
	Consejo Nacional Fomento Educativo	4,571	6%
	Programa Infraestructura Basica atencion Pueblos Indigenas	210	0%
II	**HEALTH**	**19,476**	**27%**
	Seguro Popular	18,412	26%
	Programa Comunidades Saludables	115	0%
	Programa Caravanas de Salud	761	1%
	Sistema Integral Calidad Salud	188	0%
III	**CASH- IN KIND TRANSFERS**	**27,807**	**39%**
	Desarrollo Humano Oportunidades	20,043	28%
	Programa Apoyo Alimentario	4,834	7%
	Programa de Empleo Temporal	2,930	4%

Source: Presidencia de la Republica (2009).

Whereas opponents of the proposals based their conclusions on the regressive effects of taxation, supporters did the same based on the progressivity of the expenditure. No study has considered the combined effect of this proposal. In the next section, I introduce the methodology employed and the data that will be used the tax-benefit incidence to determined the reform's final effect on household's income.

2. Tax-Benefit Incidence Analysis: Methodology and Data

The tax benefit incidence analysis assesses government's budgetary effect (taxes and public spending) on the effective distribution of benefits and burdens associated with fiscal policy. The

goal is to answers questions like: Who bears the burden of taxation? Who benefits from public expenditure? How the combined effect of the expenditure benefit and the tax burden affects the income distribution? As starting point, the effect of government taxes and expenditure on households' income decile i can be represented by

$$y_i^{pre-tax} - \tau_i = y_i^{after-tax} + \varepsilon_i^{imputed} = y_i^{disposable} \qquad (1)$$

Where:

$y_i^{pre-tax}$	is the pre-tax income
τ_i	is the tax paid
$y_i^{after-tax}$	is the after-tax income
$\varepsilon_i^{imputed}$	is the imputed expenditure benefit
$y_i^{disposable}$	is the final imputed disposable income net of taxes and expenditure

The budgetary impact is the resulting difference between the pre-tax income distribution and the imputed disposable income net of taxes and expenditure that is households' available resources for consumption. Ideally, the budgetary impact should consider not only the change in allocation, changes in taxes and expenditure paid by each household, but also how households react towards this change. Ideally, the pre-tax income distribution is such that would have taken place in the absence of taxes and expenditure as well as the behavioral responses to them. Nevertheless, this distribution is unobservable and its estimation requires a general equilibrium, an analysis beyond the scope of this paper given data restrictions and the complexity of these behavioral responses. In this paper I used a reconstructed pre-tax given that the survey data reports the after-tax income. [13]

In this paper, a tax benefit analysis focuses on the allocation change leaving the behavioral response as a separate problem. As Poterba (2007) mentions, in any tax change there are two effects in the income distribution that should be considered. The first one is the redistributive impact of taxes themselves given a pre-tax income distribution, this effect is the one presented in this paper. The second effect is from changes in the pre-tax distribution due to

[13] The adjustment was done with the following procedure. First, I adjusted households aggregate demand reported in the System of National Accounts to the total autonomous income reported in the survey data.[13] Second, I subtracted the imputed taxes paid and expenditure received by income decile using the federal government balance sheet and the tax burden and benefit received reported distribution reported by the Minister of Finance.

behavioral responses. This is not captured by static analysis and its implications are not trivial. However, the inclusions of these effects require information that is not available in almost any country. The incorporation of the behavioral response requires the construction of theoretical models that goes beyond the scope of the tax benefit incidence analysis.

Instead, the tax benefit incidence analysis is based on simplifying assumptions that allow the quantification of the redistributive impact of taxation and expenditure. The computation is focused on the regressivity of the tax increase vs. the progressivity of the expenditure. In other words, how the VAT tax on food and medicines and the expenditure increase modify the economic incidence of government on income distribution.

The departing point of this analysis is the pre-reform scenario, in the absence of VAT on food and medicines. Regarding federal taxes, the first section of Table A.1 in the appendix shows that the tax burden distribution, defined as tax payments as a fraction of income, is progressive as the tax burden increases with income (column C). The progressivity of the tax system leads to a reduction of the Gini coefficient from 0.482 of the pre-tax income distribution to 0.475 of the after tax income. Nonetheless, the second section of this table shows that the main redistribution is made through government expenditure as the bottom deciles receive the largest fraction of expenditure (column E). These expenditure transfers have a significant impact on income at the bottom of the distribution as in some cases they represent more than 100% of the after tax income (column F). The progressivity of the expenditure translates into a substantial reduction in potential consumption inequality, as the Gini coefficient of imputed income net of taxes and expenditure drops to 0.421 (column G).

