Stanford
Center for International Development

Working Paper No. 84

Tax-Paying towards Equity: A Reform Proposal for the Value-Added Tax

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December 2000

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TAX-PAYING TOWARDS EQUITY: A REFORM PROPOSAL FOR THE VALUE-ADDED TAX

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Abstract

Establishing a uniform 15% VAT rate for every good and service subject to this tax would generate additional fiscal resources of, at least, 81.2 billion pesos. The approximate cost of granting an exact compensation for the first three quartiles of the income distribution (in case of considering this as target population) for the impact of such measure—under the pessimistic assumption that 75% of the increase in VAT rates is transferred to prices—to the first three quartiles of income distribution (considered as the target population) would amount to 32.5 billion pesos. The measure would therefore generate 48.7 billion pesos worth of net resources for the three levels of government (federal government, states and municipalities). In fact, it is possible to overcompensate part of the low-income population, and even the entire low-income population, and yet generate available net resources by making the VAT reform simultaneously revenue-raising and redistributive. This is independent from the destination of the net resources received by the three levels of government. If, at least, part of those resources is channeled towards social programs, the redistributive impact of such reform is strengthened.

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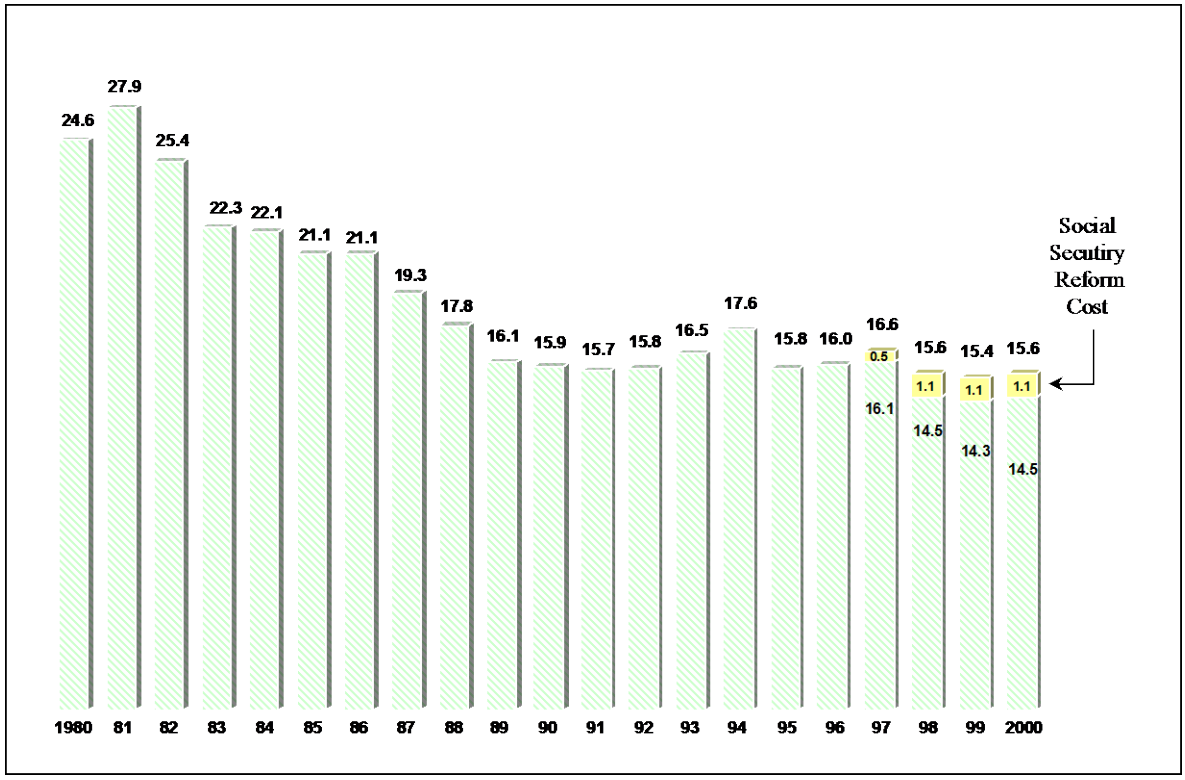
I. INTRODUCTION

In the aftermath of the 1994/95 economic crisis, the Mexican economy is showing signs of new stability, having taken the path towards economic growth. Albeit the 6% contraction of the real Gross Domestic Product (GDP) in 1995, the annual average growth for the five following years is expected to reach 5.5%. The recovery of stability and growth stems from a wide array of factors, among which an effective monetary policy and the positive impact of economic growth in the United States, together with the favorable effects of the North American Free Trade Agreement (NAFTA). In addition, another instrumental element has been fiscal discipline, reflected upon the fact that, throughout the preceding five years the consolidated federal public sector economic deficit has reached 0.8% of GDP on average.

Fiscal discipline may be achieved by means of strengthening revenues or limiting expenditure. In the case of Mexico, during the aforementioned period, the latter element has been instrumental. As it gathers from Chart 1, programmable expenditure will total, on average, 15.8% of GDP between 1995 and 2000, below the actual 17.7% average registered between 1985 and 1994. The contraction is still larger discounting the cost of the social security reform.[1]

Chart 1
Programmable Expenditure Behavior, 1980-2000
(percentage of GDP)



[1] A new Social Security Law came into effect since July 1997. Such Law establishes individual retirement savings accounts for workers, as opposed to the prior collective system. As part of this reform, the Federal Government must meet the cost of the retired workers' pensions according to the previous Law which accounts for annual expenditure above 1% of GDP. Thus, in order to compare programmable expenditure series for the period 1980-2000, the data must exclude the cost of such reform.

Public expenditure restriction, albeit instrumental in a context of tax base weakness[2], gives rise to significant and increasing social and economic costs, particularly in a society whose demographic dynamics generate the need to deal with increasingly costly measures in the field of education and health[3]. This is compounded by largely unsatisfied shortages of productive infrastructure that constrain the nation's growth and hinder a balanced regional development. [4]

The above arguments have led policy-makers and, more generally, public opinion, to set out the subject of a fiscal reform. In the current Mexican context, such reform should deal with multiple objectives: broadening the tax-payer base; simplifying compliance; finding more effective mechanisms to distribute tax and expenditure responsibilities among the three government levels; and, aligning incentives in order to reduce informality and foster investment. Each of these objectives embodies substantive challenges. However, there is an additional challenge that must be emphasized for the reasons explained above: the need to raise tax revenues.

A measure that would greatly contribute to achieve this last goal would be to modify the consumption tax regime, and particularly that of the Value Added Tax (VAT). The reason for this is that the current multi-rate regime generates considerable costs in terms of efficiency[5], fosters evasion and significantly limits its revenue-raising potential. Nevertheless, proposals to modify the VAT regime, particularly those intended to establish a uniform 15% rate, are confronted with an insurmountable obstacle: the negative impact such a measure would have on the lower-income groups that makes such proposal unacceptable to an important number of legislators (an opposition that, from our point of view, is correct).

This situation poses a strong paradox, for which this paper intends to find a possible solution: consolidating economic stability while at the same time social expenditure increases in order to favor lower-income groups is not a feasible objective without a fiscal reform; however, undertaking a fiscal reform might seem, in a first approach, as hazardous to the lower-income groups. The solution we propose here is, basically, very simple: to separate the redistributive considerations from the VAT regime, and employ other economic policy tools to compensate (or maybe even overcompensate) the lower-income groups for the undesirable redistributive effects of such measure.

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[2] Mexico's fiscal revenues/GDP ratio is among the world's lowest. Thus, for 1996, this ratio was well below that of Sweden, France, Italy, the United Kingdom, the United States and Canada, and even that of Korea, Chile, Turkey, Brazil, Nicaragua and Costa Rica. Moreover, if the contributions paid by Petróleos Mexicanos were omitted, this ratio would be lower than in Peru, Colombia and Panama. See OECD (1999) and CEPAL (1997).

[3] In a considerably preliminary estimation undertaken by the Mexican Ministry of Finance (SHCP) unmet public expenditure needs were calculated at nearly 3% of GDP; see SHCP (1998).

[4] E. Dávila, G. Kessel and S. Levy (2000) argue that NAFTA will worsen the differences between the Nation's north and south, which is why a special investment effort will be called for in terms of productive infrastructure and transportation in Mexico's southern region.

[5] Efficiency costs referred to here consist in transaction costs, which increase exponentially with the number of rates applied. In a Walrasian world, where perfect information is available, there are no transaction costs and individuals voluntarily comply with the contracts they subscribe (and, presumably, also comply with their fiscal obligations) it would be optimal, under different scenarios, to apply different tax rates to different products (e.g., depending on the share represented by payments to labor in added value as well as own and cross price elasticities, see, for instance Auerbach, A.J. and M. Feldstein, 1985). However, abandoning such simplifying assumptions means that, in practice, fiscal experts tend to prefer a single VAT rate.

Thus, this paper analyzes the incidence of the current VAT regime in Mexico. In a first instance, we argue that special VAT regimes (such as zero-rate and exemptions) turn out to be ineffective and inefficient and, more particularly, do not accomplish their goal as tools to combat poverty, which is why they must be eliminated (Sections II to IV). Nonetheless, it is instrumental that a sector of the population be compensated for the impact of adjusting the VAT rates (Section V). In fact, it is set out that a certain percentage of the country's population (the lower-income population) be eligible for compensation and that each individual belonging to such group receives a Slutsky transfer or a uniform compensation for the whole target population (Section VI). The paragraphs that follow analyze, in a conceptual level and concretely for Mexico, the problem regarding the type of tools to employ in order to carry out such compensation (Section VII). Further ahead, the impact on incentives for the individuals is briefly analyzed. Finally, Section VIII summarizes the conclusions of the analysis carried out in previous sections.

II. GENERAL ANALYSIS

A very well known empirical regularity has to do with the existence of systematic differences among the household consumption patterns of different income levels (even if there are demographic feature controls)[6].

The implication of this statement for microeconomists is that it is convenient to postulate that individuals' preferences are not homothetic (and therefore, Engel curves are not, in general, straight lines departing from the origin), in order to build models whose predictions will not be easily refuted by empirical comparison. The specific form of the Engel curves will depend on the analysis' level of aggregation: if only a few generic categories of goods and services (such as food, clothing, transportation, etc.) are dealt with, Engel curves will depart from the origin, they will be strictly increasing and each category will absorb a significant fraction of total spending. On the other hand, if goods and services are specified to a certain level of detail (for instance, bottled soft drinks, polyester shirts, taxi rides, etc.) Engel curves will frequently show departure points different from the origin, they will show decreasing sections (to the extent that, in certain cases, consumption may again be nil at certain income levels), and each good or service will absorb a small fraction of total spending[7].

The differences in consumption patterns associated with income levels tend to have a certain appeal for economic policy-makers, in the sense of subsidizing goods and services (or consumption categories) whose relative relevance in household expenditure is greater as income levels decrease. Based on this, different countries have justified their subsidizing (in the broad sense of the term, which includes granting preferential tax treatments) the following:

- basic grains (wheat, corn or rice, depending on the country) and their large-consumption derivatives (such as bread or tortillas);
- edible vegetable oils;

[6] See for instance Theil, H. (1980, pg. 10) and Deaton, A. and J. Muellbauer (1984, pg. 24).
[7] See Mas Colell, A., M. Whinston and J. R. Green (1995, pg. 25).

- food in general, based on Engel's Law[8]; and,
- (current) consumption in general, based on the hypothesis that consumption's average and marginal propensities are decreasing functions of income levels[9].

In this paper, however, we argue that, at least in the case of countries with highly concentrated income, such as Mexico, subsidizing consumption is both ineffective and inefficient if employed as a redistributive tool. Firstly, its ineffectiveness stems from two reasons:

- even if there is a total subsidy, that is, if the good or service is delivered for free, the quantity consumed is finite, which limits the amount of subsidy received by the poorer households; and,
- if the subsidy is not total, that is, if the good or service maintains a positive price, the amount of subsidy poorer households likely to receive is seriously limited by their income (as well as by the need to spend in other goods or services).

Secondly, its inefficiency emerges from the fact that a small fraction of spending in a high-income household may exceed, in absolute amounts, a substantial fraction of spending in a low-income household. Therefore, income concentration translates into a similar level of concentration in spending and even in a concentration of consumption of goods and services considered as basic. Under such circumstances, the larger portion of this subsidized consumption will be captured by the middle and high-income groups.

Even if the consumption of a good or service were to be identical for every income level, it would mean that half of the subsidy would be captured by the less poor half of the population. Hence, in order to concentrate a consumption subsidy towards the poorer population, broad consumption categories should not be the subject of a subsidy. Instead, it is necessary to identify specific goods and services consumed only by the poorer households. This requires making a careful distinction between the luxury and popular presentations of a same category of goods or services, which normally imposes excessive costs on the subsidy's management, besides the fact that it induces simulation behaviors — or even corruption —, which are very difficult to fight. In any case, as it has been stated in previous paragraphs, these goods and services will usually absorb reduced fractions of household spending, which will stress the ineffective features of this instrument.

In more general terms, any attempt to transfer income by means of *consumption* subsidies (either explicit or implicit), will reflect the existing inequality in income distribution. Consequently, while such an inequality is present, general subsidies for a certain group of products, either explicit through budgetary resources, or implicit by means of tax relieves, will bring about, in general, limited redistributive effects and, from a certain perspective, even adverse consequences.

[8] Stated by E. Engel in 1857. Houthakker H. S. (1957) published a bibliographical survey to commemorate this paper's centennial. A quick review of spending structures of Mexican households (INEGI, 2000) allows confirming the current validity of this empirical regularity.

[9] This is the famous "fundamental psychological law" discussed by Keynes in Chapter 8 of his General Theory of Employment, Interest and Money. Keynes (1943).

