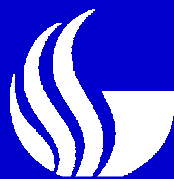


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December 2004

Tax Burden in Jamaica

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Tax Burden in Jamaica

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Abstract

The Government of Jamaica imposes a wide range of taxes on income, consumption, and property. An important consideration in any reform of these taxes is their impact of the distribution of income, or their tax burden. This staff paper presents background and analysis of the burden of the existing system of taxes.

The question of “who bears the final burden of a tax?” is a fundamental one. Any tax will cause individuals and firms to change their behaviors, and the resulting changes in product and factor prices will affect the “incidence”, or the distributional effects, of the tax. Economists have devoted much attention to the question of tax incidence. Although there is wide agreement about the incidence of some taxes, such as excise or individual income taxes, the incidence of other taxes remains controversial. Even so, several basic “principles” of tax incidence should be kept in mind.

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Executive Summary

The Government of Jamaica imposes a wide range of taxes on income, consumption, and property. An important consideration in any reform of these taxes is their impact of the distribution of income, or their tax burden. This staff paper presents background and analysis of the burden of the existing system of taxes.

The question of “who bears the final burden of a tax?” is a fundamental one. Any tax will cause individuals and firms to change their behaviors, and the resulting changes in product and factor prices will affect the “incidence”, or the distributional effects, of the tax. Economists have devoted much attention to the question of tax incidence. Although there is wide agreement about the incidence of some taxes, such as excise or individual income taxes, the incidence of other taxes remains controversial. Even so, several basic “principles” of tax incidence should be kept in mind.

A first principle is an obvious but often ignored one: *Only individuals can bear the burden of a tax.* Consider, for example, the company income tax. The company is the agent legally responsible for remitting the tax payment to the government, and so bears the “statutory incidence” of the tax. However, the company is merely a legal entity, and it makes little sense to claim that it is the company that bears the “economic incidence” of the tax. Instead, the economic incidence will be borne by one or more of several possible candidates, as product and factor prices adjust in response to the company tax: the owners of the company, the consumers of the company’s product (s), the workers of the company, the individuals who supply other inputs to the company, and even the owners of other companies. As another example, consider an excise tax on gasoline. The firm that collects the excise tax and remits it to the government will bear

the statutory incidence of the tax, but again the economic incidence will depend upon the ways in which product and factor prices adjust to the excise tax. The final burden of the tax will likely be borne by consumers of gasoline via increased gasoline prices, or by those who supply inputs to the production of gasoline. As a final example, consider the employer's share of a payroll tax. The statutory burden of the tax is borne by the legal entity of the firm, but the economic incidence will ultimately be borne by its stockholders via a lower return, by its workers via lower wages, by its input suppliers via lower input prices, or by the consumers of its product via higher product prices. Tax incidence attempts to find ways to assign the burden of a tax to these individuals.

A second principle of tax incidence is that *incidence on both the sources of income and the uses of income should be considered*. A tax may affect the prices of the products that individuals consume (or their "uses" of income). The same tax may also affect factor prices (or the "sources" of income). A full understanding of the incidence of the tax must incorporate both sides. Consider once again the excise tax on gasoline. To the extent that the price of gasoline increases, then individuals who purchase gasoline will pay some of the excise tax. To the extent that individuals who work for the gasoline companies receive lower wages (as, say, the companies reduce their demands for labor), then these individuals will also bear some of the burden of the excise tax. Both the sources and the uses of income must be analyzed in incidence analysis.

A third principle may be less obvious. *Incidence depends upon on the nature of the budgetary change; that is, incidence depends upon how the tax revenues are used*. A basic government accounting identity requires that all government expenditures must be financed from one or more of several sources: tax revenues, borrowing from (or the

issuance of debt to) the public, or borrowing from the government via money expansion. Any change in tax revenues must be accompanied by a corresponding change in government expenditures, in government debt, in the money supply, or in another tax. The impact of any specific tax change on product and factor prices will clearly depend upon the precise change in these other instruments that accompanies the tax change.

A fourth principle is that *incidence depends upon market structure*. Tax incidence attempts to trace the impact of a tax on product and factor prices. The ways in which prices are determined in these markets will affect the final burden of a tax. An excise tax imposed in a competitive market with many small firms will have a different impact on prices than the same tax imposed in a market that dominated by a few large firms. Similarly, a tax imposed in a market in which all demands and supplies come from domestic sources will have a different impact on prices if it is imposed in a market in which international agents participate either on the demand side or on the supply side.

A related subprinciple is that *in a competitive market the incidence of a tax does not depend upon where it is imposed – on consumers of the produce or on producers of the product*. The tax simply drives a wedge between the gross-of-tax price paid by consumers and the net-of-tax price received by producers, and the origin of the wedge (e.g., from the demand side of the market or from the supply side of the market) is irrelevant.