The income distribution in Table A.1 is the benchmark to assess the impact of the reform. The first step of the analysis is the estimation of the tax incidence of the VAT on food and medicines $\Delta\tau_i^{VAT}$ on the tax burden distribution and the change in the after-tax income distribution.

$$y_i^{pre-tax} - (\tau_i + \Delta\tau_i^{VAT}) = \left(y_i^{after-tax}\right)^{Post-reform} \quad (2)$$

The second step is to analyze the effect that the expenditure increase $\Delta\varepsilon_i^{increase}$, using the proceeds of taxation, has on the expenditure distribution.

$$\left(y_i^{after-tax}\right)^{Post-reform} + \left(\varepsilon_i^{imputed} + \Delta\varepsilon_i^{increase}\right) = \left(y_i^{disposable}\right)^{Post-reform} \quad (3)$$

As an illustrative example, I also show the marginal effect of the reform isolating it from the rest of taxes. That is for every peso taxed and spent through this reform what fraction is paid and received by each income decile. Given that a conventional tax incidence analysis does not consider behavioral responses to the VAT on food does not the incidence of the other taxes remains constant as the as household's consumption. Under these assumptions, the change in disposable income is the resulting net transfer between the additional spending minus the increase of the VAT burden defined as:

$$\left(\Delta y_i^{disposable}\right) = \Delta \varepsilon_i^{increase} - \Delta \tau_i^{VAT} \qquad (4)$$

2.1 Tax incidence methodology

The first step is to assess the distribution of the tax payments τ_i Although the law is explicit about who has to pay the taxes, *statutory incidence*, generally who ultimately bears the tax burden is different, *economic incidence*. Tax incidence analysis has been an important area in Public Finance since the seminal works of Musgrave et al. (1951) and Pechman and Okner (1974).[14] The existing literature has used conventional assumptions to facilitate the computation of the burden and it distribution. In this paper I will follow the conventional assumptions listed by Anwar and Whalley (1991) in studies for developing countries.

The starting point is the estimation of the tax burden. Taxes usually impose excess burdens on consumers: deadweight loss. On the efficiency ground the size of the burden is relevant to analyze the welfare loss due to the tax, however given that tax incidence analysis is focused on the equity impact of the tax (tax incidence) and not the efficiency impact (excess burden losses), a conventional assumption is that the total tax burden coincides with the tax revenue collected (tax burden assumption).

Similarly, I am assuming that the entire tax burden is shifted from producers to consumers (shifting assumption). I assume that households pay the statutory rate of 15% on the taxable consumption and no tax on the exempted VAT goods.[15] Although some authors like Stern (1987), have pointed out that estimation of the tax burden requires an estimation of the distribution between consumer and producer based on the elasticities of supply and demand, the information

[14] See Nssah (2008) and Martinez Vasquez (2001) for a literature review.

[15] Some authors have assumed that households pay a fraction of VAT incorporated in the production of food or medicine. For instance, Vargaz Telles (2009) assumes that households pay half of the statutory tax rate.

provided by survey on households consumption is not enough for such calculations as the survey only gives the amount of money spent without separate prices and quantities. [16] As in the standard tax incidence analysis, the tax burden and the shifting assumptions allow the computation without any explicit estimation of the estimation of elasticities of demand or supply.

The second step in the tax incidence analysis is to allocate the tax burden among different income deciles. I use national consumption data from Encuesta Nacional de Ingreso y Gasto de los Hogares (ENIGH 2008). The survey covers 35,000 households with consumption information representative at the national level. For analytical purposes I use households' monetary consumption with adjusted prices to estimate the tax burdens.[17] Using the categories listed in Table A.2 in the appendix I grouped monetary consumption by VAT category. A summary of this information is shown in Table A.3. The first row of this table shows that 49% of all consumption is taxed at the general rate whereas the rest is either exempted or zero-rated. This is the main reason why the VAT base is so small. Just food consumption represents 24% of all monetary consumption whereas medicine 1%.

Table A.3 also shows the distribution of monetary expenditure by income decile. In the case of goods taxed at the general rate and exempted goods (like transportation, education services, rent and medical services) the top deciles spend a larger fraction of their consumption than households at the bottom of the distribution (columns A and B). In contrast, the opposite trend is observed in the case of the zero-rated food and medicines. In this case: the poorer the household the bigger the share of total consumption spent on these goods (column C). In the case of food, difference is remarkable as the share allocated by households at the bottom of the distribution is three times the share allocated by households at the top (column C1). As I will show in the following section, this consumption structure implies the progressive distribution observed in the VAT burden distribution.

I use the consumption distribution to adjust the aggregate consumption data reported in the System of National Accounts and the aggregate tax revenue. This is important to capture how

[16] If q is the consumer price and the consumer is given p=(q-t), the effect of the tax on consumer prices will be given by $\eta/(\eta+ \varepsilon p/q)$ where η and ε are respectively the elasticities of supply and demand.