In Mexico's particular instance, the State has traditionally subsidized the consumption of certain goods and services such as tortillas, electricity, passenger railroad services and local telephone services, as well as food, medicines, medical examinations and educational services; the latter by means of special regimes (zero rate and exemption) in the payment of the VAT. Disperse efforts and, sometimes, the employment of tools with a relatively low effectiveness in terms of their redistributive impact, have generated efficiency costs that eventually restrict the possibility of taking advantage of the nation's growth potential. This, in turn, has a negative effect on the poorer population by limiting their employment opportunities and the fiscal resources needed to carry out social measures.

However, albeit its negative effects, this situation was totally justified to the extent that there were no alternative tools efficient enough to reduce inequalities, since not trying to correct the sharp concentration of income could not be considered as an option. Nevertheless, during the last few years there has been some progress in designing mechanisms that allow to:

- carry out *direct* income transfers favoring well identified population groups, which significantly increases the efficiency of such transfers, as opposed to the general subsidy alternative;
- grant *monetary* transfers, which brings greater flexibility in terms of the amounts to be transferred, as opposed to the alternative of in-kind subsidies by means of the free or subsidized availability of a particular product, such as milk or tortillas, thus achieving greater effectiveness; and,
- in some cases, associate these income transfers to actions performed by the targeted households allowing them to *permanently* increase their income levels by means of investment in their human capital.

Consequently, one must assess the feasibility and convenience of concentrating redistributive efforts in a set of highly effective and efficient tools that simultaneously lead to achieve the desired objective of reducing income distribution inequalities, separate redistributive considerations from the relative price structure, and, particularly, from the consumption tax regime[10]. The above leaves the possibility of assessing the price and rate structure strictly in terms of effectiveness and efficiency, which would, for instance, prevent cross subsidies in telephone services or eliminate subsidies to power rates, which would significantly improve the competition and efficiency conditions in those sectors. More precisely, this would also allow tax-raising instruments to fully perform their core function, which consists in guaranteeing the sustainable financing of public expenditure levels required by the nation, particularly in the social aspect.

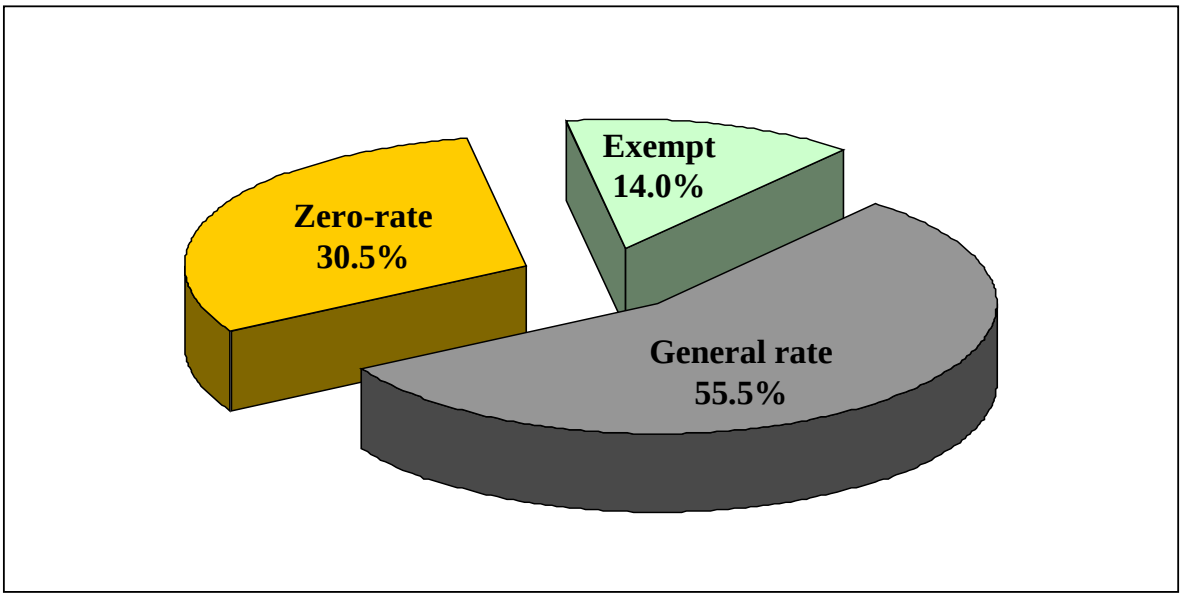
[10] Distributive considerations should certainly be an essential part of other economic policies, for instance, in education, regional development, labor training and housing. In any case, the tax system cannot be based exclusively on consumption taxes since they are not usually progressive; progressiveness in the tax structure may be achieved by means of the income tax (*impuesto sobre la renta, ISR*), reforming such tax in order to increase its efficiency and equity.

III. MEXICO'S VAT REGIME

VAT is a suitable tax instrument, since individuals are taxed according to their expenditure, independently of the source of their income. Moreover, an individual that has evaded a significant amount of income tax from the tax authorities will eventually pay VAT on such income when he/she spends it acquiring goods and services. Nonetheless, in the case of Mexico, these advantages are limited by the presence of two special VAT regimes: the zero-rate and exemption regimes.

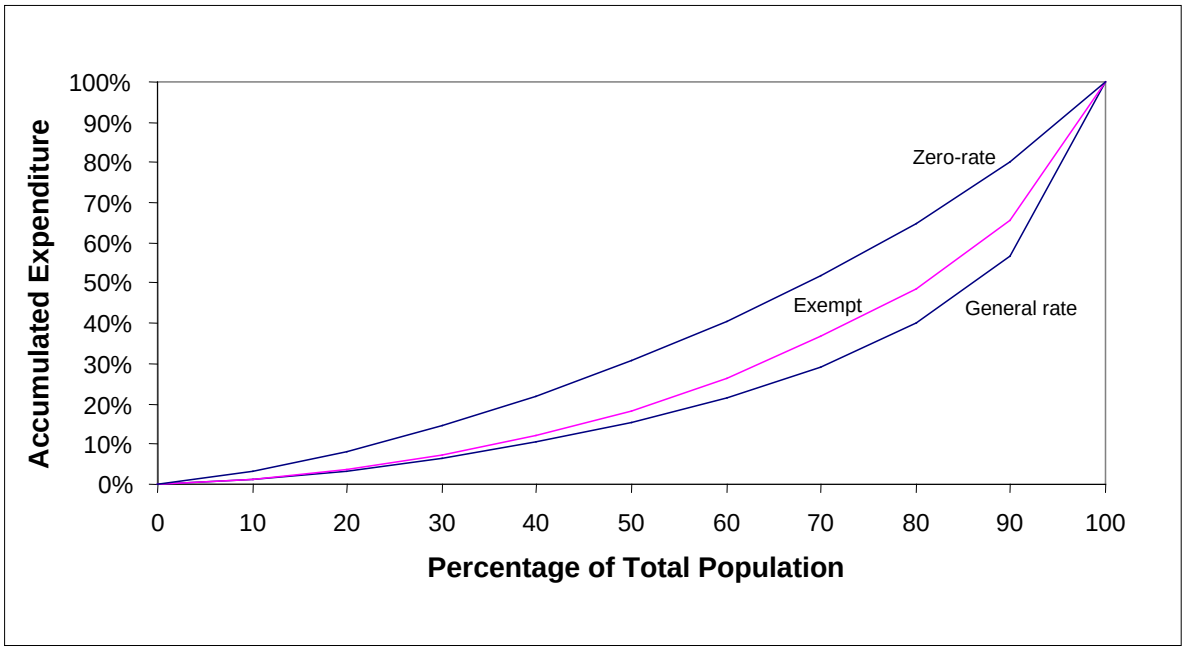
According to the zero-rate regime, the good or service is not taxed in any of its production stages, which is achieved by means of a tax reimbursement scheme that pays the VAT on the inputs employed back to the producer. Goods such as food, medicines, books, magazines and newspapers are under this regime. On the other hand, under the exemption regime the good or service is free of tax only in its last stage of production, which is why a reimbursement scheme is not necessary. Medical examinations and education, among others, are currently under this regime. As it may be gathered from Chart 2, VAT special regimes absorb, altogether, 45% of the households' current monetary expenditure, according to the National Survey of Household Income and Expenditure for 1998 (*Encuesta Nacional de Ingresos y Gastos de los Hogares de 1998, (ENIGH-98)* carried out by the National Institute for Statistics, Geography and Information Systems (*Instituto Nacional de Estadística, Geografía e Informática, INEGI 2000*).

Chart 2
Current Monetary Expenditure Composition by VAT Regimes
(%)



On the other hand, Chart 3 shows the Lorenz curve for current monetary expenditure in goods and services, by deciles of individuals, according to their total current per capita income of the households in which they live[11], for the different ways of applying the VAT (zero-rate, exemption and the general rate).

Chart 3
Decile Distribution of Current Monetary Expenditure of VAT Regimes



As it may be gathered from the charts, although the goods and services under the zero-rate regime show a smaller concentration than the rest, 35.1% of the implicit subsidy is captured by the last two deciles, 69.2% by the last five and only 8.1% by the first two. *This means that, for every peso of revenue loss due to the zero-rate regime, only over 30 cents reach the poorest half of the population.*

Concerning exempt goods and services, the distribution of the implicit subsidy is still more unfavorable: 51.3% for the last two deciles, 81.7% for the last five and only 3.6% for the first two. *This means that, for every peso of revenue loss due to the exemption regime, less than 20 cents reach the poorer half of the population.*

These results may be analyzed from the other way around, when considering the impact of a decrease in the VAT's general rate: given the decile distribution of the expenditure on the goods and services currently under the general regime at a 15% rate, it is inferred that the distribution of the implicit subsidy of a possible decrease of the general rate would be equally unfavorable: 59.8*% of the revenue loss would benefit the last two deciles, 84.7% the last five and only 3.4% the first two.*

[11] This measure is more refined than the one presented in the (printed) publishing of the 1998 ENIGH (INEGI, 2000), which employs household deciles according to their current monetary income. In fact, total current income takes non-monetary income into account (such as self-consumption, payments in-kind and the imputed rent of owned housing, either borrowed or received as fringe benefit) and the expression in per-capita terms corrects the distortions introduced by the differences in household sizes. From here on, decile distribution will refer to deciles of individuals according to total per-capita current income of the households they inhabit.

Based on the above, it may be concluded that VAT's special regimes (or any decrease in the general rate) are neither efficient nor effective mechanisms to transfer income to the poorer population. As it has been pointed out earlier, this results from the fact that a high concentration of wealth and income determines a high concentration of consumption spending, including items considered as basic, such as food. Therefore, the implicit subsidy financed by the revenue loss stemming from the special regimes goes, to a great extent, to the higher-income groups (or, at least, to the population that is not poor).

IV. SPECIAL REGIME ELIMINATION

1. Slutsky Compensations

According to the previous analysis, it would then be desirable to eliminate the VAT special regimes, as long as it is possible to compensate the lower-income households for the loss of the implicit subsidies received by means of these regimes. In order to do this, a Slutsky compensation is proposed. Such compensation may be achieved by means of direct transfers of monetary income to the poor households[12].

Initially, the model will assume a market economy, in which individuals are confronted with a given price vector ($\boldsymbol{p} = [p_j]$)[13], which will be altered as a result of the disappearance of the VAT special regimes, observing a change ($\Delta\boldsymbol{p} = [\Delta p_j]$), to end in a higher level ($\boldsymbol{p}' = [p'_j]$), thus:

$$\Delta\boldsymbol{p} = \boldsymbol{p}' - \boldsymbol{p} \tag{1}$$

In order to simplify, it will be assumed that every individual has (not strictly) monotonous and convex (but not homothetic) preferences. The h-th individual initially counts with a given income, y_h, which will increase as a result of a compensation Δy_h, to reach a level y'_h. The consumption basket originally chosen by the h-th individual is $\boldsymbol{x_h} = [x_j^{(h)}]$ and after the VAT adjustment and the compensation it will be $\boldsymbol{x'_h} = [x_j'^{(h)}]$, whereas, if there had not been a compensation, it would have been $\boldsymbol{x''_h} = [x_j''^{(h)}]$, since y_h would have remained unchanged[14]. The amount of the compensation for the h-th individual is determined according to Slutsky's criterion:

$$y'_h - y_h = \Delta y_h = \Delta\boldsymbol{p}\,\boldsymbol{x_h} \tag{2}$$

so that, according to the previous assumptions, $\boldsymbol{x'_h}$ is preferred or indifferent with respect to $\boldsymbol{x_h}$. Moreover, if strictly convex preferences are assumed, it may be assured that $\boldsymbol{x'_h}$ is

[12] As it is well known, the Slutsky compensation of a price increase is calculated to allow the consumer to acquire, if he/she so wishes, the same basket than before the change in prices. Conversely, the Hicks compensation is calculated so that the basket acquired by the consumer under the new situation remains indifferent with regard to the original basket. In differential terms, both approaches are equivalent (and only the Slutsky matrix is mentioned and not the Hicks matrix), but if the variations are discrete, the Slutsky compensation may bring about an improvement in the consumer's welfare (if preferences are strictly convex). See Mas Colell, A., M. Whinston and J. R. Green (1995, pgs. 29-30).

[13] Under the convention that price vectors are row vectors and quantity vectors are column vectors.

[14] We particularly assume that the wage vector ($\boldsymbol{w}=[w_k]$, where $k=1,\ldots,q$ indicates the specific type of work dealt with) remains constant. In a general equilibrium context, the reform's impact on the labor market would require modeling; however, for reasons stated further ahead, this is not the approach analyzed here.

strictly preferred to $\boldsymbol{x_h}$. Notice that in order to calculate the amount of the compensation for each individual, it is only necessary to count with information on his/her consumption basket *before* the reform, as well as its impact on prices[15].

