Financing Universal Social Security in Mexico

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Abstract

The proposal by Levy (2008) whereby a universal social insurance (USI) scheme is guaranteed to all workers, regardless of formality status, aims at abolishing the current contributory social insurance system and financing social insurance through value-added taxes instead (henceforth, the *social security reform*). We argue that this is a major reform as it breaks down the duality present in social insurance policy in Mexico and other Latin American countries and put an end to both informality and the truncated welfare state problem, in the sense that all workers would be covered by the same regulations with regard to social insurance. The model is calibrated for the Mexican economy, as this country is characterized by a large informal sector, high rates of tax evasion, and a knotty tax system, including differentiated rates on value-added taxes. In particular, we estimate the hypothetical cost of such scheme for 2008 as well as the extra revenues generated after imposing a uniform VAT rate of 16 percent. These calculations are based on a static general equilibrium model, which takes into account the change in firms' behavior in a tax evasion framework. The results suggest that the USI scheme is financially viable, even after taking into account a compensatory transfer to poor households as a result of the VAT increase. In addition, real wages in the formal sector might increase by 15 percent as a result of USI. This number should be interpreted as an upper bound estimate, given that the model assumes an inelastic labor supply.

JEL Codes: J58, I13, J21, J26

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Introduction

A contributory social insurance system (the so called "Bismark" model of social insurance, henceforth CSI) has been in place in most Latin American countries since the early part of the 20th century. As well known, this program was implemented with the objective of providing workers and their families with protection against health shocks, poverty in old age and other risks. Even though this system is now several decades old, there is still a large number of workers in Latin America not covered against such risks. For example, Gasparini and Tornarolli (2009) estimate that on average about 56% of workers in the region are not enrolled in a contributory social insurance scheme. This has led to characterize this situation as the "truncated welfare state" (Fiszbein, 2005; Perry et al., 2007).

In an attempt to at least partially revert this situation, over the last years a non-contributory social insurance (NCSI) system has been built in parallel by several governments in the region. However, this dual social insurance scheme may yield undesirable outcomes over time as the non-contributory system may incentive informality and erode the tax base (Levy, 2008).[2] Given this policy dilemma, is it possible to think about an alternative situation, where the State provides insurance to all workers without simultaneously promoting informality? That is, can the State provide a non-contributive universal social security scheme?

This paper claims that such an alternative is possible and financially viable. In particular, we consider the proposal by Levy (2008) whereby a universal social insurance (USI) scheme is guaranteed to all workers, regardless of formality status. This proposal aims at abolishing the current CSI system and financing social insurance through value-added taxes instead (henceforth, the *social security reform*). We argue that this is a major reform as it breaks down the duality present in social insurance policy in Mexico and other Latin American countries. In this sense, this proposal would in fact put an end to both informality and the truncated welfare state problem, in the sense that all workers would be covered by the same regulations with regard to social insurance.

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[2] We follow Kanbur (2009) and define formality with respect to "a" regulation. In this paper we focus on social insurance, so the relevant regulation in this case is coverage of social security. Hence a worker is labeled as formal if she is enrolled in a contributory social insurance scheme according to law; otherwise, the worker is classified as informal.

To evaluate Levy's proposal, we construct a static, general equilibrium model with tax evasion.[3] The model is calibrated for the Mexican economy, as this country is characterized by a large informal sector, high rates of tax evasion, and a knotty tax system, including differentiated rates on value-added taxes.[4] Taking into account the existence of differentiated VAT rates, the model is simulated to study whether a uniform VAT rate of 16 percent yields the necessary resources to finance USI. The advantage of having a model is to understand how the change in relative prices resulting from the social security reform affects firms' decisions in a tax evasion framework. It is also useful to identify other parallel benefits of this reform that include, among others, a potential increase in workers' real wage. Finally, the model allows us to examine how the government fiscal balance would be affected by this reform.

After calculating the costs of implementing USI from Mexican data, the simulation suggests that the social security reform with a uniform VAT rate of 16 percent is financially viable at least in a static way. This is true even after taking into account a direct income transfer to the poorest households to compensate them for the VAT increase on those goods not currently taxed. The model also suggests that real wages in the formal sector might rise by 15 percent, as a result of the large increase in labor demand due to the elimination of CSI. In parallel, we acknowledge that the pressure on public finances as a result of the social security reform may increase over time, given the natural changes in the demographic structure of the population. For this reason, a policy warning is that additional sources of financing the scheme might need to be considered over the medium term.

This paper is organized as follows. Section 1 briefly compares the current social insurance and tax policy in Mexico against USI's proposal. Section 2 presents the model. Section 3 compares the model to Mexican data. Section 4 presents a preliminary estimation of the effects of USI on government's budget balance, wages and the labor market. Section 5 concludes with some remarks.

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[3] In this paper, we only present a sketch of this model. For details, see Antón, Hernández and Levy (2011).
[4] As of 2011, value-added taxes in Mexico apply to some goods and services at a rate of 16 percent. VAT is excluded from goods such as food and medicines, among many others.

