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Abstract

In this paper, we revisit the theory of property tax incidence in light of the conditions in developing and transition countries by modifying the property tax incidence model to account for at least some of the specific conditions of these countries that are thought to affect property tax incidence. We develop and use a computable general equilibrium (CGE) model and test the impact of various assumptions regarding those specific issues that reflect the reality of property taxes in transition and developing countries. Our results indicate that the burden of property taxes imposed on capital and land is borne by the capitalists (owners of land and capital.) The property tax burden is progressive with the middle income and wealthy consumers bearing a heavier burden compared to the poor consumers. Further, the incidence patterns are largely unaffected by the different assumptions regarding the intranational and international mobility of capital. These findings are robust to alternative distributions of consumer incomes or factor endowments and factor intensities.

Introduction

The theory of the incidence of the property tax in developed countries, and the resulting implications for the equity of the tax, are still being debated. In developing and transition countries the incidence of the property tax is even less sure. Smooth-working capital markets, access to information, defined property rights, etc., are typically assumed in the analysis of tax incidence in developed economies. These "givens" in developed countries cannot be taken for granted in developing and transitional economies, and thus any incidence analysis for a developing or transitional country has to account for this. The implications of institutions, economic base, and political systems may have an important impact on the theoretical impact of taxes on returns to capital, labor, and land.

In this chapter, we revisit the theory of property tax incidence in light of the conditions in developing and transition countries by modifying the property tax incidence model to account for at least some of the specific conditions of these countries that are thought to affect property tax incidence. The rest of the chapter proceeds as follows. First, we summarize the current thinking on the incidence of the property tax and its applicability to developing countries. Second, we develop a computable general equilibrium (CGE) model and test the impact of various assumptions regarding those specific issues that reflect the reality of property taxes in transition and developing countries. We conclude with some suggestions for further research.

Property Tax Incidence

To make clear our focus, we define tax incidence to refer to how the prices of factors of production and final goods and services change as a result of a tax, and define

tax equity as the resulting tax burden across income classes. In tax equity studies, researchers generally adopt a set of assumptions regarding the incidence of the tax. Bahl and Lin (1992) provide a list of property tax equity studies conducted in developing and transition countries, all of which were conducted prior to 1977.[1]

The breadth of the incidence assumptions found in tax equity studies for developing countries is quite large. For example, the tax on land is alternatively assumed to be borne by property owners, by capital owners, and by occupants. The tax on industrial and commercial property is alternatively assumed to be borne by consumers of nonfood items, by consumers of non-housing items, and by shareholders. These assumptions suggest a lack of consensus on the theory of incidence in developing countries.

There is still much debate among the alternative "views" of the incidence of the property tax in developed countries. The fact that the "new view" of property tax incidence is over 25 years old speaks to the longevity of the debate. The debate boils down, roughly, into three different views of the incidence of the property tax—and these are not necessarily mutually exclusive or completely separate views. These are: the Old or Traditional View, the New View, and the Benefits View. Each of these views asks, "Who bears the burden of a property tax?"

The traditional view of the property tax identifies the property tax as a tax on mobile capital, whose supply is assumed to be perfectly elastic, and a tax on land, whose supply is assumed to be perfectly inelastic. In the traditional view capital owners bear no burden of the property tax on capital; the tax is borne by renters, consumers, and/or labor.

[1] We searched for references to more recent studies but were unable to identify any.

The tax on land is borne by land owners. Tax equity studies that assume the traditional view find that the property tax is regressive (Netzer 1966).

The new view of the property tax (see Mieszkowski 1972 and Mieszkowski and Zodrow 1989) assumes that capital is mobile, but is fixed in supply. The new view treats the capital portion of the property tax as two pieces: a basic, or average, tax rate applied to all capital, plus a local differential that varies by jurisdiction. The average tax is levied on a fixed supply of capital, and thus capital owners can't escape the tax. The differentials around the average encourage capital to move among jurisdictions until the net of tax rates of return on capital are equal. The net rate of return to capital falls as a result but how much it falls depends on the effect on land and labor. Tax equity studies that adopt the new view find that the property tax is progressive or at least not as regressive as under the old view (Aaron 1975), as land and capital are owned by higher income individuals. In the long-run (new view), capital might respond to changes in interest rates, international capital flows, etc. so long-run the elasticity is not as extreme as perfectly inelastic.

Finally, the benefits view of property tax incidence argues that the property tax is a benefits tax equal to the benefits received for the public services funded by the property tax. Under this view, individuals search for jurisdictions that meet their demands for public goods, with the property tax being the price or payment for local public goods. As long as there are sufficient choices of jurisdictions and jurisdictions impose fiscal zoning to prevent individuals from paying less than the average cost, individuals will seek to match their demand for public goods with the appropriate jurisdiction. In this case, the

tax is a user charge—and there is an inherent fairness to the tax based on the benefit principle (Hamilton 1975).

Zodrow (2001) notes that the various views of property tax incidence rely on acceptable theoretical economic models. Zodrow also notes that it is difficult to disentangle and identify the impacts of the property tax at the national level versus local level. The assumptions of the underlying models—Tiebout in the case of the benefits view, and Harberger in the case of the new view—may be more or less applicable to any one particular government.

Critiquing these assumptions is particularly crucial when we analyze the incidence of a property tax in developing and transition countries. It is very unlikely that a number of assumptions like mobility, good information, and accountability hold in countries that are new to market-based economic systems. However, even in these countries, it is likely that certain aspects of both views have an influence on the distribution of the property tax burden. Below, we provide a matrix of some of the important assumptions for the various incidence views and note their reality in the case of developing and transition countries:

Assumption	"View"	Reality?
Capital is mobile among jurisdictions	Traditional and new view	In both developing and transition countries this may be true in theory, but a lack of available capital or an unwillingness to invest in many areas of the country may effectively negate the value of this assumption. In some countries, regulations prevent the legal movement of capital outside the country.
Households are mobile and able to vote with their hands and feet	Benefits view	In many developing countries, individuals are mobile, but are not necessarily able to vote in local elections. In some transition countries,

		like Russia, individuals are not legally allowed to migrate freely, which may prevent them from voting if they do migrate illegally.
Jurisdictions are allowed to impose different tax rates	New view and benefit view	Not true in all countries; but might be true in fact if tax administration varies.
Total capital is fixed in supply	New view (not relevant in the benefits view)	In the short run this may be valid, but porous borders may increase elasticity of capital.
Non-monopoly markets for land and capital	All views	In some transition countries (e.g., China and Romania), state ownership of land may have confounding effects on incidence.

It is hard to believe that a benefits view of property tax is applicable to developing and transitional countries. For most developing and transitional countries, the property tax plays a relatively minor role in financing local public services (Bahl and Martinez 2006). In addition, fiscal zoning does not apply to these countries, and the Tiebout conditions of a large number of local governments and residential mobility normally does not exist in developing countries.

But it is also the case that the conditions specified in the new view of property tax incidence do not apply to most developing and transitional countries. Bird (1974; 1976), McLure (1979), Linn (1979), Strasma et al. (1987), and Bahl and Linn (1992) present extensive discussions of how conditions in developing and transitional countries differ from those required in order to apply the Mieszkowski (1972) property tax incidence model. We summarize these conditions here, but for a full discussion the reader is referred to the references listed above.

One of the basic assumptions of the new view is that the factors of production are fixed in supply nationwide. But most less developed countries are small open economies. To the extent that capital is perfectly mobile across boundaries, the assumption of fixed

capital supply is inappropriate for developing countries. However, as the authors cited above suggest, the international supply of capital is not perfectly elastic. Capital flows depend upon risk and increasing debt reduces the elasticity of supply. Thus, it seems appropriate to assume that the capital stock is not fixed, but that the elasticity of supply is less than perfectly elastic.

A second major assumption is that capital is perfectly mobile across space and that labor and capital are mobile across sectors. (Models of national taxes assume that labor is mobile across space, but models of the new view assume immobile labor.) But it is argued that capital is not perfectly mobile geographically in less developed countries, particularly with respect to tax rate differentials. Several reasons are given for this argument, including that owners lack information regarding tax rate differentials, the large variation in effective tax rates within jurisdictions due to poor assessment practices and weak tax enforcement, and that because of the lack of infrastructure some areas of the country will not attract firms regardless of the tax differential.