2. Impact on Tax Revenues

The establishment of a 15% single VAT rate is considered by means of eliminating special regimes (zero-rate and exemption)[16]. Therefore, there will be a vector of (integrated) increases in VAT rates ($\Delta \boldsymbol{t} = [\Delta t_j]$), whose j-th component will be:

- zero, if *j* is a product already under the general regime;
- 15%, if *j* is a product under the zero-rate regime; and,
- a percentage according to the value-added share (of the final stage) in the price of product *j*, if *j* was part of the exemption regime.

The private consumption vector of the economy before the VAT reform ($\boldsymbol{x} = [x_j]$) is the sum of the individual demands for consumption:

$$\boldsymbol{x} = \sum_h \boldsymbol{x_h} \tag{3}$$

By analogy:

$$\boldsymbol{x}' = \sum_h \boldsymbol{x}'_{\boldsymbol{h}} \tag{4}$$

$$\boldsymbol{x}'' = \sum_h \boldsymbol{x}''_{\boldsymbol{h}} \tag{5}$$

Based on the above, the tax revenue impact (ΔR) of eliminating the special VAT regimes, in the absence of compensation, would be:

$$\Delta R = \sum_j (\Delta t_j) p_j x_j'' \tag{6}$$

Such tax revenue impact, expressed in terms of December 2000 pesos[17], is estimated at 81.2 billion pesos[18]. It should be noted that this calculation does not take into

[15] It is assumed that consumption decisions are made directly by the individuals, albeit in practice many of them are made at the household level, which expresses in a smaller scale, the problems related with Arrow's General Possibility Theorem and would lead us to model the way in which household decisions are made. These complications are ignored in this paper.

[16] We also assess a possible decrease in the general rate to 13%. The corresponding calculations are omitted in order to simplify the presentation, but are available for interested readers to analyze.

[17] Every monetary figure is expressed in December 2000 pesos.

[18] In fact, for lack of enough information, the calculations were carried out according to vector $\boldsymbol{x}$ and not to $\boldsymbol{x''}$, which implies a certain overestimating which, nevertheless, is countered by two significant underestimations: first, that the fact of employing ENIGH-98 data ignores income and consumption level improvements between 1998 and 2000; and, second, that the fact that the national accounts data are not made compatible, the correction of the underestimation that may exist in the ENIGH-98 is omitted (the latter is discussed further ahead, in Section V).

account the revenues obtained on the remaining components of final demand[19]. In principle, ΔR's estimation must take into account a certain degree of tax evasion. On the other hand, however, the presence of a single rate, constant through time, significantly simplifies compliance control and therefore, tends to reduce evasion and makes way for an additional increase in revenues. Ignoring such considerations, we establish a value for ΔR that could be considered as conservative.

Now, since the VAT is a federal-level tax, it is subject to the revenue-sharing and contributions to local governments (states and municipalities) established in the *Ley de Coordinación Fiscal* (Fiscal Coordination Law). If λ is the share of revenues transferred to states and municipalities, then:

$$\Delta R_F = (1-\lambda)\Delta R \tag{7}$$

$$\Delta R_L = \lambda \Delta R \tag{8}$$

where sub indices F y L refer to the federal and local (states and municipalities together) levels of government.

From here on, we will assume that the Federal Government carries out every compensation to consumers, so that ΔR_F will stand for the upper limit of the resources available for that purpose. Since currently $\lambda = 0.33$, we have that ΔR consists of 54.4 billion pesos for the Federal Government and 26.8 billion pesos for states and municipalities. Notice that we assume λ as constant, although it might be possible that, as part of the VAT reform, a change in that parameter could also be agreed. This deserves pointing out since, to the extent it is greater, the resources available for compensations decrease, as it will be shown further ahead in equation (21).

3. Price Impacts

It is assumed that, for the j-th product, only a fraction $\alpha_j \in [0,1]$ of the VAT rate increase will be transferred to the prices paid by consumers, therefore:

$$\Delta p_j = \alpha_j(\Delta t_j)p_j \tag{9}$$

and substituting (9) in (2) we obtain:

$$\Delta y_h = \sum_j \alpha_j(\Delta t_j)p_j x_j^{(h)} \tag{10}$$

so that α_j's values play a crucial role in determining individuals' compensations.

In the instance of perfectly competitive markets, $\alpha_j = 1$, the entire change in the VAT rate will be transferred to the final consumer. This may be the case, for example, of perfectly tradable goods, or of goods produced with constant returns to scale. Nevertheless, in other instances, it is highly possible that $\alpha_j < 1$. This may be the case, for example, of not

[19] Such omission is justified, in part, because taxing government consumption would not represent any additional net resources for the public sector.

perfectly tradable goods, for which the single price law does not apply, since there is some trading, transportation or local distribution component. Alternatively, there may be imperfect competition components in certain markets (such as the medicine market), which prevent the tax rise from being entirely transferred into the final price, resulting in a reduction of the price-cost margins.

Concerning the cases in which $\alpha_j < 1$, it should be taken into account that price-cost margins are income for certain households, which is why, to the extent these margins contract as a result of a change in the VAT regime, these households' incomes will consequently decrease. In addition, the VAT reform impact should be incorporated into the wage vector $\boldsymbol{w}$ and its subsequent impact on the price-cost margins.

In order to formally seize both phenomena, it would be necessary to deal with a context of general equilibrium, so as to capture the final impact of this measure on the distribution of the product between real wages and price-cost margins. The cost of this, however, consists in introducing a large series of quantitative parameters whose exact estimation is highly difficult to achieve and might hinder the reliability of the numerical calculations, which are one of the core interests of this paper. Therefore, we set out two alternative solutions. On one hand, we assume that those who own the productive assets in sectors featuring imperfect competition — where the reductions in the price-cost margins would appear —, are individuals located in the last quartile of income distribution, and who are not taken into account for compensations in any of the scenarios contemplated below. Therefore, the whole weight of the VAT reform would fall on such individuals, both in their role as consumers and as receivers of monopolistic rents.

On the other hand, and given the practical relevance of price impacts (Δp_j), a mechanism to determine them is introduced below. Such mechanism would take advantage, in case the reform came into effect, of the actual information about the path followed by prices after the reform and that, *ex – post,* would allow guaranteeing the target population that compensations according to (10) will entirely reflect the rises in prices. In order to do that, it is proposed that:

- a fixed time period, $\Delta\tau$, be established for the VAT's adjustment impact on prices to become apparent. Such time period should begin to count from the moment when the reform is carried out, τ_0;
- the price vector ($\hat{\boldsymbol{p}} = [\hat{p}_j]$ [20]) is estimated for the date $\tau_1 = \tau_0 + \Delta\tau$. This price vector is the one that would prevail if the VAT special regimes continued in effect. Furthermore, this estimate would be based on inflationary expectations in the absence of changes in such regimes; and,
- once the date τ_1 is reached, follow current prices ($\boldsymbol{p}' = [p'_j]$[21]), in order to determine the vector[22]:

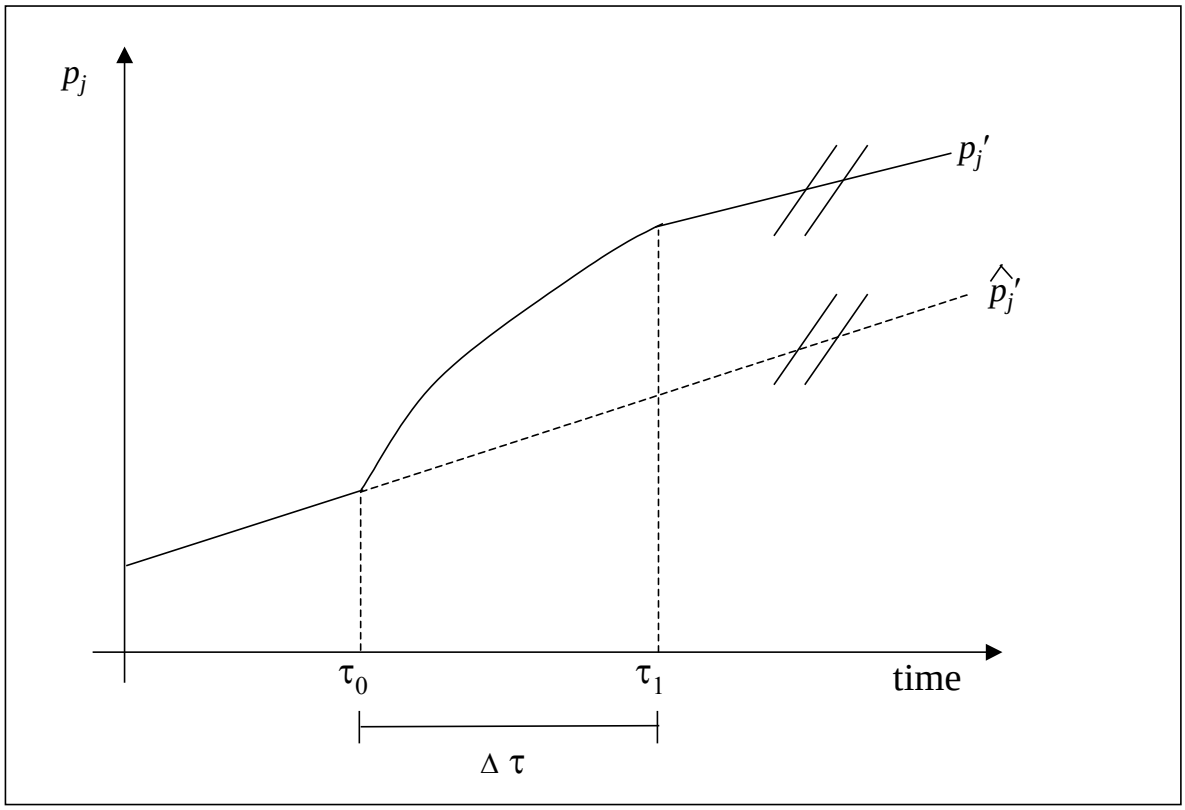
$$\Delta \boldsymbol{p} = \boldsymbol{p}' - \hat{\boldsymbol{p}} \tag{11}$$

[20] To simplify notation, the index indicating the date of the price vector is omitted.
[21] Likewise, the date index is omitted.
[22] So that equation (11) substitutes, in practice, equation (1).

which serves as basis to grant compensations[23].

Under these circumstances, Chart 4 describes the path followed by the j-th good or service:

Chart 4
Path Followed by the Price of the j-th Good or Service



The continuous line stands for the actual path followed by the price of the j-th product until the moment τ_0, this is, before the reform, while the dotted line signals the expected path in the absence of reforms. The continuous line to the right of τ_0, represents the actual path after the reform has been carried out. Therefore, once the period $\Delta\tau$ has passed after the reform, there is a gap between the actual price (p'_j) and the price estimated in the absence of a reform ($\hat{p}_j$). Such gap will help determine the amount of compensation to grant.

Making an *ex-post* calculation of the α_j implicit in the price paths is an interesting exercise, which, taking (9) and (11), results in:

[23] It is assumed above that compensations are paid *ex – post* (on date τ_1). If they were to be paid *ex – ante* (on date τ_0) it would require estimating the expected price increase as a result of the reform ($\Delta\hat{p}$), from estimated coefficients $\hat{\alpha}_j$: $\Delta\hat{p}_j = \hat{\alpha}_j(\Delta t_j)\hat{p}_j$; in order to obtain the expected prices after the reform: $\hat{\boldsymbol{p}}' = \hat{\boldsymbol{p}} + \Delta\hat{\boldsymbol{p}}$, which would serve as basis to grant the (initial) compensations. If $p' > \hat{p}'$, complementary compensations would be granted *ex-post*.

(12) $$\alpha_j = (p_j^{'} - \hat{p}_j)/(\Delta t_j)\hat{p}_j$$

and may be aggregated into a α index:

(13) $$\alpha = \sum_{j=1}^{n} \alpha_j \theta_j$$

where θ_j is the weight of the j-th good or service in the consumer price index (henceforth INPC, from the Spanish *Índice Nacional de Precios al Consumidor*)[24].