[17] The survey provides consumption at market value (VAT is included in the price). Therefore it is necessary to estimate the VAT paid adjusting consumption first. Following Vargaz Telles (2009), the VAT paid by the family i for the jth good is $T_{ij}=t_j b_j d_{ij}$, where t_j is the VAT rate, b_j is the price given by the producer and d_{ij} the units demanded. Given that the total expenditure reported in the survey g_{ij} is defined by $g_{ij}=b_j d_{ij} + T_{ij}$ thus $b_j d_{ij} = g_{ij}-T_{ij}$ which combined with the definition of T_{ij}, yields $T_{ij}=t_j(g_{ij}-T_{ij})$ and rewriting $T_{ij}=[t_j/(1+t_j)]g_{ij}$.

the change in the VAT distribution affects the overall progressivity of the federal taxes. As mentioned earlier, in the analysis of the reform I am not considering any change in the rest of the taxes. For that reason I use the estimation of the Minister of Finance (SHCP) for the computation of the tax burden distribution of the rest of federal taxes: income tax, social security payroll tax, excise taxes (tobacco and alcohol and gasoline, etc.), car property tax (tenencia) and brand-new tax.[18]

2.2 Benefit incidence methodology

A central issue in this paper is if the expenditure progressivity included in the reform proposal can compensate the regressive effect o taxation. Evidently this depends on the public expenditure effect on households after tax income. However, given its heterogeneous nature of government spending, requires valuation assumptions that allow the calculation. In principle, this is a challenge as how can we assess the effect of a new school or the improvement of health due vaccination campaigns on households' income? Whereas it is easier to measure cash transfers, it is more difficult to measure the benefit accruing from public and private goods provided by government: e.g. expenditure on health, education, etc. Usually we do not have market prices or information about the value of such services. Even if we had markets for certain goods, as Martinez Vazquez (2008) suggest, given that their supply is monopolized by the State, the price would not reflect the marginal benefit to consumers. For these reasons, the standard assumption in the literature, and followed in this paper, is that the benefit of the public expenditure is given by the cost of provision paid by government.

Following Nssah (2008), Sehili et. al (2008) and Demery (2003), imputing the distribution of value of government transfers by the cost of provision requires two steps. The first one is to assess the cost of the public service using the government aggregate data. The second step is to estimate the rate of use of each service by household decile from households' survey data and then derive the distribution of such imputed value. The estimation of the incidence of the expenditure included in the 2009 reform proposal, shown in Table 1, follows this procedure utilizing the methodology published by the Minister of Finance (SHCP).

[18] Minister of Finance (2010).

In the case of the investment on Public Schools, I took the average cost per student estimated by the Minister of Education, Household benefit is determined by the number of children in schooling age reported in the ENIGH (2008). In the case of Scholarships Oportunidades, I used transfers information included in ENIGH (2008) and Minister of Finance (2008). In the case of the expenditure on Health I use the rate of use of the three main health institutions in Mexico: *Instituto Mexicano del Seguro Social* (IMSS), *Instituto de Seguridad Social y Servicios de los Trabajadores del Estado* (ISSSTE) and *Pemex* reported in Minister of Finance (2010). Finally, the cash and in-kind transfers I use the distribution of monetary transfers reported in the income section of ENIGH (2008).

3. Tax-Benefit Incidence Analysis

3.1 The redistribution effect of the VAT increase on zero VAT goods

Based on the methodology shown in the previous section, Table 2 shows the pre and post reform VAT burden distribution by income decile. The first section of the table shows that the VAT is regressive, as the bottom 7 deciles bear a higher burden than their income share (column B), thus the VAT burden as a fraction of pre tax income (column C) is around half for wealthier households respect the ones at the bottom of the distribution.

Table 2. Change in VAT burden distribution

		VAT rate: 15%		VAT rate: 17% (incl. 2% on food and medicines)					
			VAT burden		VAT burden as a fraction of Pre- Tax Income				
Income decile	Pre Tax Income Distribution A	Distribution B	as fraction of Pre Tax Income (%) C	VAT burden Distribution D	Total VAT E=E1+E2+E3	General Rate E1	Food E2	Medicaments and others E3	VAT payment increase (%) F
Total	**100.00**	**100.00**		**100.00**					
1	1.22	2.28	**9.90**	2.49	**12.48**	10.68	1.72	0.08	32.40
2	2.55	3.33	**6.93**	3.56	**8.56**	7.48	1.03	0.06	29.77
3	3.58	4.27	**6.30**	4.49	**7.67**	6.80	0.81	0.05	27.75
4	4.65	5.35	**6.09**	5.56	**7.33**	6.58	0.70	0.04	26.25
5	5.76	6.35	**5.84**	6.56	**6.97**	6.30	0.63	0.04	25.38
6	7.13	7.84	**5.82**	8.01	**6.88**	6.28	0.56	0.04	24.06
7	9.12	9.25	**5.37**	9.36	**6.28**	5.79	0.46	0.03	22.96
8	11.77	11.71	**5.26**	11.70	**6.09**	5.68	0.37	0.03	21.38
9	16.61	17.03	**5.43**	16.77	**6.18**	5.86	0.30	0.03	19.65
10	37.62	32.59	**4.58**	31.50	**5.13**	4.95	0.15	0.03	17.45

Source: ENIGH (2008) .