It is also argued that capital is not perfectly mobile across sectors in developing and transitional countries. For example, capital may not flow to the informal sector, which may have no access to capital markets. Such a sector may expand capital through saving, for example, expanding the housing as the occupant is able to do so. Thus, it may be appropriate to assume that the stock of capital is fixed in the informal sector, but that perhaps the stock of capital can shift between housing and small enterprises within the informal sector.

The common assumption in the new view is that land is fixed in supply within every jurisdiction. But if jurisdictions can expand into the existing agricultural land, land

is not in fixed supply in each jurisdiction. This is an issue if the tax on agricultural land differs from that in urban areas.

Another way that the conditions of less developed countries differ from the assumptions of the new view is that there are submarkets that serve different segments of the population and there may be no mobility across these submarkets. Some producers may be able to sell to only certain segments of the country. As noted above, the supply of housing for low-income households (the informal sector) may be fixed and not a substitute for housing for the middle and upper-income households.

In addition to these market conditions, the authors cited above also list a set of government policies that result in market imperfections. These include price restrictions, including rent control, crop prices set by the government, maximum legal interest rates, subsidized prices for farm inputs, and exchange rate policies. Government enterprises may constitute a large segment of the economy, and may not behave as profit maximizing firms. In addition, there are many ways that markets may fail to work in less developed countries, for example, custom may drive how wages are set and may limit the mobility of labor across sectors, or land may be held for prestige or social standing and not for economic reasons. Finally, some sectors may be controlled by monopolists so that the assumption of perfect competition in all markets does not apply.

The incidence of the property tax also depends on administrative aspects of the tax. While not restricted to less developed countries, exemptions from the property tax for owner occupied housing and agricultural land and capital affect the incidence of the property tax. Several less developed countries also use progressive rate structures. As McLure (1979, 70) states in reference to determining the incidence of property tax in less

developed countries, "the proper approach is likely to be far different from anything done in the past, and it is theoretically more difficult and empirically more demanding."

While these authors point out that it is not appropriate to apply the new view model of property tax incidence to developing and transitional countries, we have not found anyone who has attempted to formally model property tax incidence in developing and transitional countries. Our objective is to fill this void by incorporating several, but not all, of the conditions discussed above into a model of property tax incidence. In particular, we specify a Computable General Equilibrium (CGE) model of a hypothetical developing country in which we consider the effect of alternative mobility assumptions on property tax incidence.

Computable General Equilibrium Models of Developing Countries

CGE models have been used to explore the implications of fiscal policy in many developing countries.[2] The first CGE model of a property tax in a developing country of which we are aware was prepared by Follain and Miyake (1986) in order to study the effects of substituting the Jamaican land value tax with capital value property tax or an income tax. The model is a static national level CGE model that consists of three production factors—land, capital, labor—an intermediate good, housing, and a non-housing composite final good. They assume perfect competition in factor and product markets and analyze both open and closed economy cases.

More recently, Light (2004) used a CGE model to explore the effects of various possible tax reform options for Jamaica.[3] The model represents a small open economy

[2] Dervis, de Melo and Robinson (1982) provide one of the earliest applications of CGE models to developing countries.
[3] Light's CGE model is similar to the model Rutherford, Light, and Barrera (2005) use to consider equity and efficiency of raising taxes in Colombia.

with 48 production sectors, a single representative agent, and three factors of production. He assumes constant returns-to-scale and perfect competition. Other than the existing taxes, no imperfections in the economy are assumed. One of the taxes is the land value tax, which in Jamaica is imposed at a constant national rate; he does not consider any policy change with respect to the land value tax. Light acknowledges the existence of an informal sector that is not taxed, but because of the lack of data on the size of the informal sector, it is not included in the model.

Corsetti and Schmidt-Hebbel (1995) use numerical simulations of an overlapping generations growth model to study pension reforms in Chile. They allow for two sectors. The first sector, i.e., the formal sector, employs both labor and capital and is subject to social security regulations. The second sector, i.e., the informal sector, is less efficient, employs only labor, and it is unregulated. They allow the pension program to determine the size of the two sectors.

Enoh, Enoh, and Koffi (2000) developed a standard CGE model of Côte d'Ivoire in which they assume four classes of labor, only two of which are perfectly mobile, whereas the other two are restricted to non-agricultural use and agricultural use, respectively. The restriction on the mobility of the two classes of labor is imposed to assure that there is a minimum amount of labor in those two sectors. They adopt a similar assumption of a sector-specific form of capital in the production of the agricultural good. They consider various types of value added tax and import tax reforms.

Lora and Herrera (2000) present a CGE model for Colombia to study the incidence of the value added tax, import tariffs, a capital flat tax, and corporate and

individual income taxes. The capital tax would be equivalent to a property tax that excluded land. They allow for different degrees of factor mobility across sectors, wage and price rigidities, and supply constraints in specific sectors. These restrictions on mobility are similar to the ones we incorporate into our model.

Their model allows for five factors of production. These include two types of capital, rural and urban, and three types of labor, rural, skilled urban, and unskilled urban. Skilled and unskilled urban labor is combined in the urban sector. However, in the rural sector only rural labor is used. Rural labor can migrate to the urban sector, where the degree of migration is based on expected wages and an elasticity of migration parameter. The two types of capital are split between the rural and urban sectors through a constant elasticity of transformation function, with the elasticity determining the degree of mobility. They also allow for an informal and a formal urban sector.

Lora and Herrera also consider wage, quantity and price rigidities. They allow for rigidity of the real wage of unskilled workers in the formal sector. Thus, in the absence of migration, the change in demand for this type of worker results in a change in the number of such workers who are unemployed. Quantity rigidities are imposed on the production of such products as oil due to limitations on the pipeline network. Finally, they allow mark-up pricing as a way of modeling oligopolistic practices.

A Static Computational General Equilibrium Model for Developing and Transitional Economies

Our CGE model attempts to capture many, but not all, of the developing country conditions discussed in the second section. The model presented depicts a small open economy with three broadly defined formal sector industries and two informal sector

industries and is drawn from Sennoga (2006) but is based on Rutherford and Light (2001). The formal sector industries are trade-manufacturing (denoted as industry 1), farming (denoted as industry 2), and housing (denoted as industry 3), while the informal sector industries include a service-housing sector (denoted as industry 4) and a farm sector (denoted as industry 5). We assume that in the informal sector a "house" is used for both housing and for the provision of services.

While informal sectors are present in all countries, in developing and transition countries the size of the informal sector at times rivals that of the formal sector. Schneider (2005) reports an unweighted average of the shadow economy as a share of the official GDP of 43.2 percent in developing nations and 40.1 percent for East and Central European and former Soviet countries. For OECD countries, the unweighted average is 16.3 percent (all for 2002/03).

We specify a more narrowly defined informal sector to reflect a subsector of the economy that is largely isolated from the rest of the economy rather than an informal sector that intersects with the formal economy. It is constructed to reflect the conditions discussed in the second section and is not meant to represent the larger, more common definition of an informal sector found in developing countries. The model reflects consumption choices of three domestic consumers or households (specified as poor, middle income, and wealthy). Three primary factors (land, labor, and capital) and three intermediate inputs are used in production. We allow imports and exports of goods and the importation of physical capital. The government collects tax revenues and uses the revenue to produce a good we call "public administration." We assume that the government is the only consumer of this good and therefore the good does not enter into

the consumers' utility function. However, consumers earn wages, capital rental income, and land rents from supplying labor, capital, and land to the government.

Our model is consistent with an Arrow-Debreu economy that is characterized by constant returns to scale and perfect competition across all forms of production. Producers maximize profits taking prices as given, while consumers maximize utility subject to a budget constraint that depends on the value of their endowments. The small open economy assumption implies that relative prices of imports and exports are fixed. Taken together, these assumptions imply that no producer earns above-normal profits and that consumers cannot increase the consumption of all goods.