Throughout the rest of this paper there will be simulations for different α values, namely 0.25, 0.50, 0.75 and 1.00. Thus, Table 1 shows the impact of VAT reform on the INPC and on the basic food basket cost (CCBA, from the Spanish, *Costo de la Canasta Básica Alimentaria*) for α's selected values:

Table 1
Impact on Price Indices
(%)

Index	α			
	0.25	0.50	0.75	1.00
CCBA	3.8	7.5	11.3	15.0
INPC	1.6	3.2	4.7	6.3

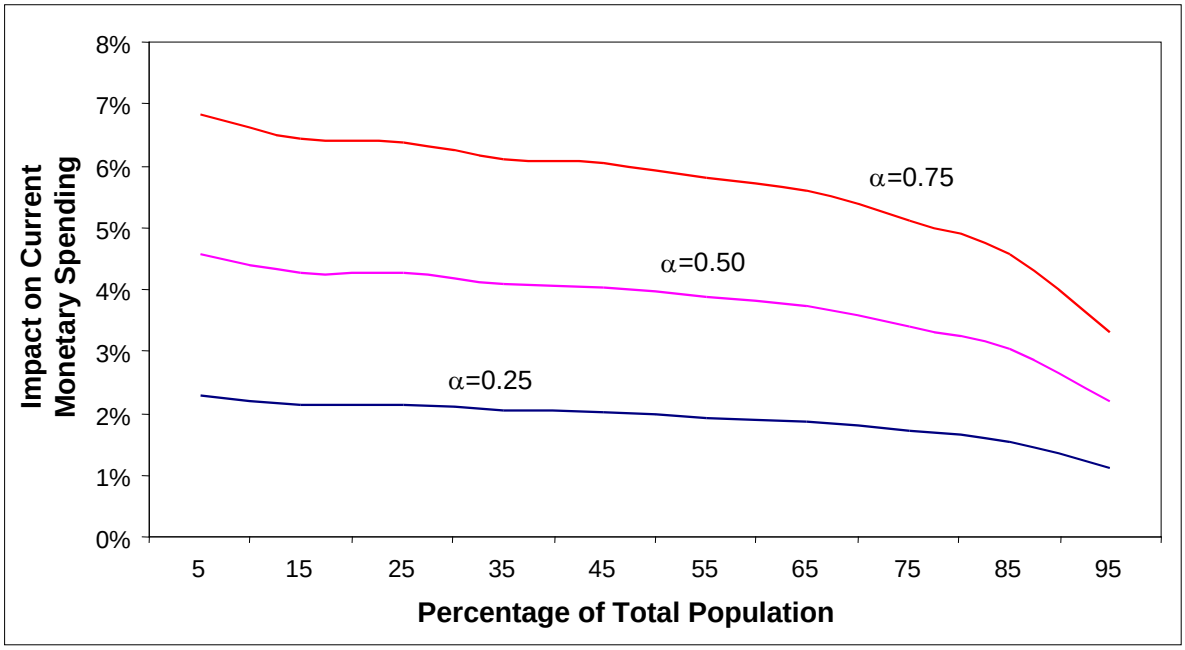
As it gathers from Table 1, when α = 1.00, the impact on the CCBA will be 15%, which owes to the fact that the basic food basket is currently subject to the zero-rate regime and would become part of the general regime at a rate of 15%. Conversely, the impact on the INPC would be much lower, since, as it is shown on Chart 2, more than half of the households' spending goes to goods and services subject to the general regime and to the fact that the exemption regime would have an impact of less than 15%, since the additional tax only affects the added value of the last stage.

4. Relative Impacts on Household Spending

Chart 5 shows the estimated percentage impact of eliminating the special VAT regimes on the current monetary spending of the different deciles for the selected α values[25].

[24] For consistency purposes, weights based on the ENIGH-98 were employed in the simulations instead of the weights used by Banco de México that are modified with large intervals. The econometric estimations carried out by the Ministry of Finance (*Secretaría de Hacienda y Crédito Público*) in 1997, suggest a α = 0.50 value based on the experience of the VAT general rate change carried out in 1991. It should be noticed that, in principle, it would be a vector $\boldsymbol{\alpha}_h$ for each individual, depending on the composition of his/her consumption basket. In practice, the lack of detailed information forces the use of a uniform α.

Chart 5
Impacts on Current Monetary Spending
(%)



As it may be gathered from the chart, the percentage impacts on the first decile are much larger than on the tenth decile. Even in the intermediate case where $\alpha = 0.50$, eliminating special regimes would be equal to an almost 5% decrease in consumption for the households from the first two deciles. Therefore, it is instrumental that any changes in the VAT's taxing regime be complemented by compensating measures with a clear redistributive orientation.

V. TARGET IMAGE FOR COMPENSATIONS

This section introduces a target image in terms of compensation, which will translate, in later sections, into operational strategies given the heterogeneous features of the population to be compensated. The target image contemplates two basic aspects:

- the group of people for whom a compensation is desirable (target population); and,
- the desirable amount of compensation to grant each individual with.

1. Target Population

Let us assume that there are *m* individuals in the country who are ordered according to an increasing function of their income:

(14) $$y_h \leq y_{h+1} \qquad h = 1, \ldots, m\text{-}1$$

[25] Calculating these impacts evidently requires knowledge of vector $\boldsymbol{\alpha} = [\alpha_j]$. The assumption that $\forall j$: $\alpha_j = \alpha$, was employed in these exercises but, if additional information is available, it is possible to recalculate the impacts for α_j differing among themselves. This applies for every numerical exercise presented below.

Given this order, y_1 and y_m respectively represent the income level of the poorest individual and that of the richest in the country. Now, let us establish $y^* \in (y_1, y_m)$ as the income level that serves to separate population M into two sets:

(15) $$M_a = \{h \mid y_h \leq y^*\}$$

(16) $$M_b = \{h \mid y_h > y^*\}$$

M_a is thus the set of target population that should be compensated for the reform in VAT and M_b (its complement) the set of population that would pay for the entire reform to this tax. We also have that, bearing in mind that # is the operator that counts the elements on the set formed by the operand, that:

(17) $$m_a = \#(M_a)$$

(18) $$m_b = \#(M_b) = m - m_a$$

so that:

(19) $$\beta = m_a/m$$

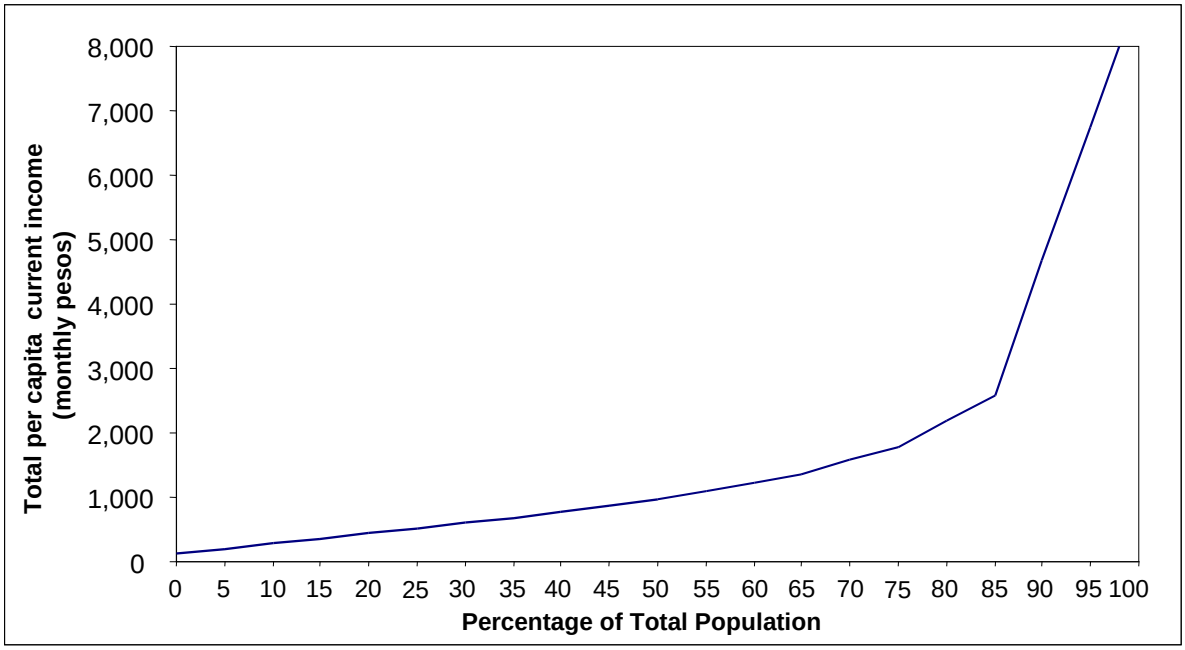
is the share of total population that will be compensated.

Notice that, under the assumption that (14) describes a strictly increasing function, there is a one to one relationship between y^* and β. Therefore, an income level y^* may be established in order to divide the population into low-income and high-income population, or a β share of the population to be compensated may be arbitrarily established, which implicitly defines a y^* income level in both subsets[26]. The value y^* could for example stand for the extreme poverty line (so that M_a would be the extremely poor population). However, this is not necessary, since M_a could also include the moderately poor population with another value of y^*. Since discussing the specific value of y^* would stray us from the purposes of this paper, from here on the discussion will focus on the value of β, which has a clear intuitive interpretation, and we will make calculations for four values of this parameter: 0.25, 0.50, 0.75 and 1.00, in order to assess the consistency of such calculations.

In order to make the previous concepts operational for the Mexican case, Chart 6 shows the function (14) of total per capita monthly current income for the household members (y_h), taking the 1998 ENIGH.

[26] Although only the β such that $\beta m \in \mathbb{N}$, where $\mathbb{N}$ is the set of natural numbers, would by strictly admissible, and that each would correspond with an *interval* of possible values y^*: $y^* \in [y_{\beta m}, y_{\beta m + 1})$, where $\beta m = m_a$.

Chart 6
Total Per Capita Monthly Current Income, 1998
(pesos)



In principle, it would be possible to expect for the area under the curve in the previous chart to represent the households' aggregate income as reported by the Mexican National Accounting System (*Sistema de Cuentas Nacionales de México, SCNM*) for 1998. However, the 1998 ENIGH shows an amount significantly below the one reported by the SCNM[27]. This study did not carry out any adjustment intended to reconcile both data, which may be justified based on the following:

- the gap with regard to the SNCM may be attributed to the fact that the 1998 ENIGH does not capture (due to differentiated non-answering) the higher-income households[28], which is why the adjustment does not affect the middle and low-income households, in fact the major interest of the compensation strategy; and,
- under declaring is concentrated in the last deciles of income distribution and, thus, it has little practical relevance in terms of defining the potential target population to be compensated when considering instances where $\beta \leq 0.75$.

2. Exact Compensations

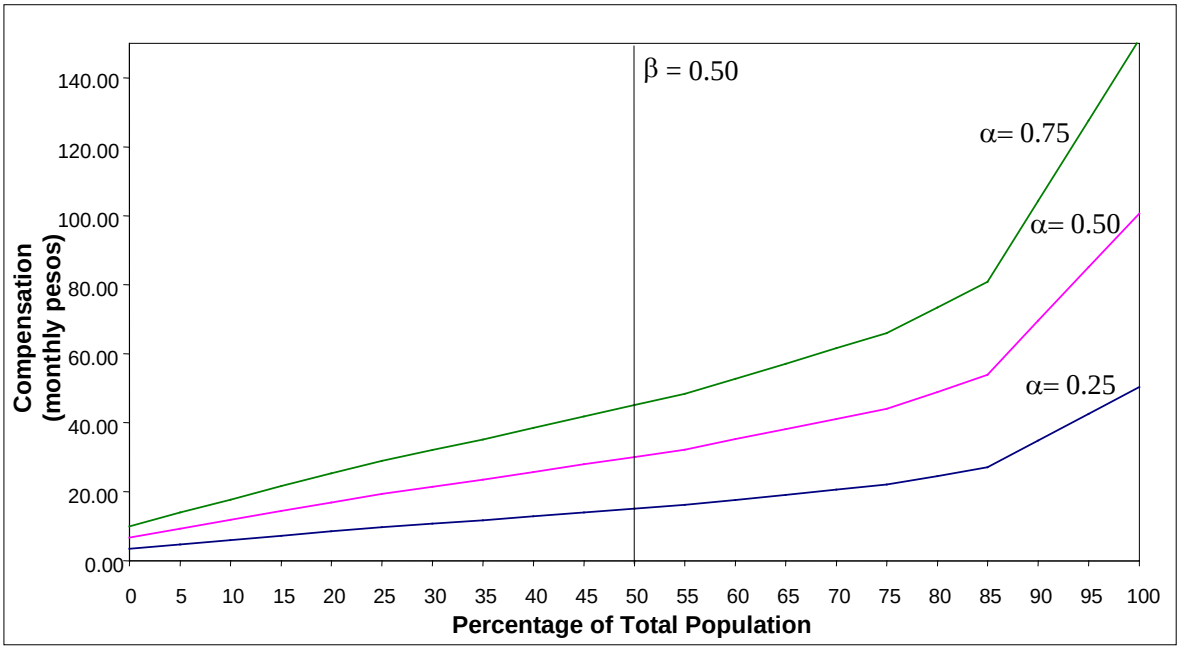
Chart 7 shows the monthly amounts of the Slutsky compensation for the average households in the different income deciles, this is, the values of Δy_h according to (10)[29].

[27] According to the SCNM for 1998, households' net disposable income is twice the total household current income registered in the ENIGH-98.

[28] That is, although the richest households in the country are sometimes part of the ENIGH, the probability that they answer a survey is very low (much lower than for the middle and low-income households).

[29] The ENIGH-98 data base was used to disaggregate each household's expenditure for goods and services considered under the general regime and those under special regimes: zero-rate (aggregate) and exemption (disaggregated, in order to take into account the differences in added value percentages in the last stage). Nevertheless, with the purpose of lessening

Chart 7
Slutsky Compensation
(monthly pesos)



As it gathers from the chart, the Slutsky compensation (for a given α value) is clearly an increasing function of income[30]. The area under such function, until β's value (arbitrarily fixed as 0.50 in Chart 7) stands for the total fiscal cost of the exact compensations granted to each individual, which we will designate as *CE* (an increasing function of *m*, α and β):

(20) $$CE\,(m,\alpha,\beta) = \sum_{h=1}^{\beta m} \Delta y_h$$

On the other hand, the budget constraint shows that the total cost of the exact compensation, *CE* (.), must satisfy the following condition:

(21) $$CE\,(m,\alpha,\beta) \leq (1-\lambda)\,\Delta R = \Delta R_F$$

meaning that total cost is lower than the additional resources raised by the Federal Government due to the reform. Table 2 presents the values of CE for the selected α and β values and for a value of *m* equivalent to 97.4 million individuals[31].

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the effect of buying pattern irregularities (as well as of sample variations), impact estimates were carried out for the average individual in each decile.

[30] It should be noted that it does not necessarily have to be so. If goods and services subject to special regimes, taken together, behaved as an inferior good from a certain income level, the Slutsky compensation curve would decrease from that income level. However, for the Mexican case, the goods and services subject to special regimes, taken together, behave as normal goods, so that the Slutsky compensation monotonously increases with income levels.