1. Current social insurance and tax policy vs. USI

a) Current social insurance vs. USI

Social insurance policy in Mexico may be characterized by a dual scheme (Levy, 2008). On the one hand, there is a social security structure for formal workers providing health, work-risk, and life an disability insurance; day care for workers' children; a contributive retirement pension system; and housing loans (see Table 1). In order to get access to these benefits, a contributory scheme applies while being and remaining in formality. To the extent that these benefits are not fully valued by workers, contributions to social insurance constitute a "pure" tax on salaried labor.

On the other, social insurance benefits are offered to both non-salaried (i.e., self-employed and workers in family firms) and salaried informal workers financed by general revenues.[5] These benefits include health services provided by Federal and State governments (through *Seguro Popular,* a joint federal and state program); subsidies for housing; day care; and pensions provided by *Oportunidades* and some State programs (Distrito Federal, Estado de México, and Michoacán). These benefits constitute in fact a subsidy to informal workers as they are based on a non-contributive scheme. As of today, informal workers are not covered from life, disability and work risks (see Table 1).

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[5] In Mexico, salaried informal workers are illegal in the sense that CSI contributions must be paid by law but are evaded. In contrast, non-salaried informal workers are legal in the sense that they are not forced by law to comply with CSI taxes.

Table 1
Social insurance: Status quo vs. USI

Coverage	Status quo		USI
	Formal	Informal	
Health insurance	Wide coverage	Basic coverage	Wide coverage
Life and disability insurance	Yes	No	Yes
Work-risk insurance	Yes	No	Contributory system only for salaried workers
Pensions	All workers	All *Oportunidades* affiliates and the elderly in some Mexican states	All workers
Day care	Yes	Yes	No
Housing	Yes	Yes	No

Despite the access of informal workers to health insurance, currently there are important differences in the array of services provided to formal and informal workers and their families in Mexico. In particular, health services available to informal workers are limited in scope, as compared to those provided to formal workers. For example, *Seguro Popular* covers a package of mostly primary and secondary health care services, including preventive, outpatient, inpatient, emergency, and a restricted (but gradually increasing) list of surgical interventions. In contrast, formal workers are provided with a wide coverage of health services, including tertiary care services.

The coexistence of these two mutually exclusive programs clearly incentives firms to hire salaried informal workers in order to avoid paying for CSI. If a firm perceives that the probability of being detected by the authority evading CSI payments is small, it will be less costly for the firm to hire a worker with no CSI coverage at all. This is especially true for small firms as it is more plausible for them to go undetected by the authorities in such illegal practice. Hence this dual scheme not only incentives informality but it also incentive firms to keep small in size, with potentially adverse effects on productivity and fiscal revenues.

Under the social security reform proposed here, a universal health, life and disability insurance along with a retirement pension is provided *equally* to all workers regardless of formality status. The proposal contemplates a wide coverage of health

services, similar to those currently available to formal workers. It also guarantees both a life and disability insurance and a retirement pension not currently available to all informal workers (see Table 1). Work-risk insurance is contemplated for salaried workers only, financed through a firm's specific, wage-based contributory rate (see Antón, Hernández and Levy, 2011 for details). In contrast, USI does not consider day care and housing coverage as they are not perceived as essential risks for which all workers need to be protected (see Levy, 2008 for a discussion). Under USI, social security contributions (other than work-risk insurance) are thus eliminated in order to minimize distortions in the labor market and the perverse incentives under the current status quo.

b) Current tax policy vs. USI

Mexico's tax system is complex. Like many countries, revenue collection is very centralized as the most important taxes (corporate income, value added, foreign trade and most excise taxes) are levied and collected by the federal government (approximately, 96% of total tax revenue). The structure, however, is highly knotty as there are plenty of special treatments in both corporate/personal income and value-added taxes. With respect to VAT, the current rate is 16 per cent. However, there are several special treatments: food and medicines are zero-taxed while other goods and services are tax-exempted (see Table 2). Furthermore, VAT rates at border zones are different from the rest of the country, currently set at 11 per cent.

Table 2 also presents the current structure of SI taxes and subsidies in Mexico. CSI taxes are estimated at 38% of formal worker's wage rate on average (Antón, Hernández and Levy, 2011). Out of this tax, the government subsidizes approximately 16 percent. On the other hand, subsidies to informal workers are gradually increasing over time. In 2008, they are estimated at $5,650 per informal worker, which represent approximately 7% of the informal wage rate on average.

Table 2
Value added and SI taxes and subsidies: Status quo vs. USI

Tax/subsidy	Status quo	USI
Value-added	A 16% VAT rate on non-border states; a 11% VAT rate on border states. A zero VAT rate on food and medicines. Education, cultural activities, private medical expenses, some financial services, and books and magazines are tax-exempted	A uniform VAT rate of 16% on all goods and services
Tax on formal workers	An average 38% tax rate on formal worker's wage must be paid by law. The government subsidizes approximately 16% out of this tax	Zero
Subsidy to informal workers	Approximately $5,650 pesos per year per informal worker in 2008	Zero

Source: Antón, Hernández and Levy (2011).