The model is formulated and solved as a complementary problem with three types of equilibrium conditions: market clearance, zero profit, and income balance (Mathiesen 1985). The numerical equations are based on data that is constructed to depict a developing small open economy, but does not represent any actual, specific, country.

Economic Flows

Production technology in sector *i* combines the three primary factors: capital, labor, and land. Intermediate inputs (which are outputs from other sectors in the economy) are combined with the primary factors to produce goods that can either be consumed domestically or exported.[4] An Armington good, which is a combination of domestic and imported goods, is the basic consumption commodity. Armington composite goods are consumed by industry as intermediate inputs, by consumers as final

[4] We assume that formal sector production only utilizes intermediate inputs from the formal sector industries while the informal sector utilizes intermediate inputs from both the formal and informal sectors.

goods, and by the government as public administration. Consumers use their earnings from endowments to purchase the Armington good or to pay taxes.

The formal and informal sector industries are assumed to produce nearly identical goods, but the informal sector is assumed to be characterized by inefficient and small scale activities such as street vending and subsistence farming. We assume that informal sector goods are consumed by all domestic consumers but are used as intermediate inputs only in the informal sector.

Functional Forms

Our model adopts Constant Elasticity of Substitution (CES) functions. CES functions are widely used because they are globally regular, and can be defined by their zero, first, and second order properties (Light 2004). In general, our assumptions regarding the values of the elasticities of substitution imply nested Leontief-Cobb-Douglas functions.

Production functions

Production inputs. Goods are produced according to a nested Leontief–Cobb-Douglas technology, where intermediate inputs and aggregate value-added enter at the top level. Value-added represents a Cobb-Douglas aggregation of labor (L), capital (K), and land (R). The general form of the total production function is:

$$Y_i = \min\left[\min_j\left(\frac{x_{ji}}{a_{ji}}\right), \frac{v_i}{b_i}\right],$$

where Y_i represents output of good *i*, x_{ji} represents intermediate inputs of good *j* from the domestic market, $a_{ji} = x_{ji}/Y_i$, $b_i = v_i/Y_i$, and v_i is value-added given by

$$v_i = L_{Fi}^{\alpha_F} L_{Ii}^{\alpha_I} K_i^{\beta} R_i^{\gamma};$$

Where subscripts F and I represent the formal and informal sectors, respectively. Constant returns to scale imply that $\sigma = \alpha_F + \alpha_I + \beta + \gamma = 1$. When the elasticity of substitution for production inputs, σ, is unity, value-added totals are Cobb-Douglas, as represented here.

*Production outputs***.** Each of the three formal production sectors produces both a domestic good, D_i, and an export good E_i. We assume that these goods are imperfect substitutes and that they are characterized by a constant elasticity of transformation η. The transformation function can be written as follows:

$$Y_i = h(D_i, E_i) = \left[\theta_i^D D_i^{1+1/\eta} + \left(1-\theta_i^D\right)E_i^{1+1/\eta}\right]^{1/(1+1/\eta)}$$

In this expression, θ_i^D represents the benchmark value-share for sector *i* of total domestic output. The informal sector is assumed to produce only for the domestic market.

Government production. The government good is produced using formal sector labor (L_F), capital (K), and land (R), with substitution possibilities governed by a Cobb-Douglas production function. Specifically, the government good is produced according to the following production function:

$$G = L_F^{\alpha_F} K^{\beta} R^{\gamma},$$

in which constant returns to scale imply that $\alpha_F + \beta + \gamma = 1$. We assume that the production of the government good is labor intensive.

*Imports***.** Following Light (2004) our model adopts an Armington representation of import demand. Armington good A_i is produced by aggregating domestic goods with imports from the same sector. Domestic goods D_i and import goods M_i are treated as imperfect substitutes (for instance tea from Kenya vs. Uganda). The Armington elasticity is represented by σ_A. The Armington good is given by:

$$A_i = \left(\theta_i^M M_i^{1-1/\sigma_A} + \left(1-\theta_i^M\right)D_i^{1-1/\sigma_A}\right)^{1/(1-1/\sigma_A)}$$

*Trade balance***.** The small open economy assumption implies that export prices, $\overline{P}_i^E$, and import prices, $\overline{P}_i^M$, are fixed exogenously. Further, the real exchange rate is market determined by the supply of exports and the demand for imports, and is established in units of foreign currency. Trade balance is shown by the equality of the following expression:

$$\sum_i \overline{P}_i^E E_i + B = \sum_i \overline{P}_i^M M_i ,$$

where B is an exogenously specified current account balance.

Consumption. Private consumer demand is endogenously determined via utility maximization. Consumer *j*'s utility maximization problem is specified using a Cobb-Douglas utility function as follows:

$$\underset{A_i}{Max} U = U^j\left(A_i\right) = \prod_i A_i^{\alpha_i}; \sum_i \alpha_i = 1$$

subject to

$$\sum_i P_i A_i \le p_K K + p_L\left(L_F + L_I\right) + p_R R$$

where *P* and *p* denote product and factor prices , respectively.

Informal labor supply. Our model assumes that labor supply is fixed. Further, we assume that the labor endowment of the poor is entirely allocated to the informal sector while the labor endowment of the middle income and wealthy can be allocated to either formal labor supply (L_F) or informal labor (L_I) supply. The middle income and wealthy choose how much of each type of labor to supply based on relative wages of the two sectors. Following Rutherford and Miles (2001), we specific the labor-supply unit revenue function as follows:

$$w = \left[\alpha^L \left(\frac{w_F}{\overline{w}_F} \right)^{1+\eta^L} + \left(1 - \alpha^L\right) \left(\frac{w_I}{\overline{w}_I} \right)^{1+\eta^L} \right]^{1/\left(1+\eta^L\right)}$$

In this expression, η^L is the labor supply elasticity and $\overline{w}_F$ and $\overline{w}_I$ represent the benchmark prices for formal and informal labor.

Capital. We allow for international flow of physical capital by introducing a market for foreign capital that is rented from foreigners. The country is assumed to be a price taker and we adopt two alternative assumptions regarding the supply of capital: fixed foreign capital supply and foreign capital can be acquired at an increasing price. Foreign capital is one of the import goods and is paid for using the proceeds from exports. For the initial simulations we assume a fixed foreign capital supply; this assumption is modified in subsequent simulations. Foreign capital is used only in the formal sector.

Capital used in the informal sector is assumed to be sector-specific (i.e., not mobile across sectors) and fixed in supply. Furthermore, we assume that informal sector capital is largely "rudimentary" and commands a lower rate of return than formal sector

capital. These assumptions capture the notion that our informal sector mostly comprises street vending, subsistence farming, and other small volume activities.

Taxes. We assume that no taxes are levied in the benchmark. Four "tax-treatments" are then introduced as counterfactual exercises:

- a uniform national property tax on land and capital of 25 percent;
- a property tax with differential tax rates in the urban (35 percent) and rural jurisdictions (25 percent);
- a uniform national property tax of 25 percent that exempts land and capital inputs used in the agricultural sectors;
- a property tax with a zero tax on informal sector inputs (that is, complete tax evasion in the informal sector) and 25 percent elsewhere.

Equilibrium Conditions

Mathiesen (1985) demonstrates that an Arrow-Debreu general economic equilibrium model can be formulated and solved as a complementarity problem. The Arrow-Debreu equilibrium is defined by three conditions: zero profit, market clearance, and income balance. These conditions are described in the next section.

Data and Model Calibration

In this section we describe the Social Accounting Matrix (SAM).

Salient Features of the SAM

Table 1 presents the definitions of the notation. Table 2 summaries the salient features of the SAM used in this study. The SAM is constructed to reflect a small open

developing economy, but does not represent a specific country. We assume that the formal sector is more capital-intensive than the informal sector. We also assume that the formal sector is more efficient than the informal sector and that the informal sector utilizes part of the formal sector output (in addition to inputs of labor, capital, and land) as an intermediate input. It is assumed that the formal sector utilizes neither labor of the poor nor informal sector products in production.