The rest of Table 2 shows that the generalized increase of the 2% to a 17% general rate and 2% VAT on food and medicines exacerbate the VAT regressivity. Comparing the VAT burden before and after the reform we observe that the share paid by the bottom 7 deciles increases (columns D and B). Regarding the VAT burden as a fraction of pre-tax income, we observe that the 2% increase of zero VAT products is mainly borne by low income households as their tax burden increase is larger than households at the top of the income distribution (columns E and C). In particular, the VAT on food is the most regressive (column E2) as the fraction of the pre tax income paid by the bottom decile represents more than ten times the fraction paid by the top decile (1.72% vs 0.15%). Although with smaller differences, the VAT on medicine and other zero VAT products are also regressive. This regressivity is translated into a disproportional increase of low income households VAT liabilities (column F): 30% for the lower part of the income distribution and 20% for the upper part.

Evidently this regressive effect raises concerns about how the reform modifies the progressivity of the tax system. To illustrate this, Table 3 shows the VAT payments combined with other excise and income taxes.[19]

Table 3. Tax burden distribution and after-tax income distribution

Income decile	Tax burden distribution (%) Pre Reform A	After Reform B	B-A	Total Tax Increase C	After tax income distribution (%) Pre Reform D	After Reform E	E-D	Change in income (% of Pre reform Pre-Tax Income) F
Gini coefficient					**0.475**	**0.476**		
1	1.09	1.34	0.25	35.33	1.23	1.21	-0.02	-2.77
2	1.53	1.85	0.32	33.41	2.64	2.62	-0.02	-1.71
3	2.35	2.67	0.33	25.50	3.69	3.67	-0.02	-1.44
4	3.38	3.70	0.32	20.75	4.76	4.74	-0.02	-1.30
5	4.34	4.66	0.32	18.39	5.88	5.86	-0.02	-1.20
6	5.94	6.23	0.28	15.49	7.23	7.22	-0.02	-1.13
7	8.15	8.32	0.17	12.55	9.21	9.20	-0.01	-0.98
8	11.14	11.18	0.04	10.59	11.83	11.83	0.00	-0.88
9	17.82	17.56	-0.26	8.61	16.50	16.52	0.01	-0.82
10	44.33	42.48	-1.85	5.62	37.02	37.14	0.11	-0.60

Source: ENIGH (2008).

Columns A and B show that the reform reduces the tax burden of the top 2 deciles, in particular for the top decile. This comes from the disproportional tax increase across the income distribution (column C). The bottom decile increases its tax liability seven times more than the top decile: 35.33% versus 5.62% resulting into a larger loss of after-tax income for first groups

[19] That is the personal income tax (ISR) and the excise taxes on tobacco, gasoline and other goods: IEPS (*Impuesto Especial sobre la Produccion de bienes y Servicios)*, automobile taxes (*Tenencia*) and brand new car tax (ISAN).

(column F). Evidently this undermines the progressivity of the tax system shown in Table 1. As the Gini coefficient of the After-tax income slightly increases after the reform is implemented (columns D and E).These results are the main evidence for opponents to the proposal, as the exemption on food prevents a highly regressive VAT. In general, countries that do not have these exemptions tend to have a more regressive VAT.[20] The next question to answer is if the progressivity of the expenditure offets the regressive effect.

3.2 Benefit incidence results

As mentioned in the first section, the federal government proposed to use the proceeds of the tax increase to fund the social programs listed in Table 1. The benefit incidence of each of the programs included in the presidential proposal is highly progressive as a substantial fraction of the expenditure is received by the first three deciles, in particular by the bottom decile. For instance, the bottom decile receives 34% and 33% of the total expenditure on the Scholarship *Oportunidades* and Cash-Kind transfers programs. Although slightly less progressive, the expenditure on health and the investment in public schools also concentrate a substantial fraction on the bottom four deciles. Overall, the compensatory effect of the expenditure proposal combining the programs listed (column E) mostly benefits the bottom three deciles.

Table 4. Incidence of the programs included in the compensatory expenditure

	EDUCATION		HEALTH	CASH-IN KIND	
Income decile	**Scholarship Oportunidades 1/ A**	**Investment in Public Schools 2/ B**	**(Seguro Popular) 3/ C**	**TRANSFERS (Oportunidades) 1/ D**	**TOTAL Distribution E**
1	34.03	18.42	19.85	33.33	28.87
2	18.32	15.66	16.03	18.42	17.56
3	12.57	13.42	11.96	12.72	12.52
4	9.42	11.03	10.69	9.43	9.88
5	6.28	9.56	8.91	6.36	7.24
6	7.33	8.59	8.14	7.24	7.60
7	4.71	7.40	6.62	4.82	5.45
8	3.14	6.53	6.62	3.29	4.37
9	2.62	5.50	6.36	2.63	3.83
10	1.57	3.90	4.83	1.75	2.68

Source: ENIGH (2008), Minister of Finance (2010) and Minster of Education (SEP).

1/ Based on scholarships received from income reported in ENIGH (2008)

2/ I consider the average cost per pupil published by Minister of Education (SEP). I multiply this cost by the attendance to public primary schools by income decile reported in ENIGH (2008).

3/ Based on ENIGH (2008) I consider the number of beneficiaries of Seguro Popular by income decile.

[20] For instance, Engel et al. (1999) show that in Chile, where food is not exempt the VAT is quite regressive.