These features of the tax system combined with a set of other factors, like the existence of high levels of illegality (à la de Paula and Scheinkman, 2010); a deficient rule of law (Laporta et al. 1999, and World Bank Doing Business, 2010); a low quality of public expenditures (Scott, 2010, for social expenditures; World Bank IPER, 2005, for public infrastructure); and an inefficient tax collection authority in the presence of some corruption (see mandatory public evaluations at www.sat.gob.mx for different taxes), have induced high levels of tax evasion. In the particular case of value-added taxes, it is estimated that VAT revenue would be close to 6.1% of GDP under full compliance, given the current tax rates. Instead, observed revenues were 3.77% of GDP in 2008 (Antón and Hernández, 2010). As for CSI taxes, it is estimated that about two thirds of the total labor force engaged in market activities in Mexico do not pay social security contributions (Levy, 2008; Antón, Hernández and Levy, 2011).

Under USI, social security contributions (other than work-risk insurance) and subsidies to informal workers are eliminated in order to minimize the distortions in the labor market mentioned earlier. To finance social security, a uniform VAT rate on all goods and services is proposed. Such proposal is a major break down with respect to the status quo. It has the advantage of eliminating distortions in after-tax relative prices across the different sectors in the economy. It may also reduce substantially many loopholes and elusion strategies currently in place. However, a major concern is the

negative impact that a uniform VAT rate could have on the poorest households, as a proportionately larger share of their income is spent on food and medicines. For this reason, a direct income transfer to the two lowest-income deciles of the population is contemplated as part of the costs of the proposal, as explained below.

Arguably, the social security reform proposed here brings substantial changes in both social and tax policies. It does not only provide social insurance for all workers (a legitimate social policy goal for its own sake) but in addition eliminates several relative price distortions currently in place in both labor and goods markets. There are other potentially advantages of this reform, such as an increase in real wages and a smaller size of the self-employed sector, which typically goes undetected to the tax authorities and is arguably less productive. To prove this point, we rely on a general equilibrium model that helps to understand why this may be the case.

2. The model

This section briefly presents the structure of the model used in this paper to evaluate the effects of the social security reform on variables such as the government's fiscal balance and real wages, among others. The interested reader is referred to Antón, Hernández and Levy (2011) for further details.

The model is a static, neoclassical general equilibrium model of a small open economy with government. There are three sectors: an intermediate, a final, and a self-employed sector, with firms behaving in a competitive fashion.[6] Goods produced in these sectors are tradable so their prices are exogenously given, as well as labor and capital endowments. GDP is endogenously determined after aggregating all firms' value-added.

The government may impose three different taxes on firms: value added taxes (τ_{vat}), income taxes (τ_{ct}), and social security contributions (τ_n). However, firms have an incentive to evade taxes. The probability of being detected in such practice by the authority is directly proportional to firm's size, so a relatively large firm faces a higher probability of detection relative to smaller firms. Thus a relatively large firm will evade less so that its rate of tax compliance will also be higher. In contrast, the self-employed

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[6] As this is a model for profit maximizing firms, government employees and people engaged in religious activities are excluded from the analysis.

sector is able to evade all taxes as the size of such firms is typically small; thus this sector does not pay taxes at all.

Intermediate goods are produced with two inputs: labor L and capital K, which is distributed exogenously across firms. There are two types of intermediate goods (indexed by $z = i, j$) that differ in the technology level A_z, the distribution of capital K_z and the value-added tax rate $\tau_{vat,z}$ they face by law. In particular, the VAT rate in sector i, $\tau_{vat,i}$, is set to zero whereas in sector j it is positive. Conveniently, intermediate sectors i and j are labeled as the "non-taxed" and "taxed" sectors, respectively.

Intermediate good firms demand salaried labor, and they choose whether to hire workers with social security benefits (formal) or not (informal). If firms hire formal workers, they must pay the formal wage w_f plus CSI taxes for the amount $\tau_n w_f$. If government subsidizes a share η of CSI, the unit cost of a legally hired salaried worker is just $[1 + (1 - \eta)\tau_n]w_f$. In contrast, if firms hire informal workers they pay the informal wage w_{nf}. However, firms may be discovered by the authority in such practice with probability $\lambda_{ssc,z}$. If discovered, firms must pay the amount θ, which includes all unpaid social security contributions times a penalty. Hence, the expected unit cost of a illegally hired salaried worker is $w_{nf} + \lambda_{ssc,z}\theta$. To the extent that the probability of being detected evading CSI taxes is less than one, it will be optimal for firms to demand a mix of formal and informal workers.

The problem for a profit-maximizing firm of size K_z is to choose total labor demand $L_z(K_z)$ and salaried informal workers $L_{nf,z}(K_z)$.[7] For the first case, the demand function is given by

$$L_z(K_z) = \left(\frac{\left(1 - \tau_{vat,z}\xi_{vat,z}(K_z)\right)\alpha A_z p_z}{[1 + (1 - \eta)\tau_n]w_f} \right)^{1/(1-\alpha)} K_z, \qquad \text{for } z = i, j. \qquad (1)$$

In expression (1), α is the labor elasticity of income, p_z is the exogenous price of the intermediate good z, and $\xi_{vat,z}(K_z)$ is the (size dependent) firm's VAT rate of compliance.[8] Thus $\tau_{vat,z}\xi_{vat,z}(K_z)$ represents the *effective* VAT rate faced by a firm of

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[7] Naturally, salaried formal workers $L_{f,z}(K_z)$ are defined as the residual $L_{f,z}(K_z) = L_z(K_z) - L_{nf,z}(K_z)$ with the restriction $L_z(K_z) \geq L_{nf,z}(K_z)$.