The small open economy represented here is assumed to have two jurisdictions: urban and rural. The trade-manufacturing and the housing industries are assumed to be situated in the urban jurisdiction, while the (formal sector) farming industry and both informal sector industries are located in the rural area.

We assume that the poor households' endowment is 43 and 33 percent of the endowment of the middle income and wealthy households, respectively.[5] It is important to note that though it is feasible to use various parameters to reflect the input and output choices that are consistent with these assumptions, the choice of our input and output values is dictated by the need to maintain the internal consistency of our social accounting matrices or to preserve the zero profit, market clearing, and income balance conditions. Table 3 presents the data for the five-good, three-factor, and four-consumer small open economy model used in this study. We now turn to a description of these data.

Input/Output Data

The input data are presented in the form of a balanced matrix, in which the entries represent the value of economic transactions in a given period (typically one year). The

[5] Our sensitivity analyses assume that the poor household's endowment is 33 and 20 percent of the endowment of the middle income and wealthy households.

rectangular SAM format adopted follows the sign convention in which supplies or receipts are represented by positive numbers and demands or payments are represented by negative numbers. Internal consistency of a rectangular SAM implies that row sums and column sums are zero. With this interpretation, a row sum is zero if the total value of commodity flowing into the economy (inputs) equals the total value of commodity flowing out of the economy (outputs). This is market clearance, and one such condition applies for each commodity in the model. Columns in this matrix correspond to production sectors or consumers. A production sector column sum is zero if the value of outputs equals the cost of inputs. A consumer column is balanced if the sum of primary factor sales equals the value of final demands. Zero column sums thus indicate zero profits (product exhaustion) or consumer income balance.

The SAM shown in Table 3 has one row for every market (traded commodity). In the present model, there are eight markets, the five goods and the three primary factors. There are two types of columns in a rectangular SAM, corresponding to production sectors and consumers. In the current model, there are five production sectors and four "domestic" consumers (poor, middle income, wealthy, and government).

It is important to emphasize that the numbers in the SAM are values, or prices multiplied by quantities. A commonly followed practice is to choose units so that the prices of as many activities as possible are initially equal to unity. However, in the presence of taxes, both consumer and producer prices generally cannot equal one. Table 3 presents the rectangular SAM used in this study.

Production sectors

We assume that each of the three formal sector industries produces 150 units of output. For instance, trade-manufacturing output of 150 units is produced using 45 units of labor, 55 units of capital, 35 units of land, 5 and 10 units of intermediate inputs from the farming and housing sectors, respectively (Table 3). The units are chosen to reflect the fact that formal sector production is more efficient and capital-intensive relative to production in the informal sector. We also assume that the formal sector does not utilize intermediate inputs from the informal sector.

Consumers' endowments and labor supply

We assume that the poor consumer is endowed with 40 units of labor, 10 units of capital, and 15 units of land, while the endowments of middle income consumer are 50, 45, and 55 units, respectively (Table 3). The wealthy consumer is endowed with 60 units of labor, 75 units of capital, and 65 units of land.

Labor supply choices of the three consumers can also be inferred from Table 3. For instance, the poor consumer supplies 50 percent of his/her labor to the informal services industry and the remaining 50 percent is supplied to the informal agriculture (i.e. subsistence) industry. We assume that informal sector activity is largely a small scale operation and as such, the poor consumer is assumed to be equally likely to work in either of the two informal sector industries. The middle income and wealthy consumers are assumed to supply the bulk of their labor to formal sector production. In particular, we assume that the middle income and wealthy consumers supply only 10 and 8 percent of their labor to the informal sector, respectively. Our model accommodates different elasticities of labor supply, allowing formal and informal sector labor to respond to relative wage differentials across sectors and jurisdictions.

Government

The government is also considered as a separate consumer, which collects or demands tax revenues to provide a government good referred to as public administration. (The level of government activity is zero in the benchmark.) We assume that the government is the only consumer of this good, and consequently "public administration" does not enter the households' utility functions. We assume that production of the government good is labor-intensive.

Consumers' utility functions

The consumer's utility function is represented as a production activity. In other words, utility is treated as a good that is produced using commodity inputs. The utility goods (PWp, PWm, and PWw) are purchased using the consumers' endowments, which also reflect their income constraint. The activity level in sectors Wp, Wm, and Ww (utility functions of poor, middle income, and wealthy consumers, respectively) can also be interpreted as a Hicksian welfare index. For instance, utility for the poor consumer (Wp=65 units) is "produced" using 10 units of the trade-manufacturing good, 5 units of the formal sector farming good, 10 units of the housing good, 15 units of the informal sector services good, and 25 units of the informal sector farming good.

We assume that the poor consumer's utility is intensive in the informal sector goods while the middle income and wealthy consumers' utility is intensive in the formal sector goods. Further, we assume that the middle income consumer consumes 30 percent of the imported goods, with the residual being consumed by the wealthy consumer. Import goods are assumed to be close but imperfect substitutes in consumption, with an Armington elasticity of substitution in final demand of five.

Capital flows

To accommodate capital flows or trade in capital, we introduce a market for a factor which is rented from foreign consumers. One way of modeling capital flows is by creating a "fictitious" factor Kr (price PKr) which is a fixed factor in a function transforming foreign exchange into capital. We assume that this "fictitious" factor is owned by the representative foreign consumer. For our benchmark data 20 units of capital are imported.

Elasticity Choices

The elasticities for production, consumption, and labor supply used in this study are chosen based on past studies as well as conventional wisdom. Table 4 lists the default elasticity choice for each parameter. We use values that have been previously accepted in other models in the literature (see Light 2004).

It is reasonable to assume that the products from different industries are poorer substitutes than are a domestic and foreign good from the same industry. Therefore, the elasticity of substitution in final demand (value equal to one) and the Armington elasticity of substitution between domestic and import goods (value equal to five) are chosen to emphasize this feature. The elasticity of transformation between domestic and export goods (value equal to one) reflects the low substitutability between the export goods and those consumed domestically.

Counterfactuals and Simulations

Analysis of the impact of a change in government policy with a static CGE model proceeds via the comparative statics methodology. Parameter values are selected so that the model's equilibrium replicates the benchmark (SAM) data set. Simulation of the tax policies then follows by altering the relevant tax policy parameters. In the base case equilibrium, commodity prices p_i, the wage *w,* capital rental rate p_k, and the return to land p_r are all calibrated to equal one. The model is then used to evaluate the impact of changes in government tax policy on the welfare of the poor, middle income, and wealthy households, on consumption, as well as on prices of produced goods and factors of production. We carry out simulations for each of the four property tax policies listed above.

Uniform National Property Tax

In this counterfactual exercise, we levy a uniform ad-valorem tax rate of 25 percent on land and capital. In a Mieszkowski-like model if all land and capital is taxed at a uniform rate and is fixed in supply, the price paid by users of land and capital will fall by the tax rate, with no change in other prices. This result holds regardless of the mobility of capital. Our model differs from Mieszkowski in that we have a foreign sector and tax revenue is used to produce a "good"--public administration. Because of these features, our results differ somewhat.

Column 2 of Table 5 shows that for our model when formal labor is mobile between the urban and rural jurisdictions and when capital supply is fixed, the incidence of a uniform national property tax is largely on the owners of land and capital. The net-

of-tax return to formal sector capital falls by 25.3 percent while the net-of-tax price of land drops by 21 percent. The return to informal sector-specific capital declines by 26.9 percent.

The return to imported capital falls by 1.1 percent, indicating that a small portion of the property tax is exported to the foreign capitalist. The price of imported capital is assumed fixed in the home country's currency. However, because of changes in the exchange rate, the rental price of imported capital in terms of the host country's currency falls, but by much less than prices of other capital.[6]

Wage rates increase, with some differences in the size of the increases depending upon the sector and the particular income group. Wage rates increase because the tax revenue is used to produce public administration, which is labor intensive. Thus, the shift of resources to the government causes an increase in the demand for labor relative to capital.