3.3 Does the expenditure proposed compensate the regressive effect of this policy?

The next question to answer is if the benefit incidence compensates the regressive effect of the tax increase. In order to show the change in disposable income, Table 5 shows the implicit net transfer per 100 pesos collected and spent by this reform, as defined in equation 4. The marginal net transfer is computed considering the expenditure distribution (column A), distributed according to the distribution shown in Table 4, minus the distribution of the VAT burden increase (column B). The tax burden increase includes the 2% on food and medicaments plus the additional 2% in all the consumption taxed at the general rate.

Table 5. Expenditure distribution per peso collected and spent in the proposal

Income decile	Proposal's Expenditure Distribution 1/ A	VAT Increase Distribution 2/ B	Net Transfer A-B	Federal Govt Expenditure Distribution 3/ C	Net Transfer C-B	Combined Expenditure 80% Proposal + 20% States Expend. D=80% B + 20% C	Net Transfer D-B
	100.00	**100.00**		**100.00**		**100.00**	
1	28.87	3.45	25.43	11.80	8.35	25.46	22.01
2	17.56	4.62	12.94	10.50	5.88	16.15	11.53
3	12.52	5.52	7.00	10.00	4.48	12.01	6.50
4	9.88	6.54	3.34	9.80	3.26	9.86	3.32
5	7.24	7.50	-0.26	9.40	1.90	7.67	0.17
6	7.60	8.78	-1.19	10.50	1.72	8.18	-0.61
7	5.45	9.89	-4.44	10.00	0.11	6.36	-3.53
8	4.37	11.65	-7.29	10.00	-1.65	5.49	-6.16
9	3.83	15.58	-11.75	8.90	-6.68	4.84	-10.74
10	2.68	26.47	-23.79	9.10	-17.37	3.97	-22.50

Source: ENIGH (2008) and Minister of Finance 2010.

1/ Following the expenditure distribution of column E in Table 6.

2/ Given that this table only consider the tax and expenditure at the margin, I am only considering the distribution of the tax burden increase. Note that this is different to the new VAT burden distribution show in Table 3 where I consider not only the 2% increase.

3/ As published in Minister of Finance (2010). This distribution is estimated using the same metothology that I am using in column A.

The resulting net transfers are shown in column A-B. The first decile ends up with a positive transfer of 25.43 pesos, as it receives 28.87 pesos through public expenditure and only pays 3.45 pesos of VAT. On the other side, the top decile ends up with a negative transfer of 23.79 pesos (it just receives 2.68 pesos and pays 26.47 pesos). Considering the net transfers throughout the income distribution, the government proposal redistributes income from the upper half to the bottom half of the income distribution getting a quasi-symmetric structure of transfers: note that the positive net transfer of the bottom decile equals the negative net transfer of top deciles. Overall, the combined policy is progressive as the government offsets the regressive effect of the taxation with the expenditure proposal.

Table 5 also shows other possible scenarios once the reform was approved. One concern is that the federal government, instead of expending the additional revenue in the programs included in the presidential proposal, simply expands the federal expenditure (column C). In this case the resulting net transfer (column C-B) , the expenditure is less progressive the resulting net transfers redistribute income from the top three deciles to the rest of the distribution. Notice that in this case the redistribution from the top deciles to the bottom deciles is not as large but the redistribution is still progressive.

Another possibility is that the federal government cannot fully spend the additional revenue. This case is possible because given the fiscal laws 20% of the federal non oil tax revenue is directly transferred from the Federal Government to the States, being the latter who decide how to use these funds. Therefore the compensatory expenditure would not mach the amount taxed through the VAT increase. The last two columns in Table 5 consider this case. Given the lack of information about the distribution of state governments' expenditure, I assume that the 20% spent by the state governments has the same distribution as the federal expenditure shown in column C. The remaining 80% is assumed to be spent in the programs included in the proposal. The resulting net payment (column D-B) shows the same quasi-symmetric structure as in the previous case. The net payment by the top third of the distribution translates into net benefit to the bottom third. Thus, the data suggest that even if the federal government does cannot use all the funds in the expenditure proposal, the combined effect is progressive.

3.4 How the reform affects federal fiscal policy income redistribution?

The next question to answer is how the redistributive capacity of the government is modified by the reform? Based on equations 2 and 3, Table 6 shows the effect of this policy on imputed disposable income. On one side, as shown in Table 4, there is the regressive effect of the reform in the total tax burden distribution, the VAT combined with the rest of the taxes. For easier comparison, I repeat this change in Table 6 (column B-A). As mentioned previously, the reform reduces the tax burden distribution of the top two deciles and increases the burden of the rest of the distribution, in particular, from the second to the sixth decile. On the other side, Table 6 also shows the progressive effect of the additional expenditure of 71 billions in the programs included in the proposal (column D-C). After the reform, the bottom three deciles increase their share of total expenditure.