[8] The rate of compliance is defined as the ratio of the amount of taxes effectively paid by the firm over the amount of taxes that should be paid under full compliance of the law.

size K_z. From (1), it may be noticed that both value-added taxes and social security contributions negatively affect labor demand.

Standard optimality conditions also yield a demand function for salaried informal labor $L_{nf,z}(K_z)$ given by the following expression:

$$L_{nf,z}(K_z) = \left\{ \left[\frac{[1+(1-\eta)\tau_n]w_f - w_{nf}}{3\theta\hat{\lambda}_{ssc}} \right] \left(\frac{1}{K_z{}^v} \right) \right\}^{1/2}. \tag{2}$$

Here, $\hat{\lambda}_{ssc} > 0$ and $v > 0$ are parameters related to the firm's probability of being detected evading CSI taxes. Either a higher value for these parameters or a higher payment θ translates into a lower demand for informal labor. Notice also that $L_{nf,z}(K_z)$ is an increasing function of the wage gap $[1 + (1 - \eta)\tau_n]w_f - w_{nf}$. Functional forms (1) and (2) imply that the fraction of informal salaried workers relative to total labor, $L_{nf,z}(K_z)/L_z(K_z)$, decreases as the firm's capital size is larger.

In the final good sector, perfectly competitive firms simply aggregate intermediate goods i and j according to a CES production function. Thus labor is not required to produce the final good. However, firms must pay value-added and income taxes. As in the intermediate sector, these firms have an incentive to evade these taxes. It is assumed that the rates of tax compliance in the final sector are a weighted average of the tax compliance rates in the intermediate sector.[9]

In the model, the self-employed sector comprises self-employed workers and workers in family firms with non-salaried contractual relations. Here, labor L_{ae} is the only input for producing goods, and the cost of labor is simply the informal wage rate w_{nf}. Firms maximize profits in the usual fashion, so that optimal labor demand is inversely related to the wage rate w_{nf}.

Regardless of status, workers value social insurance services provided by the government. Following Levy (2008), let $\{\beta_f, \beta_{nf}\}$ denote respectively the parameters indicating how formal and informal workers value such services, with $0 \leq \beta_f, \beta_{nf} \leq 1$. Accordingly, the indirect utility of a formal worker, U_f, may be written as $U_f =$

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[9] By this way, the intermediate-final good structure in the model gives place to a transmission mechanism of tax evasion between sectors, as in de Paula and Scheinkman (2010).

$w_f(1 + \beta_f \tau_n)$. Similarly, the utility of an informal worker is just $U_{nf} = w_{nf} + \beta_{nf} T_{nf}$, where T_{nf} denotes social insurance spending per informal worker.

Some studies on labor markets suggest a large mobility between formal and informal employment (see Maloney, 1999, 2004; Gong et al., 2004; Navarro and Schrimpf, 2004; and Calderon, 2000, 2006). This evidence suggests that workers are indifferent to the wages they can earn in either sector, once the valuation of social insurance services is included. From the above discussion, this implies a relationship between w_f and w_{nf} of the form

$$w_{nf} = (1 + \beta_f \tau_n)w_f - \beta_{nf} T_{nf}. \tag{3}$$

Let $\bar{L}$ represents total labor endowment and L_z total labor demand in the intermediate sector $z = i, j$. Thus it must be the case that $\bar{L} = L_i + L_j + L_{ae}$. This resource condition along with expression (3) solve for equilibrium wages w_f^* and w_{nf}^*. In the model, real wages are defined by w_f^*/P and w_{nf}^*/P, where P is the (endogenously determined) consumer's price index.

Finally, it remains to specify the government's fiscal balance. In the model, there are four revenue sources and three spending sources. Revenue sources arise from value-added taxes (R_{vat}), social security contributions (R_{ssc}), income taxes (R_{ct}), and other sources $\bar{R}$.[10] Here, the first three sources are endogenously determined. On the other hand, spending sources are divided into exogenous spending ($\bar{G}$) and endogenous subsidies to CSI (G_{ss}) and NCSI (G_{sp}) programs. These subsidies are proportional to the number of formal and informal workers, respectively.

Let FB denote the government's fiscal balance. Thus

$$FB = (R_{vat} + R_{ssc} + R_{ct} + \bar{R}) - (\bar{G} + G_{ss} + G_{sp}), \tag{4}$$

where a "bar" over a variable denotes that it is exogenous.

It turns out that labor demand equation (1) has direct implications on government revenue in (4), as labor is directly linked to intermediate firm's value-added and income. For example, an increase in the CSI tax τ_n lowers labor demand and thus

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[10] In Mexico, "other" income sources mostly refer to oil revenues.

value-added for intermediate good firms. It also decreases profits for those firms with a relatively large capital size, as these firms cannot avoid being undetected by the tax authorities.[11] These two effects naturally erode the tax base for both value-added and income taxes. Given that formal labor is now more costly than informal labor, informality increases. This explains the negative relationship between informality and government revenue out of value-added and income sources. Notice that a similar effect is obtained if government subsidies to formal labor, η, decrease.

A larger subsidy T_{nf} to informal labor works in a similar fashion. From the arbitrage condition (3), the informal wage w_{nf} must decrease for a given formal wage w_f. This effect increases the demand for non-salaried, self-employed workers and thus the relative size of informal workers. Again, the increase in informality erodes government revenue.