[31] According to the 12th. General Population and Housing Census (*XII Censo General de Población y Vivienda*), year 2000.

Table 2
Annual Fiscal Cost of Exact Compensations
(billion pesos)

β \ α	0.25	0.50	0.75	1.00
0.25	1.9	3.8	5.7	7.6
0.50	5.5	11.0	16.5	22.0
0.75	10.8	21.7	32.5	43.4
1.00	20.3	40.7	61.0	81.3

Since, as it was indicated earlier, ΔR_F is equal to 54.4 billion pesos, it is clear that, *even under the most pessimistic price scenario due to this measure (α = 1.00), it could be possible to compensate up to 75% of the population with the lowest income (β= 0.75), and still have federal resources available*. This ultimately is a reflection of Mexico's sharp income concentration[32].

3. Uniform Compensations

Although, in principle, every individual should receive the exact amount of his/her compensation (which would differ among individuals according to the assumption in (14) that $y_h < y_{h+1}$), this may not be feasible in practice, due to the impossibility of making the information regarding each individual's consumption basket, $\boldsymbol{x_h}$, available, as well as the mechanisms to allow the transfers to reach each individual in a differentiated form.

In order to solve the latter problem, we may consider establishing a uniform compensation for the entire target population[33]:

(22) $$\forall h: \Delta yh = \Delta y$$

With the purpose of analyzing such alternative, we introduce a new parameter $\gamma \in [0,1]$, that indicates the overcompensated share of the target population, i.e., the population receiving a Δy compensation, which is greater than Δy_h, the Slutsky compensation. Consequently, (1 - γ) is the under compensated fraction of the same target population (for which $\Delta y < \Delta y_h$). Thus, the uniform compensation is established (for a given α value) in terms of the individual holding the position closest to $\gamma\beta m$, that is:

(23) $$\Delta y = \Delta y_{R(\gamma\beta m)}$$

Where R is the round off function towards the closest positive integer, so that $\Delta y = \Delta y_h$, for the h closest to $\gamma\beta m$[34]. Therefore, if γ = 0.00 the poorest individual will be taken as reference point and the entire target population, with the exception of this individual, will

[32] Notice that for $\alpha=\beta=1$ the fiscal cost of exact compensations equals ΔR, i.e., the total additional revenues. The consistency in this derives from the fact that we also used ENIGH-98 consumption data to calculate additional revenue. To the extent that it is underestimated, for the reasons explained, it should be expected for ΔR to be larger.

[33] This clearly represents the other extreme instance. According to the available tools, uniform compensations for target population subsets may also be considered, although with different amounts for each subset.

[34] Since the exact value of this expression might not be a positive integer, as it happens, in particular, if γ = 0.

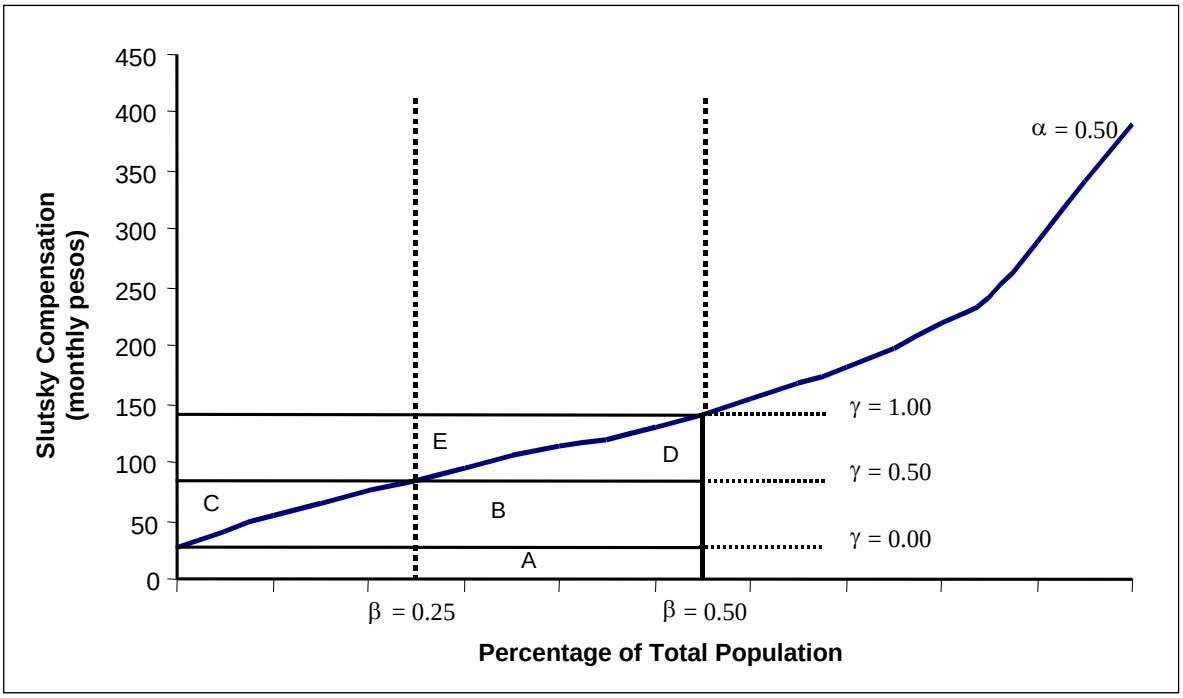
be under compensated. On the other end, when $\gamma = 1.00$, the compensation is established in terms of the marginal individual (the least poor) of the target population, so that the rest of the target population will be overcompensated. Lastly, if $\gamma = 0.50$, the compensation amount will be established according to the middle individual of the target population, half of which will be overcompensated (the half with the lowest income) and the other half will be under compensated.

The fiscal cost of a uniform compensation to every individual in the target population will be designated as CU, an increasing function of *m*, α, β and γ:

(24) $$CU(m, \alpha, \beta, \gamma) = m\beta\Delta y$$

This is shown in Chart 8, where, in order to simplify, we only chart the Slutsky function (Δy_h) for $\alpha = 0.50$, and we also establish $\beta = 0.50$.

Chart 8
Overcompensation and Under compensation



Thus, with $\gamma = 0.00$ the total cost of uniform compensation for the entire target population is A and we under compensate, with regard to the exact compensation, every individual in the target population — except for the poorest —, by a total amount B+D. With $\gamma = 0.50$ the total cost of uniform compensation is C+B+A, overcompensating, in terms of the exact compensation, the poorest 25% of the population by a total amount C and we under compensate the subsequent 25% by a total amount D. When $\gamma = 1.00$, the total cost of uniform compensation is A+B+C+E+D overcompensating the entire target population except for the marginal individual, by a total amount C+E.

Table # 3 shows the fiscal cost of uniform compensations for selected values of α and β and γ [35].

Table 3
Annual Fiscal Cost of Uniform Compensations
(billion pesos)

γ	0.00				0.50				1.00			
α / β	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00
0.25	1.0	1.9	2.9	3.9	1.9	3.8	5.7	7.6	2.8	5.6	8.5	11.3
0.50	1.9	3.9	5.8	7.7	5.6	11.3	16.9	22.6	8.8	17.5	26.3	35.1
0.75	2.9	5.8	8.7	11.6	10.7	21.5	32.2	43.0	19.3	38.5	57.8	77.1
1.00	3.9	7.7	11.6	15.4	17.5	35.1	52.6	70.2	52.9	105.9	158.8	211.7

Uniform compensations should also of course meet a budget constraint analogous to that in (21). Since ΔR_F amounts to 54.4 billion pesos, it is clear that for $\alpha \geq 0.75$ and $\beta \geq 0.75$, overcompensating the entire target population would not be feasible, (i. e., $\gamma = 1.00$)[36]. What comes as a surprise, however, is that it would indeed be feasible for the remaining cases, which illustrates the broad room to maneuver available as a result of a reform in the VAT. Particularly, if $\alpha = 0.50$ and $\beta = 0.75$, it is possible to overcompensate the entire target population and still obtain surplus revenues for the Federal Government (in addition of the resources obtained by the local governments).

As it was noted in previous paragraphs, uniform compensations either under or overcompensate part of the population, depending on γ's value. While for $\gamma = 1.00$ the entire target population is overcompensated, except for the last individual, the total cost of uniform compensation will exceed the total cost of the exact compensation and, intuitively, the difference may be employed as a measure of the *redistributive effort* (beyond compensation) associated with the change in the VAT regime; this is, a measure of the *additional income* received, if it were the case, by the lowest income households. Table 4 shows, for $\gamma = 1.00$, the differences between the exact and uniform compensations for selected values of α and β.

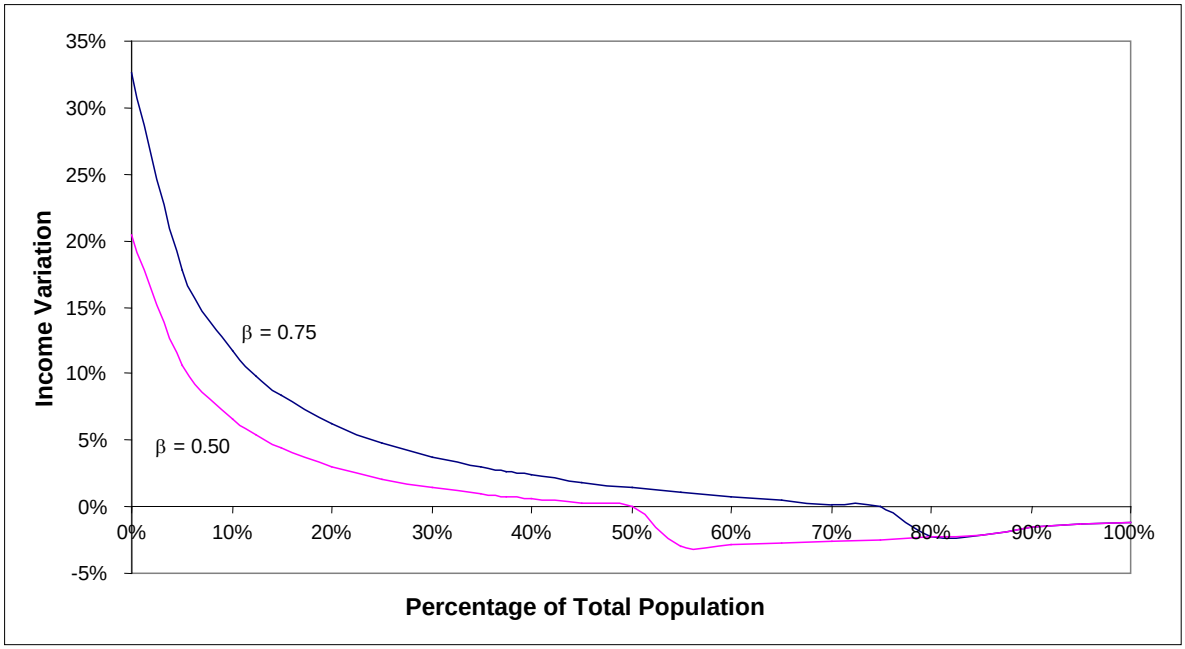
Table 4
Redistributive Effort
(billion pesos)

α / β	0.25	0.50	0.75	1.00
0.25	0.9	1.8	2.8	3.7
0.50	3.3	6.6	9.8	13.1
0.75	8.4	16.8	25.2	33.7
1.00	32.6	65.2	97.8	130.4

[35]The data for $\gamma = 0.00$ and $\gamma = 1.00$ are obtained interpolating, albeit the fact that data for the poorest and the richest individual are available in ENIGH-98.
[36] It would neither be feasible for $\alpha = 0.50$ and $\beta = 1.00$

As it gathers from the table, the redistributive effort grows as β increases, since, when β increases, not only the target population also grows, but — given the order of the population according to (14) — the marginal individual (taken as reference for compensation purposes since γ = 1.00) in it is the one with the higher income, and we have empirically found that the Slutsky compensation is an increasing function of income. Therefore, when β rises, the amount of the uniform compensation also increases which, in turn, broadens the gap between it and the exact compensation, particularly benefiting the lower-income individuals. In order to underline this effect, Chart 9 shows the gap between the exact and the uniform compensation, by income levels, for α = 0.50 and γ = 1.00, for β = 0.50 and β = 0.75.

Chart 9
Redistributive Impact
by Income Deciles
(%)



As it gathers from the chart, the reform, complemented by the proposed uniform compensations, has a clear redistributive effect, since the lower-income people, obtain an additional benefit. This additional benefit reaches, for β=0.75, 33% for the poorest individual in the population and 5% for the marginal individual in the first quartile. Conversely, the higher-income individuals must absorb a reduction in income equivalent to the Slutsky compensation. In the case where β=0.75, this effect is confined to the last quartile of the population, that is, it makes itself present from the point where income begins to show a quicker rise, according to Chart 6. The above translates into a Gini index which is *lower* than the prevalent before the VAT reform (0.514) or than the one that would be observed after the VAT reform, but in the absence of compensations (0.518) since the Gini indices for β=0.50 and β=0.75 would be 0.508 and 0.502, respectively.

In sum, in a country with highly concentrated income, it would be feasible to overcompensate the lower-income population for a change in the VAT rate, transferring *additional* resources to this part of the population, improving income distribution as a result of the reform. Simultaneously, there would be a significant rise in revenues, net from compensations, which would allow other kind of social expenditure actions. Therefore, under such circumstances, *the distributive problem associated with a change in VAT rates is not a budget matter*, but, as it will be made clear in the following section, a matter of tools.