Table 6. Tax – Expenditure Incidence after Reform

Income decile	Taxes Burden distribution (%) Pre Reform A	After Reform B	Difference (basis points) B-A	Government Expenditure distribution (%) Pre Reform C	After Reform D	Difference (basis points) D-C	Disposable Income distribution (%) Pre Reform E	After Reform F	Difference (basis points) F-E	Change in disposable income (% Pre reform level) G
Gini coefficient							**0.421**	**0.416**		
1	1.09	1.34	0.25	11.80	12.76	0.96	2.34	2.51	0.17	7.42
2	1.53	1.85	0.32	10.50	11.00	0.50	3.46	3.56	0.10	2.93
3	2.35	2.67	0.33	10.00	10.22	0.22	4.35	4.41	0.06	1.34
4	3.38	3.70	0.32	9.80	9.78	-0.02	5.29	5.31	0.02	0.41
5	4.34	4.66	0.32	9.40	9.28	-0.12	6.25	6.25	0.00	-0.01
6	5.94	6.23	0.28	10.50	10.34	-0.16	7.58	7.57	-0.01	-0.08
7	8.15	8.32	0.17	10.00	9.74	-0.26	9.29	9.26	-0.03	-0.32
8	11.14	11.18	0.04	10.00	9.59	-0.41	11.64	11.58	-0.06	-0.51
9	17.82	17.56	-0.26	8.90	8.54	-0.36	15.71	15.62	-0.09	-0.57
10	44.33	42.48	-1.85	9.10	8.69	-0.41	34.10	33.93	-0.17	-0.50

Source: ENIGH (2008)

The combined effect of these two changes on imputed household disposable income shows a symmetric redistribution from the top to the bottom of the income distribution (column F-E). The first four deciles are the only deciles that increase their share of total income, in particular the first two deciles, whereas the main drop is observed for the top decile. In order to consider the magnitude of this redistribution, column G, shows the change in imputed household's resources as a percentage of the pre reform income. The bottom three deciles increase their resources: 7.42%, 2.93% and 1.34% respectively. The fifth and sixth deciles remain unchanged whereas the top three deciles have a decrease of roughly 0.5%. From all these changes, the imputed resource improves as the Gini coefficient decreases from 0.421 to 0.416. Thus, the tax benefit incidence analysis suggests that this policy is progressive.

4. Should Mexico reduce the zero VAT rate to benefit the poor?

From the previous sections, the increase of government expenditure contributes to income redistribution to the point that if offsets the regressive effect of the tax increase. This gives some room for a reform towards a consumption-based system. However, increasing the tax revenue faces several challenges. One of them is the low compliance due to the existing loopholes in the fiscal laws and the big informal sector. From an administrative perspective, indirect taxes like the VAT seem to be easier to collect (in contrast with the income tax and all the deductions). Likewise, given that income taxes do not target households in the informal sector, there is the perception that taxing consumption will reach these households. However, is it not clear that compliance will increase by introducing indirect taxation because, as in the income tax,

taxpayers underreport their transactions in order to avoid the VAT. Despite notable progress made by the Federal Government during the last years the VAT avoidance is still an issue.[21]

Harmonizing the VAT tax rates would reduce the tax expenditure, that is the revenue forgone through VAT zero rates and exemptions. For instance, the zero-rating on food and medicine represents a fiscal expenditure of 1% of the GDP. Despite the potential increase in tax revenue that this measure represents, the question is about the redistributive effect of this reform. In order to answer this question, I simulate the hypothetical situation, where a harmonized Flat VAT rate on all consumption is imposed. In this case all consumption is taxed at 15%, including the zero VAT goods, and the rest of the income and excise taxes remain unchanged. Table 7 shows the implied effect on the tax burden and expenditure distribution. On the taxation side, under the Flat Tax the progressivity of the tax system would be eliminated (columns B and C). Notice that the two top deciles reduce their share of tax burden whereas the rest of the distribution increases it. This reallocation is the result of the disproportional tax increase at the bottom of the distribution (column D): whereas the tax liability of the bottom decile increases 23% the increase of the top decile is just 6.17%. As a consequence the bottom of the distribution experiences the largest fall of the after tax income (column G). The regressivity of this change is reflected by the increase of the Gini coefficient (columns E and F). The after-tax income distribution under the Flat Tax regime (column F) is the same than the Gini of the Pre Tax Income distribution (column A).

Table 7. Change in Incidence due the introduction of a VAT Fair Tax.