Two issues deserve a further comment. First, from equation (1) it is clear that an increase in the value-added tax $\tau_{vat,z}$ has a negative effect on labor demand. This effect is greater for larger firms in the intermediate sector z, as they face higher effective VAT rates. In fact, labor optimally reallocates from larger to smaller firms so the net effect is an increase in informal labor. Hence, implementing a positive VAT rate in the "non-taxed" sector and simultaneously eliminating CSI taxes (as it is the case under USI) in principle have an ambiguous effect on informality. However, the exercises below illustrate that the net effect on formal labor is positive as the self-employed sector contracts sharply under USI.

Second, the model endogenously yields a zero salaried informal labor under USI. To see this point, notice that the arbitrage condition (3) implies that formal and informal wages must be equal, as USI eliminates both taxes and subsidies on labor ($\tau_n = T_{nf} = \eta = 0$). The equalization of wages thus implies a zero wage gap, so that salaried informal labor must be zero (see equation 2). Simultaneously, labor demand for a firm of size K_z must increase as CSI taxes are eliminated (see equation 1). For a given labor supply, the wage rate must increase in equilibrium. The exercises below suggest that such increase is relatively large under USI.

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[11] In contrast, profits for small firms increase as they are able to substitute informal for formal labor, given the small probability of being detected by the tax authority.

3. Taking the model to the data

To discuss the social security reform at the light of the previous section, the model is calibrated to replicate relevant features of Mexican data. In particular, the model aims at reproducing the government's fiscal balance in 2008 as well as other characteristics of the economy. We do not report here how parameters are calibrated. The interested reader is referred to Anton et al. (2011) for details. Instead, we present the model's fitness for the variables of interest.

Table 3
Macroeconomic and Fiscal Accounts

	Observed		Calibrated	
	Pesos*	% GDP	Pesos*	% GDP
GDP	12,110.5		12,146.0	
Public Expenditures				
Social insurance for informal workers	151.5	1.25	151.0	1.24
Social insurance for formal workers	63.7	0.52	62.2	0.51
Other exogenous	2,679.5	22.1	2,679.5	22.0
Public Revenues				
Value-added tax	457.2	3.77	457.9	3.76
Income tax	393.0	3.24	392.4	3.23
Other exogenous	1,852.0	15.29	1,852.0	15.24
*Fiscal balance***	-192.5	-1.58	-190.4	-1.56

Source: INEGI and Cuenta de la Hacienda Pública Federal, Secretaría de Hacienda y Crédito Público, 2008.
*Thousands of millions of 2008 pesos.
** Negative is deficit.

Table 3 compares the macroeconomic and fiscal accounts of the model with those in the data. The exogenous components of expenditures and revenues are the only elements in the table that are set equal to those in the data; the remaining entries are endogenously obtained in the model. As it may be seen, these accounts are replicated remarkably well, including the government's fiscal deficit of 192.5 thousand of million pesos.

The social insurance accounts from data and the model are presented in Table 4. Here, social insurance is divided into private (i.e., firms and workers) and government contributions. Expenditures on contributory social insurance are classified into four major items: IMSS (the public institute in Mexico providing health services to formal workers), retirement pensions (Afores), housing (Infonavit), and state taxes. Expenditures on non-contributory social insurance are divided into health, pensions, housing, and day care. It may be observed that health is by far the item with the largest

expenditure share under both insurance systems, followed by pensions. Remarkably, the model closely replicates the data for all items.

Table 4
Social Insurance Accounts

	Observed		Calibrated	
	Firms and workers	**Government**	**Firms and workers**	**Government**
A. Contributory social insurance				
IMSS				
Health	109.3	44.3	111.9	43.2
Disability	21.0	1.9	21.5	1.9
Work-risk	16.8	0	17.2	0
Day care	8.4	0	8.6	0
Afores				
Retirement	54.9	17.5	55.4	17.1
Infonavit				
Housing	43.4	0	44.0	0
State taxes	25.7	0	26.4	0
B. Non-contributory social insurance				
Health	0	131.0	0	130.6
Pensions	0	9.5	0	9.5
Housing	0	9.2	0	9.1
Day care	0	1.7	0	1.7

Source: Own calculations based on IMSS, Consar &, Infonavit annual reports, and Cuenta de la Hacienda Pública Federal 2008 (SHCP).
Figures in thousands of million pesos.

Table 5 presents employment data according to different criteria. Part A divides total labor force into non-taxed, taxed, and self-employed sectors. Here, the model is able to closely match the data for all items. Part B presents data according to formality status. The model replicates informal, non-salaried labor well but over-estimates salaried informal labor by about 440,000 workers (at the expense of formal workers). This number represents about 6 percent of total salaried informal workers. The third part shows data by firm size, according to the Economic Census 2009. The model follows the data at the tails of each distribution, but fails slightly to replicate the middle of the distribution in the taxed sector.