VI. COMPENSATION TOOLS

1. General introduction

The compensations set out in the previous section may be carried out by means of several economic policy tools. Nevertheless, due to the reasons expressed in the initial sections, it is convenient to employ instruments that will allow carrying out transfers focused on individuals' *monetary income*. In this way, they may receive a benefit equivalent to (or greater than) the monetary sacrifice implicit in the VAT reform.

Let us assume there are l economic policy tools with such features, numbered with an index i ($i = 1,...,l$). Each tool has a well-defined target population (the set M_i^*), although the population they deal with (the set M_i) may be different, due to inclusion (set I_i) and exclusion (set E_i) errors specific to each tool. Then:

(25) $$E_i = M_i^* - M_i$$

(26) $$I_i = M_i - M_i^*$$

m_i^* will represent the size of the target population of the i-th tool and m_i the size of the population dealt with, that is:

(27) $$m_i^* = \#(M_i^*)$$

(28) $$m_i = \#(M_i)$$

so that the target population will equal the population dealt with plus the exclusion errors, minus the inclusion errors:

(29) $$m_i^* = m_i + \#(E_i) - \#(I_i)$$

Consistently with what was set forth in the last item of the previous section, we have that, due to operational constraints, individuals with different income levels in a population dealt with a particular tool cannot be distinguished, so each individual in the

population dealt with will receive a uniform direct income transfer by the i-th tool, by an amount Δy_i[37]. Therefore, the fiscal cost of feasible compensations (CF) will be:

$$CF = \sum_{i=1}^{l} m_i \Delta y_i \tag{30}$$

which is the total population dealt with by each tool, for their corresponding compensation amount. We assume that, given the population dealt with by each tool, Δy_i, are established in such way that a budget constraint such as (21) is maintained.

Now, the population dealt with by some (or all) instruments may be protected by transfer indexation mechanisms, already existing before the VAT reform (linked to the CCBA or the INPC), in such way that this population will be — partly — protected against the price rises resulting by the VAT reform, since such adjustment will bring about an automatic adjustment in transfer ($\Delta y_i^{(a)}$). Therefore, the explicit rise required from transfer ($\Delta y_i^{(e)}$) will be lower:

$$\Delta y_i^{(e)} = \Delta y_i - \Delta y_i^{(a)} \tag{31}$$

Consequently, when there are automatic compensation mechanisms for some of the tools (i.e., when $\exists i = \Delta y_i^{(a)} > 0$) it may be stated that *there already are social protection networks in place*, however imperfect, *based on the available tools*. As it will be seen further below, this is precisely the Mexican case[38].

The family of sets $\{M_i\}$ should ideally constitute a partition of set M_a, i.e., of the target population set according to (15). This way, the entire target population would be covered in terms of compensation:

$$M_a = \cup_{i=1}^{l} M_i \tag{32}$$

which means that, regarding compensation, each individual in the target population would be dealt with by a certain tool. In addition, each individual would be dealt with by means of a single tool:

$$\forall\, i \neq s:\ M_i \cap M_s = \phi \tag{33}$$

where ϕ is the empty set, so that belonging to the population dealt with by a tool would imply that it is impossible to belong to the population dealt with by another tool.

The above situation represents a theoretical ideal only for compensation purposes. Nonetheless, this is not likely at all and there will usually exist, for the tool set:

[37] In fact, even if there is information available on individuals' incomes, it may result convenient not to employ it and maintain a uniform transfer for each tool in order not to distort incentives. See Section VIII.

[38] Now, although disaggregating Δy_i into $\Delta y_i^{(a)}$ and $\Delta y_i^{(e)}$ may prove relevant for operational purposes, estimating the fiscal cost of the feasible compensations should still prevail, as expressed in (29) in terms of Δy_i.

- exclusion errors contributed by set *E*:

(34) $$E = M - \cup_{i=1}^{l} M_i$$

which means that there are individuals that are eligible for compensation, but this is not possible since they do not belong to any of the populations dealt with by the available tools;

- inclusion errors, contributed by set *I*:

(35) $$I = M_b \cap (\cup_{i=1}^{l} M_i)$$

which means that there already are individuals not eligible for compensation (due to the fact that they have an income above y^*) but whose income will rise by Δy_i because they are part of the population dealt with by one of the tools; and,

- duplication errors, contributed by the family of sets: $\{ D_{is} \mid i = 1,...1;\ s = i + 1,...i \}$, where:

(36) $$D_{is} = M_i \cap M_s$$

since it is possible that some individuals simultaneously belong to the populations dealt with by different tools and that they may receive more than one compensation; such duplication errors are summarized in the set:

(37) $$D = \cup_{s=i+1}^{l} \cup_{i+1}^{l} D_{is}$$ [39]

It should be noted that inclusion and exclusion errors thus defined refer to all the instruments taken together, which is why they can not be obtained by means of the mechanical aggregation of the inclusion and exclusion errors of the different instruments.

2. Specific Instruments

In Mexico's case, the number of tools available to carry out direct monetary income transfers is quite limited, so only the three major instruments will be studied:

1. the Education, Health and Nutrition Program (*Programa de Educación, Salud y Alimentación, Progresa*);
2. government contributions to the individual capitalization accounts created as a result of the Social Security Law reform, and,
3. pensions (retirement and disability) paid by the social security institutions.

To simplify matters, it will be assumed that the compensation granted by means of each tool is the same in every instance, i.e., $\Delta y_1 = \Delta y_2 = \Delta y_3 = \Delta y$. The specific amount of Δy corresponding to the uniform compensation, which depends on α, β and γ. Table 5 introduces the amounts of Δy for these parameters' selected values.

[39] However, the data of trebling (or quadrupling, etc.) observed when analyzing the entire family of sets $\{ D_{is} \}$ are lost.

Table 5
Uniform per-capita Compensations
(monthly pesos)

γ	0.00				0.50				1.00			
α / β	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00
0.25	3.31	6.61	9.92	13.22	6.54	13.08	19.61	26.15	9.66	19.31	28.97	38.62
0.50	3.31	6.61	9.92	13.22	9.66	19.31	28.97	38.62	15.02	30.04	45.06	60.08
0.75	3.31	6.61	9.92	13.22	12.26	24.51	36.77	49.03	21.98	43.97	65.95	87.93
1.00	3.31	6.61	9.92	13.22	15.02	30.04	45.06	60.08	45.31	90.61	135.92	181.23

a) Education, Health and Nutrition Program (*Progresa*)

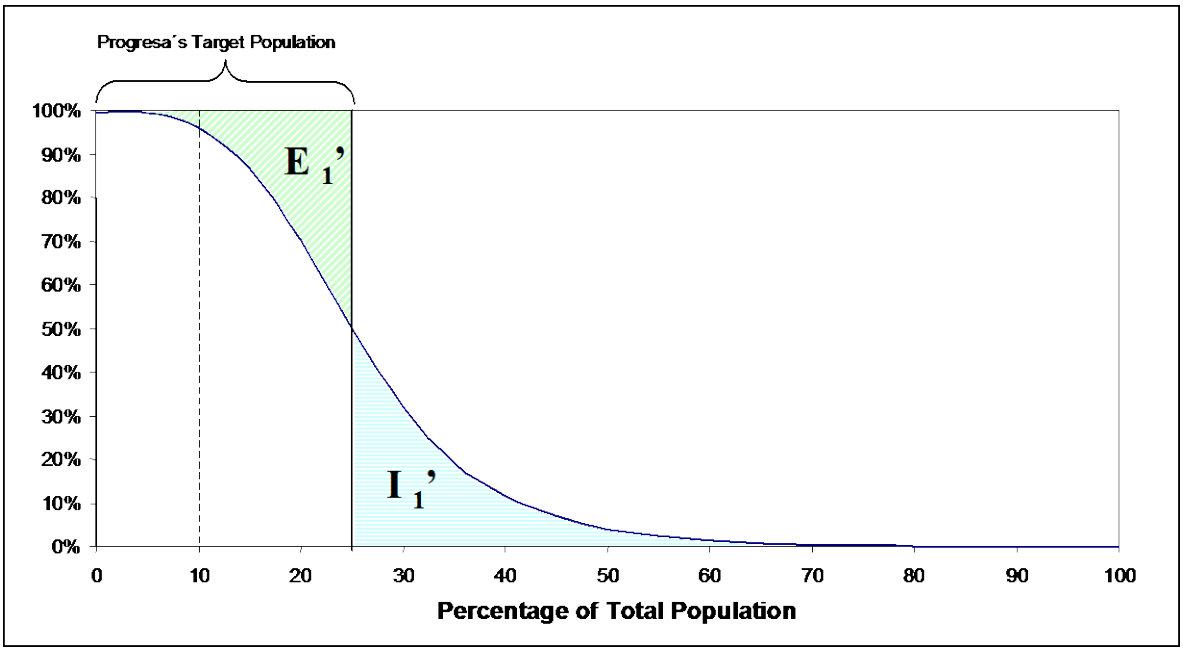
The first tool to consider (i = 1) is the Education, Health and Nutrition Program, *Progresa*, whose major focus is to deal with the extremely poor population. According to estimates calculated by *Progresa*'s National Coordination (*Conprogresa*), *Progresa*'s target population, the extremely poor population in the country (M_1^*), reaches 25% of the entire population, or approximately 25 million individuals (m_1*), so that it extends throughout the first two and half the third deciles and, therefore, matches the target population for compensation purposes when β = 0.25.[40]

Progresa currently operates only in rural areas (those with less than 2,500 inhabitants) and in the smaller urban areas (2,500 to 14,999 inhabitants) in areas with very high, high and medium-high marginality levels[41] and with the education and health services required for Progresa to operate. However for the year 2001 Progresa will be operating in strictly urban areas (15,000 inhabitants or more) and also in rural areas with sparse population, taking advantage of the efforts made to offer to the entire population, education and health services (by means of traditional instruments or more flexible operative schemes, as telesecundarias[42] and mobile squads for health care)[43]. Thus, the population dealt with by Progresa (M_1) in 2001 will be 17 million people (m_1), clearly less than the target population, but which represents a relevant increase with respect to year 2000 (23%). Moreover, this allows the assumption that Progresa´s potential coverage (M_1') is 25% of the population.

Now Progresa´s beneficiaries are selected by means of a regionalized score system, aimed to infer, from objective indicators, the households' poverty situation (dwelling characteristics, household appliances, ages and school levels of the members and so on). As in any measurement, there is a certain error margin, in consequence Progresa´s potential coverage does not match exactly with Progresa´s target population. This is the sets M_1* and M_1' will not be equal and this will give place to exclusion (E_1') and inclusion (I_1') errors, even if Progresa reaches its potential coverage. However such errors will not be significant, as it is shown in Chart #10[44].

[40] However, only the first decile has incomes of less than a dollar a day.
[41] According to the National Population Council's (*Consejo Nacional de Población, Conapo*) indicators.
[42] TV highschool.
[43] It is expected that in the year 2001, 99.7% of the population will have access to basic health care (which is required for an adequate operation of Progresa).
[44] Progresa´s potential coverage was calculated with a logistic model applied to aggregated data: $ln\ (p/(1-p)) = \xi + \eta\ ln\ (y/y^*)$, where p is the probability of an individual to be selected by Progresa´s score system, y is the total current per capita income of the household where he/she belongs to and y^* is the total current per capita income of the third decile. It was assumed that $\xi = 0$ and η was set equal to-5, greater, in absolut terms, to the value obtained by interpolation (over

Chart 10
***Progresa's* Potential Coverage**
(% of the population)



In fact the exclusion (E_1') and inclusion (I_1') errors for $\beta = 0.25$ equal, respectively, to 16% of the target population and 21% of potential coverage. The relevance of the inclusion errors in the compensation strategy set forth in this section (that is, their contribution to I according to (34)), will decisively depend on the selected β value, for instance, if $\beta = 0.75$, *Progresa* practically would not generate inclusion errors for compensation strategy purposes, and even for $\beta = 0.50$, the inclusion error would be very small. Even more important is to stress that the exclusion error is almost nil in the first decile (0.7%)

Therefore, the fact that *Progresa* has not yet reached its entire potential coverage generates, by itself, a significant exclusion error, both for the program as such (in terms of its target population) and for the compensation strategy in the instance of a VAT reform (in terms of the target population for compensation purposes). Consequently, the following analysis will assume that *Progresa* reaches its potential coverage.

Progresa grants monetary transfers including:

- a basic monetary transfer (amounting to 135 pesos per month) to each household, conditioned upon periodical attendance of every member in the household to medical units;

aggregated data) of a logistic model based on a unique score system for the whole country. This increase in the value mimics the gain in accuracy stemmed from the regionalization of the score system, which is assumed to increase in 20% the probability that an individual of the second decile would be selected and decrease in 20% the probability that an individual of the fourth decile would be selected.

- scholarships linked to school attendance, from the third grade of elementary school (90 pesos per month) until the third year of secondary education (290 pesos for boys and 335 pesos for girls[45]); and,
- monetary support for the acquisition of school supplies, from the first grade of elementary school until the third grade of secondary education[46].

Progresa's monetary transfers are already indexed to the CCBA, so that the covered households are already partially protected by an automatic compensation mechanism that covers a part of the proposed VAT adjustment[47]. Now, average per capita monetary transfers currently amount to 37.77 pesos per month and the CCBA rise, according to Table 1, would depend on the value of α, while the amount of the compensation to grant would depend on the values of α, β and γ according to Table 5. Therefore, the automatic, $\Delta y_1^{(a)}$, and explicit ($\Delta y_1^{(e)}$) compensations would be the ones shown in Table 6.