The shift of resource to the government results in a decrease in factors that can be used to produce goods and thus a reduction in the output of these goods, with the exception of housing in the formal sector. The prices of formal sector trade-manufacturing, farming, and housing goods, which are intensive in primary factors of land and capital, decline by 0.29, 0.58, and 1.16 percent respectively. The fall in prices of formal sector goods is due to the decreased production being offset by the decreased demand (due to "domestic" consumers' preference for the relatively cheaper imported

[6] The price of foreign capital (PKm) is influenced by the trade balance condition-- the value of imports should be equivalent to the value of exports and an exogenously specified current account balance B. All else constant, increased export earnings lead to increased import demand. In particular, the exchange rate adjusts to clear the market for foreign exchange, rising when there is increased import demand (which reflects an increased demand for foreign currency). The increase in the exchange rate mitigates the reduction in PKm.

goods and reduced income from capital and land endowment) of these goods. Since the primary factors used in the production of the informal sector goods are assumed to be both intra-nationally and internationally immobile, the burden of a property tax on informal sector capital and land is borne by the owners of land and capital in the informal sector (via reduced returns to land and sector-specific capital) and the consumers of the informal sector goods (via increased prices).

The equity of a uniform national property tax (as measured by the change in welfare) is progressive, with the middle income and wealthy consumers bearing a proportionately higher burden of the tax. The poor consumer's welfare falls by 4.6 percent, while the welfare of the middle income and wealthy consumers declines by 12.2 and 15.9 percent, respectively. We calculated each income group's share of the total welfare loss; the shares are 5.7 percent, 34.5 percent, and 59.8 percent for the poor, middle income, and rich, respectively. This distribution of welfare loss, however, is not the same as the shares of land and capital. In the benchmark the share of total land and capital are 9.4 percent, 37.7 percent, and 52.8 percent, respectively.

Local Tax Differentials

Column 3 of Table 5 presents the results from imposing a property tax in which the urban tax rate exceeds the rural tax rate, 35 percent versus 25 percent. With differential tax rates we expect to find excise tax effects as suggested by the new view. The results are similar in pattern to those found in column 2. Not unexpectedly, the rental prices of capital and land fall by more than in the uniform tax rate case. The returns to formal sector capital, imported capital and land rents fall by 29.3, 2.6, and 27.8

percent, respectively. Since land and capital are used in the lower-taxed rural sector (agriculture), the decreases in rental prices are less than 35 percent. The decrease in the prices of formal sector capital and informal sector capital are similar despite the difference in tax rates. The wage rates increase by more than in uniform rate case since the amount of tax revenue is larger in the tax differential case and thus there is a larger shift in the demand for labor relative to capital.

The differential rate case results in a more progressive distribution of the tax burden. Simulation results reveal that the middle income and wealthy consumers shoulder a bigger burden of taxes on land and capital compared to the poor consumer. The poor consumer's welfare falls by 4.1 percent compared to the 14.4 and 18.6 percent drop in the middle income and wealthy consumers' welfare.

These findings are consistent with McLure (1979), who argues that differentials in land and capital taxes are largely expected to increase the progressivity of taxation. He argues that local tax differentials would be reflected in land rents, wages of locally immobile labor, and prices of local goods (goods produced in a particular jurisdiction). To the extent that the richest land owners might be expected to own land in capital cities (i.e., urban areas), higher tax rates on land in such areas is likely to increase progressivity or reduce regressivity. Our model assumes that the formal sector farming activity is located in the rural jurisdiction and is undertaken by the middle income and wealthy consumers. This suggests that the middle and wealthy consumers can also benefit from lower property tax rates imposed in the rural areas. McLure (1979) points out that the latter result is unlikely to counter the effects of higher property tax rates in big cities or urban areas on progressivity, a conclusion that is in line with our findings.

Further, local tax differentials cause prices of local goods to rise where incomes are highest (urban areas). For this tax policy the price of the formal sector trade-manufacturing good increases by 1.3 percent. Given that the middle income and wealthy households consume more formal sector manufacturing goods than the poor consumers, the differential effects on prices of local goods also increase progressivity.

Exemption of Land and Capital Used in Agriculture

For the third tax policy alternative we exempt land and capital used in agriculture from property taxes, while land and capital used in the other industries are taxed at an ad-valorem rate of 25 percent. The results (column 4 of Table 5) indicate that the poor consumer's welfare, which is intensive in the informal sector farming good, falls by 3.5 percent compared to the 9.1 and 11.0 percent reduction in the middle income and wealthy consumers' welfare. Thus, in this case, the tax burden is less progressive than either the uniform rate case or the differential rate case. For example, the percentage change in welfare for the rich divided by the percentage change for the poor is 3.14 for the case of an agricultural exemption, but 3.4 for the uniform rate case.

Compared to the differential tax scenario, this scenario imposes an even lower tax (i.e., zero) on capital and land used in agriculture. Thus, we expect excise tax effects, with the prices of agricultural goods falling relative to the prices of other goods.

In fact, we find that the prices of both formal and informal sector farming goods decline by 5.86 and 0.50 percent, respectively. Prices of all other goods increase. As in the case of the two sets of results discussed earlier, the incidence of property taxation falls on both capital and land, with some of the burden being exported to the foreign

capitalist. Consumers of both national and local goods bear some of the burden via increased prices of the non-farming goods.

Evasion in the Informal Sector

In this simulation we set tax rates on land and capital in the informal sector equal to zero, as would be the case with full tax evasion. Capital and land used in the formal sector are taxed at an ad-valorem rate of 25 percent. Perhaps the most noteworthy finding from this policy option (column 5 of Table 5) is that even with tax evasion in the informal sector, the poor consumer's welfare declines, albeit by a small magnitude as compared to the other tax policy options. This outcome can be explained by the fact that in our model, the poor consumer's consumption "basket" is comprised of over 38 percent of formal sector goods, which are produced using primary factors of land and capital on which taxes are imposed. Further, production of the informal sector services and farming goods uses intermediate inputs from the formal sector. In our model, 30 and 36 percent of the inputs used to produce the informal sector services and housing goods, respectively, are intermediate inputs from the formal sector. To the extent that the prices of the formal sector intermediate inputs are inclusive of taxes, use of these inputs in informal sector production leads to an increase in the cost of production in the informal sector. The increase in the cost of production in the informal sector is passed onto the informal sector inputs of land and capital which are immobile and fixed in supply. The rate of return to informal sector capital falls by 9.5 percent and the return to land declines by 18.6 percent.

Alternative Mobility Assumptions

Tables 6-8 present simulation results when the intra-national and international mobility assumptions are adjusted.

Immobility Between Urban and Rural Jurisdictions (Fixed Supply of Capital)

We first modify the assumption regarding intra-national mobility, while retaining the assumption of fixed supply of capital and labor. The major difference between the simulation results shown in Tables 5 and 6 is that for Table 5 we allow for intra-national capital mobility across urban (formal sector trade-manufacturing and housing industries) and rural (formal farming) jurisdictions and labor mobility between the formal and informal farming sectors. For the simulation results shown in Table 6, labor and capital are immobile between the urban and rural areas. Our model assumes that informal sector capital is sector-specific and therefore that capital is not mobile between the formal sectors (which constitute the entire production in the urban jurisdiction) and the informal sectors (which constitute the majority of production in the rural jurisdiction). This therefore implies that even with the assumption of intra-national mobility, capital can only move from the formal sector trade-manufacturing and housing industries (urban area) to the formal sector farming (located in the rural area.)

Table 6 shows that intra-national immobility of capital does not alter the incidence results of property taxes discussed in the preceding section. The results of the change in the mobility assumption are marginally different from those reported in Table 5. The simulation results shown in Table 6 indicate that the incidence of the property tax on land and capital falls on the owners of land and capital under all four tax treatments: uniform national property tax, local differentials in property tax rates, property tax exemption on land and capital used in agriculture, and zero tax in the informal sector.

Consequently, our simulation results imply that intra-national mobility should not be expected to influence the incidence patterns of property taxes on land and capital.

It is very likely that capital used in the farming sector could be highly specialized and may not easily be adaptable to the trade-manufacturing and housing industries (for instance a combine harvester may not be easily adapted to move dirt on a construction site being cleared for a housing project). Therefore, the assumption that capital is not mobile between the urban and rural areas is very plausible.