Table 5
Composition of Employment

	Observed		Calibrated	
A. By sector				
Non-taxed sector	5.28		5.24	
Taxed sector	14.84		14.86	
Self-employed sector	18.91		18.93	
Total	39.03		39.03	
B. By formality status				
Formal	12.76		12.29	
Informal	26.27		26.73	
Salaried	7.36		7.80	
Non-salaried	18.91		18.93	
C. By firm size				
	Non-taxed sector		**Taxed sector**	
	Observed	**Calibrated**	**Observed**	**Calibrated**
1-5 employees	2.53	2.39	4.24	3.86
6-20 employees	0.70	0.67	2.31	1.89

21-50 employees	0.44	0.49	1.27	1.71
50-100 employees	0.34	0.40	0.97	1.71
101+ employees	1.27	1.29	6.05	5.69

Source: Economic Census 2009, INEGI; National Survey of Occupation and Employment, INEGI; and IMSS.   Numbers   are millions of workers.

VAT revenue as a percentage of GDP under alternative scenarios is presented in Table 6. For that purpose, the model is calibrated to closely replicate a revenue rate of 3.77 percent observed in the data. If full compliance in value-added taxes is assumed, the model yields a revenue rate of 6.12 percent. Remarkably, this number is close to the estimate of 6.08 percent reported by Antón and Hernández (2010) based on National Accounts data. The model also predicts that VAT revenue would amount to 6.2 percent of GDP if a uniform rate of 15 percent is implemented, assuming no change in government's enforcement efforts. This number increases to 10.6 percent under the hypothetical case of full compliance, which is close to the 10.7 percent estimated from National Accounts by Antón and Hernández (2010).

Given that the model replicates the data quite well along several dimensions, now it may be used to evaluate the impact of current social policy on labor markets and fiscal accounts. For that purpose, we take as a benchmark a hypothetical situation with no social insurance. Then labor taxes and subsidies are added each at a time, according to the values observed in the data in order to account for its marginal impact on the variables of interest.

Table 6
VAT Revenue (% of GDP)

	Observed or calculated from National Accounts	Calibrated
$\tau_i^{VAT} = 0, \tau_j^{VAT} = 0.15$		
Under current enforcement	3.77*	3.76
Assuming full compliance	6.08**	6.12
$\tau_i^{VAT} = 0.15, \tau_j^{VAT} = 0.15$		
Under current enforcement	N.O.	6.2
Assuming full compliance	10.7**	10.6

* Observed. Source: National Accounts, INEGI.
** Calculated from National Accounts by Antón and Hernández (2010).
N.O. Not observable.

Table 7 presents the results of such exercise. Column two is the benchmark scenario, which represents the no social insurance case, namely $\tau_n = \eta = T_{nf} = 0$. Column 3 introduces CSI at the observed rate τ_n of 38 percent in the data. Column 4 adds government subsidies at the current rate ($\eta = 0.16$, implying a subsidy per worker of 5,062 pesos) to the scenario in column 3. Finally, column 5 considers the status quo

in 2008, which includes the scenario in column 4 plus NCSI for the amount of 5,650 pesos per worker.

Several observations are worth to point out from Table 7. First, real wages are higher with no social insurance. Second, firms shift most of CSI taxes to formal workers in terms of a lower wage. Hence, social insurance is mostly changing the composition of workers' consumption (less disposable income and more social benefits), rather than re-distributing income from firms to workers. Third, the tax on salaried labor and the subsidy to informal labor induce firms to evade. The tax base contracts and VAT and income tax (IT) revenues fall. Finally, subsidies to CSI increase formal employment, expand the tax base and raise VAT and IT revenues; whereas subsidies to NCSI do the opposite.

Table 7
Impact of Social Security on Variables of Interest

	No social insurance	Only CSI	Subsidies to CSI	Status Quo: CSI + NCSI
Wages and Utility*				
Formal wage	1.00	0.79	0.81	0.83
Informal wage	1.00	0.88	0.90	0.88
Worker's utility	1.00	0.88	0.90	0.93
Employment**				
Formal salaried	26.04	12.65	13.65	12.29
Informal salaried	0	7.68	7.97	7.80
Self-employment	12.99	18.70	17.41	18.93
Fiscal ***				
Subsidies to CSI	0	0	67.3	62.2
Subsidies to NCSI	0	0	0	151.1
VAT Revenues	496.7	459.5	468.2	457.9
IT Revenues	399.0	392.4	393.8	392.4
Net fiscal impact#	---------	(-) 43.8	(-) 101.0	(-) 258.7

*Index; ** millions of workers; *** thousands of million of pesos
Calculated as the net fiscal cost vs. the no social insurance situation.

The results from Table 7 are also useful to evaluate the effect of NCSI on formal labor. As the government introduces subsidies to informal workers (columns 3 to 4), formal employment in the model falls by 1.36 million workers, namely from 13.65 to

12.29 million. This effect takes into account all the spending on this type of programs, which amount to 1.24% of GDP.

To the best of our knowledge, there is no econometric evidence measuring the impact *of each* NCSI program on formal labor in Mexico. However, there is some evidence out of *Seguro Popular*, a program gradually implemented in Mexico since 2002. In 2008, *Seguro Popular* represented about 25% of total spending on NCSI programs. If we proportionally assume that one fourth of the previous 1.36 million workers that transit from formality to informality can be explained by the introduction of *Seguro Popular*, such program would imply a fall in formality of about 340,000 workers. Remarkably, this number is not too far from the estimate reported by Bosch and Campos (2010). These authors estimate that *Seguro Popular* since its inception has increased informality by around 300,000 workers.[12]

4. Is the new scheme financially sound?

Now it is time to discuss financing issues of the social security reform under alternative scenarios based on the model's structure and Mexican data. This section details the cost of such scheme and analyzes whether a uniform VAT rate generates enough revenue to finance the proposal. Here, it is important to pinpoint that the following calculations are made using data for the year 2008. Hence the analysis ignores dynamic features (i.e., demographic and epidemiological aspects), which are left for future calculations.