Table 6
Automatic and Explicit Compensations
via *Progresa*
(monthly pesos per capita)

α	β	Δy_1	$\Delta y_1^{(a)}$	$\Delta y_1^{(e)}$
0.25	0.25	9.66	1.42	8.24
	0.50	15.02	1.42	13.60
	0.75	21.98	1.42	20.56
	1.00	45.31	1.42	43.89
0.50	0.25	19.31	2.83	16.48
	0.50	30.04	2.83	27.21
	0.75	43.97	2.83	41.14
	1.00	90.61	2.83	87.78
0.75	0.25	28.97	4.25	24.72
	0.50	45.06	4.25	40.81
	0.75	65.95	4.25	61.70
	1.00	135.92	4.25	131.67
1.00	0.25	38.62	5.67	32.95
	0.50	60.08	5.67	54.41
	0.75	87.93	5.67	82.26
	1.00	181.23	5.67	175.56

[45] Gender differentiation begins in the first year of secondary education.
[46] Monetary supports have an upper limit of 820 pesos per month (not taking school supplies into account). Moreover, *Progresa* grants in-kind support including a basic health kit, nourishment supplements for pregnant and lactating women, as well as for every child from four months to two years of age and for those children under five years showing signs of undernourishment. Obviously under the proposed compensation scheme, it should be necessary to adjust the upper limit of the monetary support.
[47] Indexing to the CCBA makes it possible to automatically adjust compensations via *Progresa*, in case of the disappearance of VAT's special regimes, by approximately twice the result obtained if indexed to the INPC. Nevertheless, this limits the ability to make automatic compensations for price rises due to the elimination of subsidies to the non-food expenditure component (e.g., electricity rate or household gas price adjustments). In this sense, it would be convenient to asess the possibility for *Progresa's* monetary transfers to be indexed to the INPC (or a linear combination of the INPC and the CCBA).

b) Capitalized Individual Accounts

The new Social Security Law, created a capitalized individual account (CIA) for every worker enrolled in the Mexican Social Security Institute (*Instituto Mexicano del Seguro Social, IMSS*), this is, for each salaried worker belonging to the formal private sector. Such account has two sub accounts: one for retirement and one for voluntary contributions.

The retirement account of the worker's CIA receives both the worker's and the employer's contributions, as well as a social contribution from the Federal Government, that does not depend on wage levels and is established in real terms (indexed to the INPC) amounting to 67.91 pesos of December 2000, per month. When the worker reaches 65 years of age, he/she can dispose of the balance on the retirement sub account of his/her CIA in order to acquire a pension both for him/her and his/her spouse and minor children. On the other hand, the worker's voluntary contribution sub account may receive contributions from worker and employer alike and the worker has the right to debit the account once every six months. Therefore, a rise in the social contribution does not mean a raise in workers' current income, since they can only dispose of this income as an increase in their retirement pension. Conversely, deposits from the Federal Government in voluntary savings individual sub accounts would represent a liquid resource transfer to the workers.[48] Consequently, crediting the voluntary savings account of the CIA, charging the federal budget, would be the most adequate tool to compensate the salaried workers of the formal private sector, i.e., the IMSS-enrolled workers and their families. Monetary fringe benefits could complementarily be increased for the workers enrolled in the Institute of Security and Social Services for State Workers (*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado, ISSSTE*), the Social Security Institute of the Armed Forces (*Instituto de Seguridad Social de las Fuerzas Armadas, ISSFAM*) and Petróleos Mexicanos' (PEMEX) social security scheme.

Government deposits in the voluntary savings CIA sub account, together with the increase in monetary benefits for the public sector workers would (jointly) constitute the second compensation tool in case of a VAT adjustment ($i = 2$)[49]. The population dealt with such tool (M_2) would consist of the population living in households where there are insured workers, whereas its target population (M_2^*) would be the population living in households where there are salaried workers since, according to the legislation in effect, every salaried worker must be enrolled in a social security institution. Consequently, the exclusion error (E_2) would consist of the population living in households where there are uninsured salaried workers, which derives from the presence of evasion, on the part of the employer, of social security obligations. On the other hand, the inclusion error (I_2), is scarcely relevant in conceptual and practical terms[50].

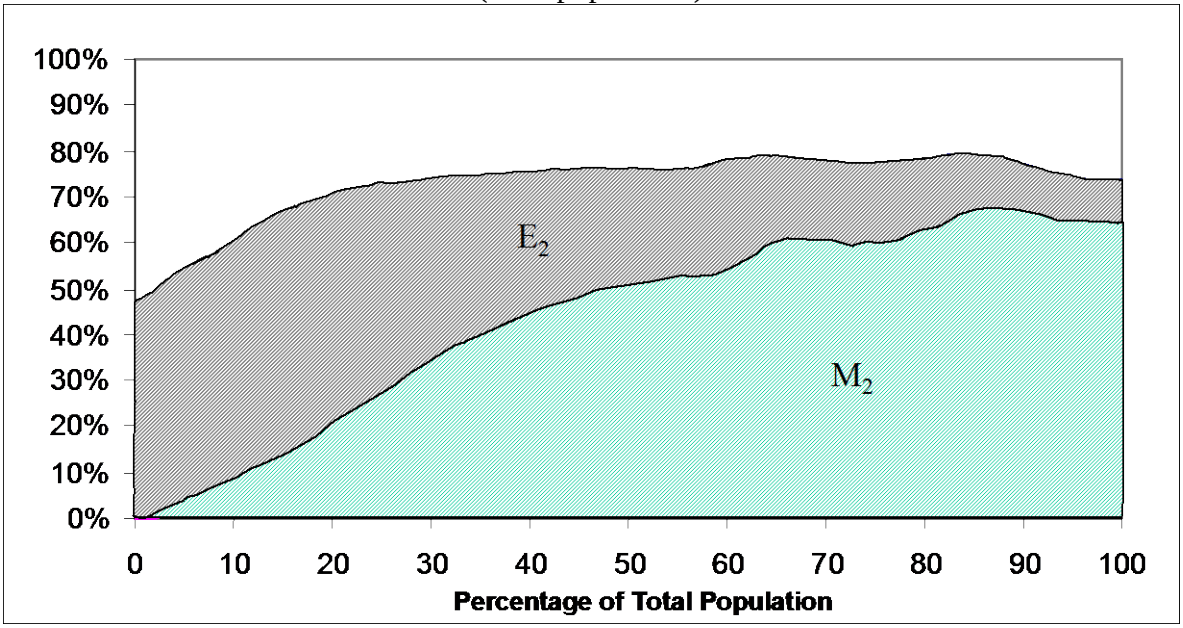
[48] If the Vat reform proposed here were to be carried out, it would be desirable to modify the Social Security Law (Art 192), in order to allow more frequent disposals, maybe even monthly, as well as to establish the possibility that the Federal Government might be able to credit those accounts.

[49] With the rise experienced by revenue-sharing and contributions, compensating state and municipality workers would be perfectly financiable.

[50] It deals with families of non-salaried individuals, but pretending to be, in order to have access to social security benefits.

Chart 11 shows the share represented by the population living in households with insured members (M_2) as well as the population in households where salaried, but uninsured, workers live, which constitutes the exclusion error of the tool (E_2), in each decile:

Chart 11
Population Living in Households with Salaried Workers, Insured and Uninsured
(% of population)



As it gathers from the chart, the tool's exclusion error (E_2), generated by employers' evasion of their social security duties is quite significant. However, even if the coverage were to be entirely eliminated, it would remain considerably below 100%, which indirectly reflects the significance of self-employment in the Mexican economy as well as the intrinsic limitation of social security coverage, when salaried workers are exclusively restricted to it[51].

On the other hand, the probability that an individual belongs to a household where insured workers live, tends to rise with income levels and therefore compensating insured workers may give way to significant inclusion errors for compensation strategy effects (I), even when applying a high β value (such as $\beta = 0.75$).

Formal salaried workers (both in the public and the private sector) are entitled to a wage credit which takes the income tax to negative values up to approximately 3.6 times the Mexico City minimum wage (smDF). Since the wage's tax credit is indexed to the

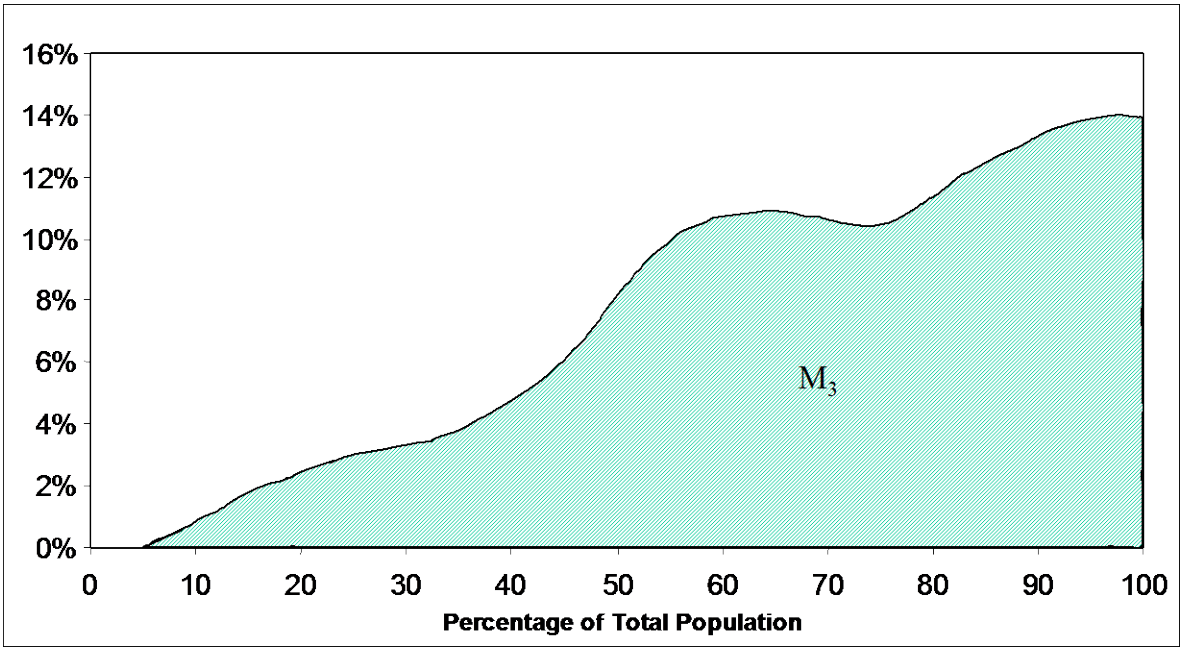
[51] The social security reform created the Family Health Insurance (*Seguro de Salud para la Familia, SSF*), allowing for a voluntary kind of insurance with the same in-kind benefits granted by IMSS's Illness and Maternity Insurance (*Seguro de Enfermedades y Maternidad, SEM*) in the compulsory regime. However, the attention mechanisms offered to open population are still attractive so that this insurance currently covers only 0.2 million families.

INPC, formal salaried workers are (partially) protected, automatically, against the price rises that would result from the proposed measures[52].

c) Adjusting Social Security Pensions

The third compensation tool (i = 3) consists of an increase in the retirement pensions granted by the social security institutions to the retired population, which would benefit the households where retired workers live (the population dealt with by means of this tool), (M_3)[53]. Chart 12 shows the share of households where retired workers live in total population for the entirety of each decile.

Chart 12
Population with Retired Workers in the Household
(%)



As it gathers from the chart (and against expectations), the population living in households where a member is a retired worker is concentrated around the last five deciles, so that the employment of this tool tends to increase the inclusion error, at least for relatively low values of β. Nonetheless, this tool would remain in the selected set since retired workers are not capable of increasing their income by participating in the labor market.

[52] For an income level of twice the smDF, the negative income tax amounts to 210.17 pesos per month, per-capita. The INPC increase (according to Table 1) would attain 3.2% for $\alpha = 0.50$ and, therefore, the automatic compensation, $\Delta y_2^{(a)}$, would amount to 6.64 pesos for such a value of α (rising or falling proportionally).

[53] In this case, the target population does not differ from the population dealt with, which is why neither the exclusion (E_3) nor inclusion (I_3) errors specific to this tool are defined.

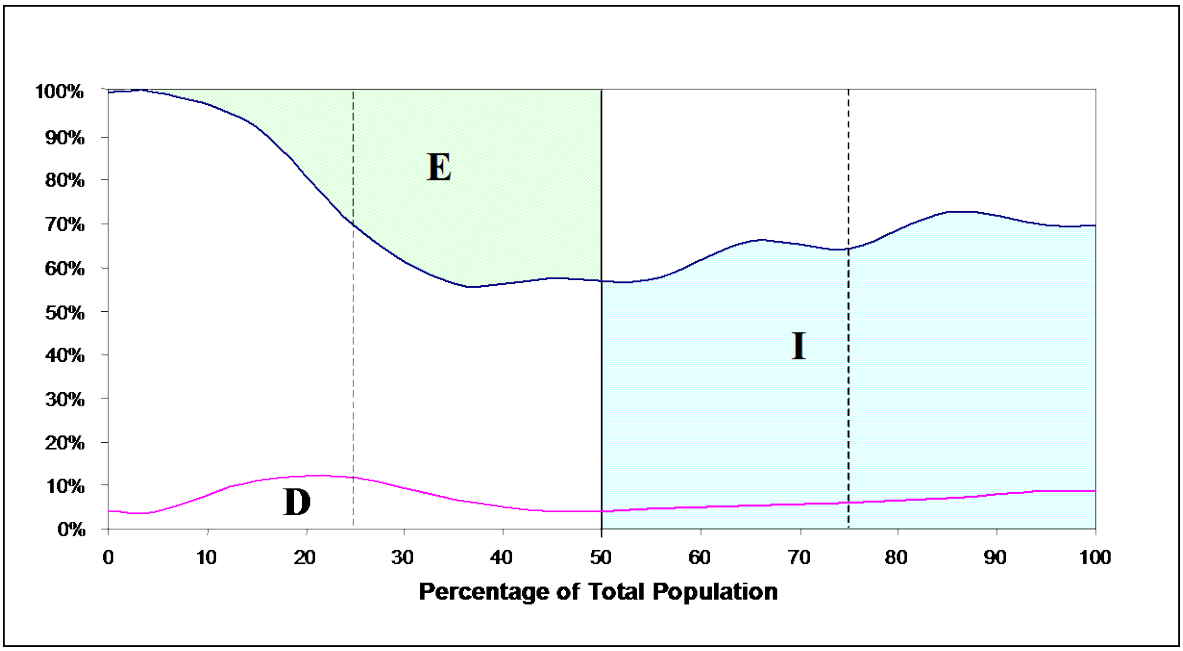
Moreover, it is worth noticing that pensions' real value is not protected by automatic adjustment mechanisms indexed to the INPC or the CCBA, but they are linked to the minimum wage[54], so that $\Delta y_3^{(a)} = 0$.