Elastic Capital Supply

For the simulations reported in Tables 7 and 8 we assume that capital can be acquired internationally at an increasing price, i.e., the elasticity of the supply of foreign capital is positive. The results in Table 7 are based on the assumption that capital and labor are mobile between rural and urban areas while the results presented in Table 8 assume intra-national immobility.

On average, Tables 7 and 8 indicate that the elastic supply of international capital to a small open economy does not alter the incidence of the property tax in any significant way, although the taxes are less progressive than reported in Table 5 and 6. Note, however, that the price of imported capital falls significantly under the assumption of an elastic supply of foreign capital.

One explanation for the similarity in results to those reported in Tables 5 and 6 is that our model assumes that capital imports are financed by foreign exchange proceeds from exports. To the extent that the value of exports for most developing countries does

not vary much from time to time, it is reasonable to assume that the amount of capital imported is also relatively fixed to the small open economy.

Sensitivity Analysis

Since the choice of our parameters and factor intensities in the benchmark data can affect the simulation results, sensitivity analyses are necessary to verify the robustness of our results. We alter the consumer endowments in our benchmark data and adjust the other values in the SAM accordingly while preserving the internal consistency (that is, maintaining the market clearing, income balance, and zero profit conditions) of the SAM. The SAM used in the sensitivity analysis is presented in Table 9.

For our sensitivity analysis we increased the divergence in consumer endowments between the poor and the higher income groups. Consequently, we assume that the poor consumer's endowment is 33 and 20 percent of the middle income and wealthy consumers' endowments, respectively (down from 43 and 33 percent, respectively, in the initial benchmark data.) Further, it is plausible to assume that the informal sector in developing countries will reflect a sizeable presence of wealthy consumer workers (as they try to avoid high marginal income tax rates in the formal sector say, by moon-lighting and/or working off the "books" in the informal sector). We therefore increase the amount of labor supplied to the informal sector by wealthy consumers to 20 percent of their total labor endowment, up from 8.3 percent in the initial SAM. We increased the size of trade-manufacturing industry output from 150 units to 160 units to reflect a higher GDP share. Finally, we adjust the poor and wealthy consumers' initial welfare (or utility) to accommodate the reduction and increase in their respective endowments. The poor

consumer now consumes only 50 units of output while the wealthy consumer purchases 250 units of output. We assume that the benchmark value of the export and import goods is unchanged.

Results from our sensitivity analysis are presented in Tables 10-13 and are consistent with the findings discussed above. These results confirm that the burden of a property tax on land and capital falls on land and capital owners, with the middle income and wealthy consumers bearing a proportionately bigger fraction of this burden. Further, intra-national and international mobility of capital does not affect these incidence patterns in any significant way.

Conclusions

The "new" view of property tax incidence attributable to Mieszkowski (1972) is based on a general equilibrium model in which capital is fixed in supply but perfectly mobile across sectors and geography. Several authors have suggested that the conditions in developing and transition countries do not correspond to those in developed countries and therefore the new view does not directly apply. To date no one has formally modeled property tax incidence under the conditions that exist in developing and transition countries. Thus, we develop a CGE model that addresses this gap in the literature.

We tailored our model and specifications to more closely represent conditions of developing and transitional countries. In particular, we introduce an informal sector, we model a significant difference in income among the three types of consumers, we treat the economies as open to international capital flows, and we consider various mobility assumptions. There are certainly other circumstances of developing countries that are

relevant. For example, the relationship between the informal sector and the various inputs could be made more complex. In addition, government influence that is not as benign as in the case presented here could be modeled. Our analysis does not incorporate other taxes, such as individual income taxes, import tariffs, and sales and excise taxes. To the extent that property taxes are imposed concurrently with other taxes, assuming away the effects of such taxes could potentially affect the results we report. Incorporating those conditions is left for future research.

The simulation results from our simple CGE model indicate that the burden of property taxes imposed on capital and land is borne by the owners of land and capital and is not significantly influenced by the assumptions regarding the mobility of capital. The property tax burden is progressive, with the middle income and wealthy consumers bearing a heavier burden compared to the poor consumers and heavier than their share of land and capital. Further, the incidence patterns are largely unaffected by the different assumptions regarding the intra-national and international mobility of capital. These findings are robust to alternative distributions of consumer incomes or factor endowments and factor intensities.

From our analysis, it appears that the property tax is a vehicle for introducing some progressivity into the revenue structure of developing and transition countries. Since wealth or income is quite difficult to tax, especially in these countries, reliance tends to be on indirect taxes such as the VAT. While most countries do exempt basic food products and other consumption of low-income individuals, the resulting distribution of tax burden may be less progressive than under a system using an income

tax. Based on our results, the property tax, with adequate administration, may be a way to address the vertical equity concerns of these countries.

Table 1. *List of Variable Definitions*

T&M (1)	Activity level for Formal Trade & Manufacturing sector
Farm (2)	Activity level for Formal Farm sector
Hsg (3)	Activity level for Formal Housing sector
Scvs (4)	Activity level for Informal Service & Housing sector
Farm (5)	Activity level for Informal Farm sector
E	Export index or activity level
M	Import index or activity level
K	Domestic capital
R	Land
KM	Capital Imports
Wp	Hicksian welfare function for Informal (poor) household
Wm	Hicksian welfare function for Formal (middle) household
Ww	Hicksian welfare function for Formal (wealthy) household
LIs	Labor supply for poor household to informal services sector
LIf	Labor supply for poor household to informal farming sector
LSp	Labor supply for poor household
LFm	Activity level for formal labor supply (middle income household)
LIm	Activity level for informal labor supply (middle income consumer)
LSm	Labor supply for middle income household
LFw	Activity level for formal labor supply (wealthy household)
LIw	Activity level for formal labor supply (wealthy household)
LSw	Labor supply for wealthy household
poor	Informal sector household
mdle	Middle income formal sector household
wlthy	Wealthy formal sector household
frgn	Representative foreign agent
P1	Price index for formal sector trade-manufacturing good
P2	Price index for formal sector farm good
P3	Price index for formal sector housing good
P4	Price index for informal sector “services” good
P5	Price index for informal sector farm good
PWp	Price index for poor household welfare
PWm	Price index for middle income household welfare
PWw	Price index for wealthy household welfare
PLIs	Price index for poor household labor supplied to firms (svcs (4))
PLIf	Price index for poor household labor supplied to firms (farm)
PLSIs	Price index for poor household labor supplied to market (svcs (4))
PLSIf	Price index for poor household labor supplied to market (farm)
PLFm	Price index for formal labor supplied to firms (mdle)
PLIm	Price index for informal labor supplied to firms (mdle)
PLSFm	Price index for formal labor supplied to market (mdle)
PLSIm	Price index for informal labor supplied to market (mdle)
PLFw	Price index for formal labor supplied to firms (wlthy)
PLIw	Price index for informal labor supplied to firms (wlthy)
PLSFw	Price index for formal labor supplied to market (wlthy)

PLSIw	Price index for informal labor supplied to market (wlthy)
PL	Price index for primary factor labor
PK	Price index for mobile capital
PR	Price index of resources (land)
PK4-5	Price index for informal sector-specific capital input (svcs & farming)
PFX	Exchange rate index
PKm	Rent due to imported capital

Table 2. Social Accounting Matrix: Summary of Salient Features

Markets	Production Sectors Formal Sectors (F)	Informal Sectors (I)	Consumers' Endowment poor middle wealthy foreign
Good 1 Good 2 Good 3 Good 4 Good 5 Capital (K) Labor (L) Land (R)	o Goods 1-3 are produced in F & 4-5 are produced in I o F is more capital-intensive o I is more labor-intensive o F uses inputs of capital, labor, land, and intermediate inputs from F o I uses sector specific capital, labor, and land inputs plus intermediate inputs from both F & I o Poor consumers' welfare is intensive in goods produced in I sectors o middle income and wealthy consumers' welfare is intensive in goods produced in F sectors		o poor has 43 and 33 percent of middle income and wealthy consumers' endowment, respectively o middle income consumer has 75 percent of wealthy consumers' endowment o foreign consumer is endowed with "foreign" capital

Note. The actual values in the Social Accounting Matrix reflect three internal consistence conditions: zero profit, market clearing, and income balance.