Table 8 contains the necessary data to calculate the cost of universal social insurance for the year 2008. Note that all calculations are based on the economically active population (EAP) at the end of 2008 and that we are excluding bureaucracy.

Table 8
Target Population

Number of IMSS affiliates Dec 2008_/1	13,774,185
Economically Active Population, Dec 2008_/2	41,064,469
Not affiliated to IMSS, 2008	27,290,284
Daily Minimum Wage, 2008_/3	52.59
Population 65 years old or older, Dec 2008_/2	1,803,207

1- Source: IMSS
2- Source: own calculation based on CONAPO and Economic Census, 2009: TLF (45894469 people) excluding bureaucracy (4830000 people)
3- Source: Conasami

[13] There is a debate in the literature on whether *Seguro Popular* yields negative and significant effects on informality. For a review, see Duval and Smith (2011).

The first step is to estimate the universal health and life and disability insurance. Here, all members of the economically active population would have access to exactly the same services any formal worker has today. Table 9 presents the corresponding estimations for 2008. As it may be noted, the cost per IMSS affiliate reaches $11,512 pesos. Applying this number to all EAP would yield a cost of $472.7 thousand of million pesos.

Table 9
Universal Health and Life and Disability Insurance for 2008

Type of insurance	Current annual expenditure	Annual expenditure per IMSS affiliate	Total expenditure on EAP_/1
Health	147,232,680	10.689	438,938,109
Illness and maternity	142,604,280		
Family practice	4,628,400		
Life and disability	11,342,000	0.823	33,796,058
TOTAL	158,574,680	11.512	472,734,167

_/1 Annual expenditure per IMSS affiliate times the economically active population (EAP) excluding bureaucracy.

Source: own calculations. Figures in thousands of pesos. Health expenditures take into account that approximately 16 cents of every peso are in fact diverted to pay the pension liabilities of IMSS's already retired workers. See IMSS (2005).

The second step is to calculate the cost of the universal pension system. In particular, we calculate two alternative pension schemes. The first one ("Alternative A") is a pension scheme where the federal government is the sole contributor, as in Levy (2008). Here, the government makes an individual contribution equivalent to 8.5 per cent of a two-minimum wage worker's annual earnings. The second alternative is a non-contributive scheme consisting of a guaranteed contribution equivalent to the earnings of a two-minimum wage worker per year ("Alternative B"). Estimations are presented in Table 10. Clearly, the first one is more expensive (in total terms) in the short-run whereas the second alternative is more expensive only in the long-run.

We are now in a position of calculating the whole cost of the proposal. Table 11 presents the total cost under both alternatives. Levy's proposal has a cost around 4.99% of GDP, while the second has a lower cost, equivalent to 4.47% of GDP.

Table 10
Costs of Alternative Pension Systems for 2008

Retirement pension	Number of retirees	Annual expenditure per head	Total expenditure
Levy's proposal	*N. A.*	3.218	132,166,321
Two minimum wages	1,803,207	37.865	68,278,072

N. A.: Not applicable.
Total expenditure under Levy's proposal is annual expenditure per head times economically active population. Total expenditure under the two-minimum wage proposal is number of retirees times annual expenditure per head.
Source: own calculations. Figures in thousands of pesos.

Table 11
Total Cost of Universal Social Insurance for 2008

Alternative A: Universal Health and Pension System

Universal Health System (IMSS-like)	472,734,167
Levy's Universal Pension System	132,166,321
Total cost	***604,900,488***
Total cost (% of GDP)	***4.99***

Alternative B: Universal Health and Pension System

Universal Health System (IMSS-like)	472,734,167
Universal Pension System (two minimum wages)	68,278,072
Total cost	***541,012,239***
Total cost (% of GDP)	***4.47***

Source: Own calculations. Figures in thousands of pesos.

To make an appropriate assessment of the costs of universal social insurance, it is necessary to take into account what the federal government currently spends on health, life and disability insurance, and pensions. Table 12 presents the corresponding data. All items sum up 213.68 thousand of million pesos, or 1.76 percent of GDP.

Using Tables 11 and 12 we get Table 13, which yields the amount needed for the reform on social insurance. Clearly, we would need extra revenues equivalent to 3.23 and 2.71 percent of GDP under alternatives A and B, respectively.

The final issue is whether a generalization of VAT rates generates the extra revenue needed. For that purpose, the model is simulated assuming a uniform VAT rate of 16 percent ($\tau_{vat,i} = \tau_{vat,j} = 0.16$) and zero labor income taxes and subsidies ($\tau_n = T_{nf} = \eta = 0$). This parametrization is consistent with the social security reform proposed. The extra revenue out of value-added taxes is reported in Table 14. For convenience, the table also presents the costs of the reform.