3. Duplication, Inclusion and Exclusion Errors

This section analyzes the duplication, inclusion and exclusion errors that emerge when compensations are granted simultaneously via the three tools mentioned above, assuming again that *Progresa* does attain its potential coverage.

Chart 13 depicts, for each decile, the union among the populations considered in each of the three tools, as well as the inclusion (I) and exclusion (E) errors for $\beta = 0.50$, together with the duplication errors (D).

Chart 13
Population in Households with Insured and Pensioned Members and *Progresa's* Potential Coverage
(% of population)



As it gathers from the chart 13, duplication errors never exceed 12% and amount, in average to 7% of total population, so they stand at nearly 10% of the population dealt with (since it represents 71% of the total population). Therefore, joint use of compensations via *Progresa* and payments to insured and retired workers of the social security does not generate any serious duplication problems.

[54] Except for the case of IMSS-retired pensioners after the reforms to the Social Security Law. On the other hand, military members' retirement pensions are linked to the active military personnel earnings.

When analyzing the union among the populations dealt with by the three tools per income deciles, the magnitudes of the inclusion and exclusion errors are determined (for selected β values) as well as their decomposition by quartiles, as shown in Table 7.

Table 7
Exclusion and Inclusion Errors

β	Exclusion error 1/				Inclusion error 2/
	Average	Quartile			
		First	Second	Third	
0.25	9.2%	9.2%	n.a.	n.a.	67.8%
0.50	24.9%	9.2%	40.7%	n.a.	46.8%
0.75	29.2%	9.2%	40.7%	37.8%	24.8%

1/ Percentage of the target population for compensation purposes.
2/ Percentage of dealt with population.

As it is observed, the first quartile can be compensated, almost completely, by means of the existent tools (particularly through Progresa if it reaches its potential coverage). Conversely, the exclusion error is significant in the second quartile, and reflects that this group does not belong to Progresa´s target population, but it neither has a proper access to social security. This confers a special priority to the creation of an adequate instrument to transfer incomes to population on moderate poverty not linked to formal sector, which, in practice, is concentrated mainly to urban informal sector.

Lastly, the inclusion error is also high for $\beta = 0.50$, although it falls significantly for $\beta = 0.75$.

4. Fiscal Cost

Table 8 summarizes the fiscal cost of the feasible compensations for the selected α, β and γ values, assuming that *Progresa* is taken to its potential coverage[55] and that, by means of each tool, the same per capita transfer is granted, corresponding to the parameters' selected values:

Table 8
Annual Fiscal Cost of Feasible Compensations
(billion pesos)

γ	0.00				0.50				1.00			
α / β	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00
0.25	3.0	6.0	9.0	12.0	5.9	11.8	17.8	23.7	8.7	17.5	26.2	35.0
0.50	3.0	6.0	9.0	12.0	8.7	17.5	26.2	35.0	13.6	27.2	40.8	54.4
0.75	3.0	6.0	9.0	12.0	11.1	22.2	33.3	44.4	19.9	39.8	59.7	79.6
1.00	3.0	6.0	9.0	12.0	13.6	27.2	40.8	54.4	41.0	82.1	123.1	164.1

[55] Attaining *Progresa's* potential coverage (from the coverage foreseen for the year 2001) means an additional fiscal cost amounting to 7.6 billion pesos (prices of december 2000), that is not, however, included in the table's calculations since it is not attributable to the compensation strategy.

As it gathers from the table, even under the pessimistic assumption that $\alpha = 1.00$, the entire target population may be overcompensated ($\gamma = 1.00$) for $\beta = 0.50$, albeit the implication of leaving the Federal Government with practically no revenue margin, (since ΔR_F equals 54.4 billion pesos). Alternatively, assuming that $\alpha = 0.50$, the entire dealt-with target population may be overcompensated for $\beta = 0.75$ and still leave a broad revenue margin to the Federal Government.

VIII. INCENTIVES: SOME COMMENTS

The compensation strategy proposed is based on transfers to be implemented by means of different instruments (Δy_i). In general, this would generate additional incentives to be part of the populations dealt with the different instruments (M_i). This effect is independent from the specific incentive structure of each tool, which affect the populations dealt with by each one, incentive structure that would not be modified by the compensation proposal.

The simplest case is the one related with the retired population (M_3), because the possibilities of manipulating this instrument are few: on the one hand, the annual growth of this population is limited and, on the other, the main inclusion criterion (age or invalidity) is easily verifiable.

Progresa has built - in a good incentive scheme for their beneficiaries (M_3) since:

- the scholarships are conditioned upon children's regular school attendance; and,
- the basic monetary transfer is conditioned upon household's members' attendance to health centers and clinics, so they can take advantage of the basic health package.

Additionally, since transfers are monetary, families can improve the quality and quantity of their nourishment, since they have greater flexibility to take advantage of local food supply (and the increase in monetary income stimulates local economies).

Nevertheless, Progresa's specific characteristics makes it attractive for people whose incomes are over the poverty line ($y_h > y^*$), that is, to individuals in the second, and even in the third quartile, and this obligates to select beneficiaries with a means test (specifically, as noted above, with a score system, which is meant to infer poverty condition from objective indicators). So, the increase of Progresa's transfers would lead to additional pressure on the score system which implies the necessity of strengthening the operational mechanisms of this program, to be sure about the fulfillment of the basic principles which preceded its creation.

The families covered by social security do not receive any monetary incentive for demanding the basic health package but, in exchange, they have family doctors that continuously evaluate their health condition an confront health-disrupting events at a very low marginal cost, since they receive medical attention (included highly specialized health care) with no deductibles or copayments and, also, monetary benefits absorb the implicit cost of absences[56]. On the other hand, IMSS new pension system (based, as noted above,

[56] See E. Dávila, and M. Guijarro (2000).

on the CIC) and the gradual evolution (throughout ten years, since 1977) towards a practically uniform contribution in order to finance substantially improved the incentive system[57]. through a more direct link between contributions to social security and their expected benefits.

In this context, the additional incentive towards formalization provided by the proposed compensation is considered as socially desirable. Nevertheless, it would not suffice to counter the existing disincentives (against the social security system) that generate, on one hand, the non-insurance of salaried workers (reflected in set E2), and on the other, the non-enrollment of self-employed workers in the Family Health Insurance (Seguro de Salud para la Familia, SSF). Worth noticing among these disincentives are, for the case of salaried workers' enrollment, the persistence of contributions which are perceived as taxes (such as IMSS's Day-Care Center and Social Benefits Insurance) and the fact that government health services aimed at the open (uninsured) population operate, in practice, as a subsidy to informality. This last effect may be, in itself, a determinant to disincentive self-employed workers' enrollment to the SSF. In any case, it cannot be ignored that, in different contexts, self-employment may be highly efficient and is perceived by workers as desirable[58], which is why its disappearance cannot, and should not, be proposed. Conversely, its incorporation into the compulsory social security regime should be proposed at least with regard to health services as well as for these workers to comply with their legal obligation to cooperate in the raising of consumption tax revenues (and particularly VAT). In order to grant an effective incentive for this formalization process, a proposal may be made in the sense of extending the right to a negative income tax to low-income self-employed workers, although such extension would take the form of a virtual payment applicable towards the SSF acquisition.

IX. CONCLUSIONS

This paper builds a simple analytical framework to determine the redistributive impact of a reform in the VAT. The framework does not capture the general equilibrium effects of such reform, which is why we cannot measure the efficiency gains obtainable from eliminating the differentiated regime or the effects of the reform on the labor market. Our aim has been more modest: on one hand, to concentrate attention on the possible measures to compensate (or even overcompensate) for the adverse redistributive effects of a VAT reform and, on the other, to obtain relatively reliable numerical estimates of the analyzed effects.

The analytical framework allows to assess the redistributive impact as well as the fiscal costs of compensating the target population, in terms of four key parameters: the percentage of additional resources generated by the reform which are transferred to state and local governments, λ; the percentage increase in VAT rates transferred to final consumers, α; the percentage of total population considered as low-income and that should be therefore compensated, β; and the percentage of target population eligible for overcompensation, γ. Our numerical estimates are based on the 1998 National Household Income-Expenditure Survey (*Encuesta Nacional de Ingresos y Gastos de los Hogares para*

[57] See E. Dávila (1997).
[58] See, for the specific case of Mexico, e.g., Maloney (1998).

1998) and allow us to conclude that, paradoxically, the sharp inequality of Mexico's income distribution offers, in principle, an opportunity to implement a VAT reform that raises revenues and redistributes income simultaneously. Specifically, if $\alpha = 0.50$, it is financially possible to overcompensate three-quarters of the population with a redistributive effort of 16.8 billion (representing net transfers towards the first three quartiles of income distribution) and still obtain a revenue surplus for the Federal Government of nearly 15.9 billion, as well as 26.8 billion pesos worth of additional income for states and municipalities.

Further ahead, we consider the three major tools available for the Federal Government to undertake, in practice, the desired compensations, and we develop a conceptual framework to identify exclusion, inclusion and duplication errors. In the numerical application we find that, for the instance of a target population consisting of the first three quartiles of income distribution ($\beta = 0.75$), it is operationally[59] possible to compensate or overcompensate 71% of such population, with the population formed by the informal urban sector the most difficult to access, which translates into a 29% exclusion error. At the same time, and for that case in point, the inclusion error would amount to 25% of the dealt-with population, and the possible duplication error would reach 10% of such population.

From an analytical perspective, we are convinced that the previous results are interesting, albeit they require a deeper study of the impact the VAT reform would have on individuals' incentives, particularly concerning their incorporation into the formal labor market. From the point of view of public policy-makers, however, the results only present a partial solution to the problem presented here, as it almost always happens in economic policy matters. A uniform 15% VAT rate would significantly strengthen the State's revenues, allowing[60] for an improvement in income levels for 75% of the poor population (considering it is half of the total population) although there would be a negative impact on the remaining 25% of the poor population, which poses a serious dilemma. It should be noted, however, that income improvements would reach 91% of the first quartile and practically the whole population of the first decile.

In any case, the question that remains to be analyzed is if, with the resources made available by the reform, net of compensations, it is feasible to design other programs and measures to assist the population not covered with the tools studied here and improve their welfare levels. We are convinced that this is feasible to the extent that the State's fiscal strengthening is channeled towards increases in social expenditure[61]. Such increase would contribute to eliminate the current dilemma in terms of VAT, creating conditions to make voting in favor of the VAT the equivalent of voting towards equity and macroeconomic stability, and the strengthening of the State.

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[59] And also financially if $\alpha = 0.50$.

[60] As shown in Table 7 and in Table 8 (for $\alpha = 0.50$).

[61] An option would be to create a national system of scholarships to encompass half the population (since the families belonging to the first five deciles confront economic problems for their children to conclude, without delays, junior high school). Another option is the already discussed possibility of expanding the application of the negative income tax to low income self-employed workers as a virtual payment applicable to the SSF contribution. One more is to explore the possibility to rise *Procampo's* payments.

In this document, the analytical framework allows to systematically explore a wide array of alternatives, particularly the specific weight to be given, on the one hand, to the redistributive effort by means of the existing tools and, on the other hand, to the net revenue margin to be freely allocated by the Federal Government, which may be channeled to the creation of new redistributive tools.

Since the current tools are not effective to cover population in moderate poverty (particularly, the urban informal population) it is advisable to adopt a conservative compensation strategy with a wide revenue margin for the Federal Government, to create new redistributive instruments, as the negative income tax for freelance workers, to be applied to the Family Health Insurance. In this context, it would be convenient to consider, as target population for compensation purposes, the first two deciles of the income distribution, but overcompensating only the first quartile (that is, taking $\beta = 0.50$ and $\gamma = 0.50$) with a feasible fiscal cost of 17.5 billion pesos, and a Federal Government surplus of 36.9 billion pesos worth, enough to extend the medical insurance benefits to low income freelance workers.

Finally, and in more general terms, we believe that the approach introduced in this paper may be applied in the analysis of certain situations where there are conflicts between efficiency and equity. As we mentioned in the introductory paragraphs, the prior absence of direct redistribute tools led to the use of public service prices and rates (such as electricity, phone services, water, etc.) with redistributive purposes, with the consequently high efficiency costs[62]; the same thing happened in the instance of price controls or fiscal subsidies to selected products, generally food. The significant inequity in income distribution caused by these measures was the motivation to establish them and, paradoxically, what made them ineffective and inefficient. To the extent we are able to replace such income transfer mechanisms with tools that are similar to the ones set forth in this paper, we are convinced that achieving higher equity, and higher efficiency at the same time, is a feasible project. We think that it is important to stress that, particularly from the perspective of the lower-income population, the relevance does not lie on the tool to employ, but on achieving the goal.

[62] Throughout 2000, household consumption subsidies implicit in electricity rates amount to nearly 22.4 billion pesos, of which it is estimated that only 44% is captured by the first five deciles of income distribution.

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