Table 3: Social Accounting Matrix

	Production Sectors																			Consumers			
Markets	T&M (1)	Farm (2)	Hsg (3)	Svcs (4)	Farm (5)	E	M	KM	Wp	Wm	Ww	LIs	LIf	LSp	LFm	LIm	LSm	LFw	LIw	LSw	Poor	mdle	wlthy	frgn
P1	150	-25		-5	-10	-20	10		-10	-30	-60													
P2	-5	150	-25	-10		-20	5		-5	-40	-50													
P3	-10	-25	150	-5	-10		5		-10	-45	-50													
P4				55	-5				-15	-20	-15													
P5					65				-25	-15	-25													
PWp									65												-65			
PWm										150												-150		
PWw											200												-200	
PLIs				-20								20												
PLIf					-20								20											
PLSIs												-20		20										
PLSIf													-20	20										
PLFm	-20	-15	-10												45									
PLIm					-5											5								
PLSFm															-45		45							
PLSIm																-5	5							
PLFw	-25	-15	-15															55						
PLIw				-5															5					
PLSFw																		-55		55				
PLSIw																			-5	5				
PL														-40			-50			-60	40	50	60	
PK	-55	-40	-45					20														45	75	
PR	-35	-30	-55	-5	-10																15	55	65	
PK4-5				-5	-5																10			
PFX						40	-20	-10																-10
PKr								-10																10

Table 4. Elasticity Choices

Labor/Capital/land elasticity in value-added	1
Elasticity of substitution between intermediate inputs	0
Elasticity of substitution between value-added and Armington aggregate good	0
Elasticity of transformation between domestic and export goods	1
Armington elasticity of substitution between domestic and import goods	5
Elasticity of substitution between formal and informal sector goods in final demand	1
Labor supply elasticity (poor consumer)	4
Labor supply elasticity (middle income consumer)	4
Labor supply elasticity (wealthy consumer)	4

Table 5. Mobility between Urban & Rural and Fixed Capital Supply

(1)	(2) Uniform National Tax (%-Chg)	(3) Local Differentials (%-Chg)	(4) Land & capital exempt in Agric (%-Chg)	(5) Evasion in Informal sector (%-Chg)
Wpoor	-4.68	-4.15	-3.51	-0.90
Wmiddle	-12.27	-14.47	-9.12	-11.81
Wwealthy	-15.94	-18.63	-11.04	-15.61
X1	-26.24	-25.58	-22.54	-25.62
X2	-21.29	0.19	11.11	-21.10
X3	10.48	-13.05	-9.40	10.43
X4	-13.24	-15.16	-10.47	-10.17
X5	-12.59	-13.99	-6.76	-8.26
P1	-0.29	1.33	4.17	0.23
P2	-0.58	-2.68	-5.86	0.11
P3	-1.16	-0.71	2.78	-0.07
P4	3.08	3.78	3.61	0.72
P5	2.73	3.02	-0.50	-0.95
PK	-25.32	-29.35	-17.47	-24.94
PK45	-26.98	-27.94	-16.69	-9.50
PKm	-1.16	-2.68	-5.86	-0.07
PR	-21.00	-27.84	-16.19	-18.64
PL	9.31	13.64	6.46	7.63
PLFm	9.10	13.51	6.45	7.47
PLFw	9.17	13.50	6.35	7.52
PLIm	11.18	14.77	6.51	9.01
PLIw	10.85	15.14	7.61	8.81
PLIs	9.31	13.74	7.00	7.70
PLIf	9.31	13.55	5.90	7.56

Table 6. Immobility between Urban & Rural and Fixed Capital Supply

	Uniform National Tax (%-Chg)	Local Differentials (%-Chg)	Land & capital exempt in Agric (%-Chg)	Evasion in Informal sector (%-Chg)
Wpoor	-4.85	-4.27	-3.55	-1.03
Wmiddle	-12.25	-14.46	-9.13	-11.80
Wwealthy	-15.89	-18.59	-11.02	-15.57
X1	-26.12	-25.49	-22.50	-25.53
X2	-21.17	0.29	11.16	-21.01
X3	10.57	-12.98	-9.36	10.50
X4	-13.70	-15.57	-10.82	-10.53
X5	-13.08	-14.28	-6.79	-8.64
P1	-0.48	1.19	4.10	0.08
P2	-0.75	-2.80	-5.91	-0.02
P3	-1.28	-0.80	2.73	-0.16
P4	3.72	4.38	4.10	1.20
P5	3.41	3.44	-0.43	-0.46
PK	-25.35	-29.37	-17.48	-24.96
PK45	-26.62	-27.67	-16.53	-9.13
PKm	-1.28	-2.80	-5.91	-0.16
PR	-20.99	-27.82	-16.18	-18.62
PL	9.46	13.76	6.52	7.73
PLFm	8.33	13.08	6.49	6.90
PLFw	8.69	13.01	5.95	7.14
PLIm	19.66	19.87	6.84	15.29
PLIw	17.95	21.98	12.78	14.25
PLIs	9.46	13.87	7.09	7.81
PLIf	9.46	13.64	5.93	7.66

Table 7. Mobility between Urban & Rural and Elastic Capital Supply

	Uniform National Tax (%-Chg)	Local Differentials (%-Chg)	Land & capital exempt in Agric (%-Chg)	Evasion in Informal sector (%-Chg)
Wpoor	-5.17	-4.85	-3.76	-1.42
Wmiddle	-12.46	-14.72	-9.20	-12.02
Wwealthy	-13.53	-16.03	-9.87	-13.14
X1	-25.57	-25.67	-22.62	-24.94
X2	-21.36	-4.90	8.66	-21.18
X3	6.21	-13.17	-9.47	6.08
X4	-12.48	-14.29	-10.08	-9.37
X5	-11.58	-12.93	-6.27	-7.19
P1	-0.06	1.55	4.26	0.46
P2	-0.42	-2.51	-5.80	0.27
P3	-1.19	-0.66	2.78	-0.10
P4	2.68	3.17	3.39	0.33
P5	2.23	2.38	-0.72	-1.43
PK	-23.59	-27.64	-16.68	-23.18
PK45	-26.77	-27.85	-16.58	-9.25
PKm	-40.91	-46.29	-26.30	-40.93
PR	-22.35	-28.79	-16.69	-20.02
PL	8.58	12.31	6.02	6.87
PLFm	8.34	12.13	5.99	6.69
PLFw	8.42	12.14	5.90	6.74
PLIm	10.63	13.84	6.25	8.44
PLIw	10.33	14.11	7.31	8.26
PLIs	8.56	12.38	6.55	6.92
PLIf	8.60	12.23	5.48	6.81

Table 8. Immobility between Urban & Rural and Elastic Capital Supply

	Uniform National Tax (%-Chg)	Local Differentials (%-Chg)	Land & capital exempt in Agric (%-Chg)	Evasion in Informal sector (%-Chg)
Wpoor	-5.36	-5.01	-3.82	-1.56
Wmiddle	-12.44	-14.71	-9.20	-12.00
Wwealthy	-13.49	-15.99	-9.85	-13.10
X1	-25.44	-25.56	-22.56	-24.83
X2	-21.23	-4.76	8.73	-21.07
X3	6.32	-13.08	-9.43	6.16
X4	-13.01	-14.80	-10.48	-9.80
X5	-12.13	-13.33	-6.35	-7.64
P1	-0.27	1.36	4.17	0.29
P2	-0.61	-2.67	-5.86	0.12
P3	-1.33	-0.77	2.73	-0.20
P4	3.41	3.90	3.95	0.89
P5	2.99	2.95	-0.58	-0.87
PK	-23.63	-27.67	-16.69	-23.21
PK45	-26.36	-27.49	-16.38	-8.82
PKm	-40.88	-46.25	-26.28	-40.92
PR	-22.33	-28.76	-16.68	-19.99
PL	8.75	12.46	6.10	7.00
PLFm	7.50	11.52	5.95	6.04
PLFw	7.87	11.55	5.46	6.30
PLIm	20.04	20.85	7.40	15.62
PLIw	18.46	22.42	13.17	14.71
PLIs	8.74	12.55	6.66	7.05
PLIf	8.76	12.37	5.52	6.94