		Tax Burden 1/				After Tax Income				Imputed Household's Resources 2/			
Income decile	Pre Tax Income Distribution (%)	Distribution (%) Current	Flat VAT Tax	Tax Increase %		Distribution (%) Current	Flat VAT Tax		% change of After-Tax Income	Distribution (%) Current	Flat VAT Tax		Change as % of Current Level
	A	B	C	C-B	D	E	F	F-E	G	H	I	I-H	J
Gini coefficient	**0.482**					**0.475**	**0.482**			**0.421**	**0.411**		
1	1.22	1.09	2.11	1.02	22.96	1.23	1.11	-0.13	-13.45	2.40	2.64	0.24	9.90
2	2.55	1.53	2.69	1.16	14.91	2.64	2.53	-0.11	-7.56	3.55	3.71	0.16	4.61
3	3.58	2.35	3.46	1.11	12.76	3.69	3.60	-0.09	-6.04	4.47	4.59	0.13	2.81
4	4.65	3.38	4.36	0.99	11.75	4.76	4.68	-0.08	-5.14	5.42	5.52	0.10	1.82
5	5.76	4.34	5.34	1.00	10.94	5.88	5.81	-0.07	-4.78	6.41	6.46	0.05	0.81
6	7.13	5.94	6.71	0.76	10.41	7.23	7.18	-0.05	-4.27	7.77	7.84	0.06	0.81
7	9.12	8.15	8.43	0.29	9.22	9.21	9.21	0.00	-3.57	9.53	9.56	0.03	0.29
8	11.77	11.14	11.49	0.34	8.52	11.83	11.81	-0.02	-3.75	11.94	11.86	-0.08	-0.65
9	16.61	17.82	17.18	-0.64	8.18	16.50	16.54	0.03	-3.40	16.12	15.89	-0.22	-1.38
10	37.62	44.33	38.24	-6.09	6.27	37.02	37.53	0.51	-2.26	34.99	34.52	-0.47	-1.34

Source: ENIGH (2008).
1/ Includes the VAT and the rest of the federal taxes. In the case of the Flat Tax, it is assumed an statutory rate of 15% to all consumption without zero VAT goods.
2/ Government net transfers are the proportional part of expenditure corresponding to that decile. In this case I am not assuming any change in the federal expenditure distribution. This the expenditure is distributes as in Table 1.

[21] Fuentes Castro (2010) estimate a drop in the VAT avoidance from 23.22% in 2000 to 19.79% in 2007.

For determining the impact on households' disposable income I do not consider any change in the expenditure distribution and I assume the same expenditure distribution shown previously. [22] The change on household disposable income distribution (column I-H) shows a progressive redistribution form the top three deciles to the rest of the distribution, in particular for the first three deciles. In terms of percentage change (column J) these deciles would have a percentage increase of the income of: 9.90%, 4.61% and 2.81% respectively whereas people at the two top deciles observe a drop larger than one percent.

This preliminary result suggests that eliminating the zero VAT rate could benefit poor households more than harm them. Thus it could happen that zero rate on food and medicines although prevents the regressive effect of the taxation, it implies a substantially drop in progressive expenditure. After all, it could be possible that poor households would be better off paying the tax and getting back the additional expenditure.

CONCLUSIONS

This paper gives preliminary evidence that the generalize 2% VAT seems to be progressive. The proposed progressive expenditure offsets the regressivity of eliminating the zero VAT rate on food and medicine. The result is important as concerns about the regressivity of consumption taxes do not consider the effect of public expenditures on household's disposable income. This paper gives a glimpse of this debate and suggests that consumption based taxation could be progressive. The extent of these benefits depends on the compensatory mechanisms for the bottom of the distribution. In order to pick the ideal compensatory mechanism, the impact of schooling and health care expenditures and tax compliance across different income groups should be considered.

For future research, several things can be addressed. For instance the quantification of the benefits can be done without following the conventional assumption that the benefit of the public expenditure is given by its cost of provision.[23] The cost of provision does not necessarily represent the improvement in household's welfare. This brings up the issue of the fungibility of

[22] Table 5 (column C).

[23] As mentioned previously, assessing the impact of expenditures presents serious estimation issues, so studies like Martinez Vazquez (2008) Nssah (2008), Sehili et. al (2008) and Demery (2003), Minister of Finance (2010) and Vargas Tellez (2009) follow this assumption.

services provided by government: do household value a dollar spent on health programs or a new school worth the same as cash transfer? This question is essential as governments use taxpayer's money for the provision of public goods and services. For instance, in the expenditure proposal analyzed in this paper, 61% of the new taxes are allocated through education and health services and the rest to money transfers. Thus a correct assessing of the benefits is crucial to determine the compensation of the regressive effect of taxation.

Similarly, the presence of the informal sector is important in a country like Mexico where people at the bottom of the distribution live in rural areas where tax collection is limited. Although the statutory tax rate implies taxing more these groups, it does not mean they will effectively pay more. Low tax compliance among these groups might be a factor in favor of indirect taxation: as low income people in the informal sector do not pay the taxes and get the benefits of the expenditure increase.

Another crucial issue is the static nature of the analysis as no behavioral response is assumed. For instance, conventional studies assume that total tax burdens coincide with the revenue collected by the government. However, as Martinez Vazquez (2001) points out, the final effect in real income might be larger than the actual taxes collected, implying social welfare loses. This evidently depends on the behavioral response. Similarly, a static analysis implies that the change in tax burden is immediate. This overlooks the incorporation of transitional cost that might be relevant for comparing intergenerational welfare redistributions.