Table 12

How much is already spent? (2008, in thousands of pesos)

Non-contributory social insurance programs	
Imss Oportunidades	6,370,722
Health Funds transferred to states	48,480,421
States' health expenditures	24,715,075
Popular Health Insurance	36,250,635
Fonhapo	2,342,231
Habitat	1,887,399
CONAVI	4,984,370
National Child Care Program	1,711,029
Federal Transfers to National Health Institutes	12,416,613
First Generation Program	1,699,724
Elderly Program (older than 70)	9,536,677
Federal contributions to Social Security	
Work Risk Insurance	5,523,793
Childcare and other social benefits	2,541,856
Health	29,639,302
Family Practice	303,071
Life & Disability Insurance	7,737,976
Sub total	*196,140,900*
Pensions (government contribution to pensions)	17,539,500
	213,680,400

Source: *Cuenta de la Hacienda Pública Federal*, 2008, IMSS (estado de resultados).

Table 13

Amount Needed to Implement USI in 2008 (thousands of pesos)

	Alternative A	Alternative B
Total Cost of Universal Health and Pension System	604,900,488	541,012,239
Current Federal Government expenditure	213,680,401	213,680,401
Amount Needed	**391,220,087**	**327,331,838**
Amount Needed in % GDP	3.23%	2.71%

Source: Own calculations.

A major concern is the negative impact that a uniform VAT rate may have on poor households, as now food and medicines would be taxed. The proposal in Antón et al. (2011) contemplates a direct income transfer to the two poorest deciles in the population. To estimate the cost of such transfer, we take data from the income-expenditure survey in 2008 that indicates that about 6.9% of total private consumption goes to the first two deciles of the income distribution. The model suggests that a uniform VAT rate of 16% would subtract 418.4 thousand of million pesos from all

households. These numbers imply that about 28.8 (=0.069*418.4) thousand of million pesos are taken away from the poorest households. This is exactly the amount that would be transferred to the poor in order to compensate them for the VAT increase.

Table 14
Estimated Fiscal Balance under USI (% of GDP)

	Alternative A	Alternative B
Total cost	4.99	4.47
Already spent	1.76	1.76
Amount needed	3.23	2.71
Extra revenue at 16% VAT rate	3.42	3.42
Compensations to the poor	0.24	0.24
Balance	-0.05	0.47

Source: own calculations.

Table 14 reports the cost of this transfer program to the poor in terms of GDP. Clearly, after taking into account all the costs the reform is financially viable under both alternatives. Here, we need to emphasize that these calculations are made only for the year 2008 and thus do not include dynamic issues, like changes in demographics and its associated epidemiological costs.

Finally, the effect of the social security reform on employment and wages is presented in Table 15. The second column displays the corresponding numbers from the calibrated model. Here, the formal sector's real wage is normalized to one under the benchmark. The third column illustrates the effect of a fiscal reform that keeps the current social security system in place. Notice that a uniform VAT rate of 16% increases informal employment (at the expense of formal employment) and decreases the real wage as the higher VAT rate partially translates to the consumer's price index.

However, if the same VAT reform is implemented along with the USI scheme proposed here, the results would be reverted. In particular, formal employment might be roughly twice as large as under the benchmark and the real wage might increase by 15 percent, as CSI taxes are eliminated. Hence, the incentives to evade value-added taxes in the intermediate sector are more than offset by lower labor costs, and demand for salaried workers expands despite the higher VAT rate.

Table 15
Social Security Reform and the Labor Market

	Calibrated	VAT reform under CSI and NCSI	VAT reform under USI
Legal salaried employment	12.29	11.66	25.61
Illegal salaried employment	7.80	7.94	0
Self-employment	18.93	19.42	13.41
Real wage index in formal sector	1.00	0.97	1.15

Source: own calculations.
Notes: Employment is in million of workers. CSI: contributory social insurance; NCSI: non-contributory social insurance; USI: universal social insurance.

Remarkably, the social security reform brings a major correction in the relative prices between salaried versus non-salaried labor, and between the relative price of legal versus illegal salaried labor. This explains the substantial increase of formal salaried workers at the expense of self-employed workers in Table 15.[13]

More detailed work needs to be carried out, but the central message suggested by the model is unequivocal: it is feasible to implement a fiscal reform that increases VAT rates uniformly to 16%, and at the same time to provide all workers with social insurance. Such reform would increase real wages and maintain fiscal balance, even assuming no additional enforcement efforts by the tax authorities.

5. Conclusions

This paper builds on Levy's (2008) proposal for a universal social security scheme. In particular, we estimate the hypothetical cost of such scheme for 2008 as well as the extra revenues generated after imposing a uniform VAT rate of 16 percent. The results suggest that the USI scheme is financially viable, even after taking into account a compensatory transfer to poor households as a result of the VAT increase. In addition, real wages in the formal sector might increase by 15 percent as a result of USI. This number should be interpreted as an upper bound estimate, given that the model assumes an inelastic labor supply.

These calculations are based on a static general equilibrium model, which takes into account the change in firms' behavior in a tax evasion framework. We acknowledge, however, that demographics and epidemiological issues should be taken into consideration, an aspect that we leave for the future research agenda.

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[13] From the arbitrage condition (3), the informal wage rate also increases under USI's equilibrium. This brings down labor demand in the self-employed sector.

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