Table 9: Social Accounting Matrix

	Production Sectors																				Consumers			
Markets	T&M (1)	Farm (2)	Hsg (3)	Svcs (4)	Farm (5)	E	M	KM	Wp	Wm	Ww	LIs	LIf	LSp	LFm	LIm	LSm	LFw	LIw	LSw	Poor	mdle	wlthy	frgn
P1	160	-20		-5	-5	-20	10		-10	-30	-80													
P2	-5	150	-25	-5		-20	5		-5	-40	-55													
P3	-10	-10	150		-10		5		-10	-45	-70													
P4				55	-5				-10	-20	-20													
P5					55				-15	-15	-25													
PWp									50												-50			
PWm										150												-150		
PWw											250												-250	
PLIs				-15								15												
PLIf					-15								15											
PLSIs												-15		15										
PLSIf													-15	15										
PLFm	-20	-15	-10												45									
PLIm					-5											5								
PLSFm															-45		45							
PLSIm																-5	5							
PLFw	-25	-20	-15															60						
PLIw				-15															15					
PLSFw																		-60		60				
PLSIw																			-15	15				
PL														-30			-50			-75	30	50	75	
PK	-65	-45	-45					20														45	90	
PR	-35	-40	-55	-10	-10																10	55	85	

PK4-5				-5	-5																10			
PFX						40	-20	-10																-10
PKr								-10																10

Table 10. Mobility between Urban & Rural and Fixed Capital Supply

	Uniform National Tax (%-Chg)	Local Differentials (%-Chg)	Land & capital exempt in Agric (%-Chg)	Evasion in Informal sector (%-Chg)
Wpoor	-4.66	-3.88	-3.66	-0.06
Wmiddle	-12.14	-13.99	-8.37	-11.41
Wwealthy	-15.18	-17.69	-10.43	-14.72
X1	-24.97	-25.50	-23.12	-23.37
X2	-20.98	0.85	13.76	-21.02
X3	11.58	-14.61	-11.80	10.29
X4	-15.15	-16.89	-11.91	-10.43
X5	-13.43	-14.79	-6.81	-8.51
P1	-0.54	1.17	4.18	0.09
P2	-0.41	-3.08	-7.62	0.45
P3	-1.17	-0.54	2.77	0.09
P4	4.49	4.76	4.87	0.11
P5	2.72	2.68	-1.06	-1.53
PK	-25.57	-29.79	-17.88	-25.13
PK45	-28.13	-29.47	-17.69	-10.56
PKm	-1.17	-3.08	-7.62	0.09
PR	-21.36	-27.40	-15.38	-18.76
PL	10.81	14.97	6.86	9.08
PLFm	10.70	14.91	6.87	9.01
PLFw	10.65	14.86	6.77	8.97
PLIm	11.69	15.47	6.78	9.67
PLIw	11.40	15.37	7.21	9.53
PLIs	10.79	14.96	7.00	9.09
PLIf	10.82	14.97	6.72	9.07

Table 11. Immobility between Urban & Rural and Fixed Capital Supply

	Uniform National Tax (%-Chg)	Local Differentials (%-Chg)	Land & capital exempt in Agric (%-Chg)	Evasion in Informal sector (%-Chg)
Wpoor	-4.86	-4.00	-3.73	-0.15
Wmiddle	-12.16	-14.01	-8.39	-11.42
Wwealthy	-15.13	-17.65	-10.40	-14.66
X1	-24.79	-25.40	-23.06	-22.14
X2	-20.82	0.97	13.84	-21.06
X3	11.73	-14.52	-11.73	9.29
X4	-16.05	-17.46	-12.46	-11.14
X5	-13.95	-15.08	-6.80	-8.84
P1	-0.77	1.03	4.09	-0.05
P2	-0.62	-3.21	-7.69	0.30
P3	-1.32	-0.64	2.71	-0.05
P4	5.75	5.58	5.63	1.02
P5	3.43	3.09	-1.03	-1.09
PK	-25.58	-29.79	-17.88	-25.06
PK45	-27.85	-29.30	-17.60	-10.29
PKm	-1.32	-3.21	-7.69	-0.05
PR	-21.33	-27.38	-15.37	-18.91
PL	10.93	15.04	6.91	9.28
PLFm	10.08	14.56	6.98	8.74
PLFw	9.61	14.16	6.14	8.32
PLIm	18.61	19.38	6.26	14.13
PLIw	16.19	18.56	10.01	13.12
PLIs	10.91	15.04	7.05	9.30
PLIf	10.94	15.04	6.76	9.26

Table 12. Mobility between Urban & Rural and Elastic Capital Supply

	Uniform National Tax (%-Chg)	Local Differentials (%-Chg)	Land & capital exempt in Agric (%-Chg)	Evasion in Informal sector (%-Chg)
Wpoor	-5.08	-4.51	-3.85	-0.52
Wmiddle	-12.30	-14.22	-8.43	-11.59
Wwealthy	-13.30	-15.67	-9.63	-12.78
X1	-24.40	-25.50	-23.15	-23.81
X2	-21.14	-4.29	11.53	-21.05
X3	7.29	-14.13	-11.61	6.92
X4	-14.16	-15.80	-11.49	-9.37
X5	-12.38	-13.68	-6.35	-7.39
P1	-0.23	1.48	4.29	0.38
P2	-0.32	-2.98	-7.59	0.54
P3	-1.22	-0.52	2.76	0.07
P4	3.93	4.02	4.64	-0.45
P5	2.20	2.05	-1.26	-2.03
PK	-23.99	-28.22	-17.23	-23.59
PK45	-27.80	-29.19	-17.53	-10.16
PKm	-41.52	-46.89	-25.87	-41.66
PR	-22.60	-28.33	-15.83	-19.87
PL	10.09	13.72	6.52	8.22
PLFm	9.97	13.63	6.52	8.13
PLFw	9.90	13.56	6.41	8.06
PLIm	11.12	14.48	6.54	8.98
PLIw	10.83	14.35	6.96	8.83
PLIs	10.07	13.71	6.65	8.23
PLIf	10.10	13.72	6.38	8.21

Table 13. Immobility between Urban & Rural and Elastic Capital Supply

	Uniform National Tax (%-Chg)	Local Differentials (%-Chg)	Land & capital exempt in Agric (%-Chg)	Evasion in Informal sector (%-Chg)
Wpoor	-5.31	-4.69	-3.93	-0.69
Wmiddle	-12.33	-14.24	-8.45	-11.61
Wwealthy	-13.24	-15.63	-9.60	-12.74
X1	-24.19	-25.35	-23.07	-23.64
X2	-20.94	-4.08	11.67	-20.88
X3	7.50	-13.99	-11.53	7.09
X4	-15.31	-16.72	-12.19	-10.37
X5	-13.01	-14.14	-6.42	-7.89
P1	-0.51	1.25	4.17	0.15
P2	-0.59	-3.19	-7.69	0.32
P3	-1.41	-0.67	2.67	-0.09
P4	5.51	5.31	5.60	0.80
P5	3.05	2.68	-1.14	-1.42
PK	-24.02	-28.23	-17.24	-23.61
PK45	-27.45	-28.92	-17.40	-9.80
PKm	-41.44	-46.80	-25.80	-41.60
PR	-22.55	-28.29	-15.81	-19.83
PL	10.25	13.85	6.59	8.34
PLFm	9.25	13.11	6.57	7.61
PLFw	8.60	12.46	5.62	6.99
PLIm	19.24	20.45	6.79	14.94
PLIw	16.83	19.40	10.47	13.76
PLIs	10.23	13.85	6.73	8.36
PLIf	10.26	13.84	6.44	8.32

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