The use of a Computational General Equilibrium (CGE) model seems to be the natural next step to incorporate the behavioral responses. The current literature (e.g. Diamond and Zodrow (2005) Auerbach and Kotlikoff (1987) and Altig et. al. (1997) has been focused in evaluating in other different dimensions. For instance, in efficiency ground, the model can test the suggested efficiency gains suggested by Atkinson and Stiglitz (1976) that give no room to consumption tax rates differentiation. Similarly, a CGE model would allow estimating the additional revenue as in the presence of the informal as the revenue gains can not be as large as they seem to be. The shift from the formal to the informal sector can reduce the revenue gains as shown by Ab Iorweth and Whalley (2002).Thus as we can see this debate has a long way to go not only in the political arena but also in the theoretical grounds.

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APPENDIX

Table A.1 The Effects of Taxes and Expenditures on the Mexican Income Distribution

Household Income decile	Pre-Tax Income Distribution 1/ (%) A	Tax burden Distribution 2/ (%) B	fraction of Pre Tax Income (%) C	After-Tax Income distribution (%) D	Expenditure Distribution 3/ (%) E	fraction of After-Tax Income (%) F	Imputed disposable income distribution (%) 4/ G
Gini Coefficient	**0.482**			**0.475**			**0.421**
1	1.22	1.09	7.28	1.23	11.80	111.87	2.34
2	2.55	1.53	4.87	2.64	10.50	46.51	3.46
3	3.58	2.35	5.33	3.69	10.00	31.64	4.35
4	4.65	3.38	5.91	4.76	9.80	24.06	5.29
5	5.76	4.34	6.13	5.88	9.40	18.68	6.25
6	7.13	5.94	6.78	7.23	10.50	16.96	7.58
7	9.12	8.15	7.26	9.21	10.00	12.69	9.29
8	11.77	11.14	7.70	11.83	10.00	9.88	11.64
9	16.61	17.82	8.73	16.50	8.90	6.30	15.71
10	37.62	44.33	9.58	37.02	9.10	2.87	34.10

Source: ENIGH (2008), System of National Accounts and Minister of Finance's data.

1/ Adjusted household disposable income, published in National Accounts adjusted by taxes, pensions and net transfers. The paid taxes and the Social Security contribution are added whereas Government transfers like welfare programs and subsidies (PROCAMPO, Oportunidades, etc) and pension payments (IMSS and ISSSTE) are substracted. The distribution is estimated based on distribution of current income in INEGI (2008).

2/ For VAT and excise taxes I estimate the burden distribution from consumption data. For the rest of the taxes I use estimates from Minister of Finance (2010).

3/ Minister of Finance (2010).

4/ Government net tranfers are taxes paid minus expenditure received.

Table A.2. VAT exempted and zero-rated categories

Non durable goods	**Services**
Food	Financial services related
Medicines	with pensions and mortgages
Books	Insurance
Gold and currency	Rental housing
Water (Utilities)	Public transportation
Financial assets	Raffle and loteries
	School fees and tuitions
Durable Goods	Interest and loans
Land purchases	Public shows
Houses	

Source: Value Added Tax Act.

Table A.3. Monetary Consumption by type of VAT Treatment

Household Income decile	Monetary Consumption (A+B+C) on products taxed at: General Rate (15%) A	Exempt Goods 1/ B	Zero VAT Total C=C1+C2+C3	Food C1	Medicine C2	Other C3
Average	**49.9%**	**23.6%**	**26.5%**	**24.4%**	**1.0%**	**1.1%**
1	37.2%	16.5%	46.3%	44.3%	1.1%	0.9%
2	38.5%	20.2%	41.3%	39.1%	1.1%	1.1%
3	40.0%	22.3%	37.6%	35.4%	1.1%	1.1%
4	42.4%	21.9%	35.7%	33.6%	0.9%	1.2%
5	43.0%	23.3%	33.7%	31.6%	1.1%	1.1%
6	45.4%	22.9%	31.8%	29.9%	0.8%	1.1%
7	47.0%	23.4%	29.5%	27.5%	0.9%	1.1%
8	49.8%	24.0%	26.2%	24.2%	0.9%	1.0%
9	53.7%	24.1%	22.1%	20.3%	0.9%	1.0%
10	58.7%	25.6%	15.7%	13.5%	1.0%	1.3%

Source: Encuesta Nacional de Ingreso Gasto de los Hogares. 2008

1/ Includes transportation, education services, rent and medical services, books.

Table A.4 Federal Taxes burden distribution

Income group	Income Tax	Social Security Payroll tax	Consumption Excise Taxes	Gasoline Excise Tax	Car Property Tax	Car Sales Tax
Total	100	100	100	100	100	100
I	-1.2	1.1	2.1	0.8	0.6	0.4
II	-1.9	2.7	4.1	2.0	1.9	0.1
III	-1.3	4.0	5.4	2.8	1.9	0.7
IV	-0.4	5.4	7.5	4.3	3.3	0.5
V	0.6	6.7	8.7	5.9	5.2	1.4
VI	2.4	8.3	10.9	7.6	6.1	1.9
VII	5.9	10.5	12.8	9.4	8.2	3.9
VIII	11.0	13.3	12.0	13.7	10.2	9.8
IX	20.5	17.6	16.0	21.2	19.8	20.5
X	64.4	30.4	20.4	32.3	42.9	60.7

Source: Minister of Finance (2010)