Finally, and most importantly, when a tax is imposed individuals will adjust their behavior to reduce their tax liabilities. Those who are better able to adjust their behavior – those who have a larger responsiveness, as measured by their “elasticity” – are better able to shift the tax burden to others and will bear less of the burden of the tax. This

leads to a fifth principle: *Incidence depends upon elasticities*. For example, if consumers have a low response to gasoline prices, then consumers will bear more of the incidence of an excise tax on gasoline. Similarly, if workers are able to reduce their work effort or to shift their labor to untaxed sectors in response to an individual income tax or a payroll tax, then workers will bear less of the burden of an income or a payroll tax.

So who bears the burden of the taxes imposed by the Government of Jamaica? The starting point of this analysis is to consider the incidence of each of these taxes. We make several assumptions about tax incidence, assumptions that are standard in these types of analyses.

We assume that the Pay-As-You-Earn, self-employed, and all payroll taxes and contributions are borne fully by labor in the form of lower returns to labor. We also assume that the withholding tax on interest and the tax on dividends are borne by the owners of these assets in the form of lower net-of-tax returns. For the corporate income tax, we assume that 50 percent of the tax is borne by capital and 50 percent is borne by labor; of the 50 percent borne by capital, we assume that half is in Jamaica and half is outside of Jamaica. We therefore distribute half of the appropriate level of tax revenue based on capital holdings (interest, dividends, and retained earnings), and we distribute the other 50 percent based on labor income.

The property tax and stamp duty tax are also distributed via an “allocation method.” We assume that the owners of housing bear the burden of the tax. The stamp duty is assumed to be borne by purchasers of taxed items. Finally, all indirect taxes – the General Consumption Tax, the Special Consumption Tax, excise taxes, and trade taxes –

are assumed to be borne by consumers of the taxed commodities, and their burdens are allocated to consumers in proportion to their shares of consumption of the taxed goods.

It should be noted that there have been several previous analyses of the incidence of Jamaican taxes. The most recent ones examine the impact of the tax reforms that were introduced during the 1980s. The general conclusions from these analyses are that the reforms lowered the overall tax burden and that they also introduced more progressivity into the tax system. These studies also tend to find a “wandering progressivity” of direct taxes, as effective tax rates tend to increase as income increases, at least up to a point, after which tax rates clearly decline. Indirect taxes are consistently shown to have a generally proportional impact on tax burdens. Overall, then, these studies suggest a pattern of incidence that is modestly progressive over much of the income distribution, before becoming regressive at higher income levels.

The current study updates these previous studies by examining the incidence of the existing system of direct and indirect taxes. To do this, we construct a measure of “comprehensive income” by combining data from a number of sources, including: the Emoluments Survey, the Survey of Living Conditions, the Labor Force Survey, individual income tax returns, the National Income Accounts, and the Jamaica Stock Exchange.

Our main conclusion is that the overall tax burden of all taxes is mildly progressive. Indirect taxes generally have a proportional impact on tax burdens, while direct taxes have a progressive impact. In total, effective tax rates rise as income rises

Tax Burden in Jamaica

Introduction

The Government of Jamaica imposes a wide range of taxes on income, consumption, and property. An important consideration in any reform of these taxes is their impact of the distribution of income, or their tax burden. This staff paper presents background and analysis of the burden of the existing system of taxes. Our main conclusion is that the overall tax burden of all taxes is mildly progressive, with direct taxes having a more progressive impact than indirect taxes.

In the next section, we discuss the general notion of who bears the burden of taxes. We then examine previous attempts to estimate the distribution of income in Jamaica, as well as other attempts to measure the impact of taxes on the distribution of income. We then present our own methodology and results.

The Concept of “Tax Incidence”

All taxes must ultimately be paid by someone, and one of the most fundamental questions asked by economists is: “Who bears the final burden of a tax?” Any tax will cause individuals and firms to change their behaviors, and the resulting changes in product and factor prices will affect the “incidence” or the distributional effects, of the tax. This section discusses the notion of tax incidence, and attempts to answer the basic question: “Who bears the burden of a tax?”

Economists have devoted much attention to the question of tax incidence.¹ Although there is wide agreement about the incidence of some taxes, such as excise or individual income taxes, the incidence of other taxes remains controversial. Even so, several basic “principles” of tax incidence should be kept in mind in the discussion that follows.

A first principle is an obvious but often ignored one: *Only individuals can bear the burden of a tax.* Consider, for example, the company income tax. The company is the agent legally responsible for remitting the tax payment to the government, and so bears the “statutory incidence” of the tax. However, the company is merely a legal entity, and it makes little sense to claim that it is the company that bears the “economic incidence” of the tax. Instead, the economic incidence will be borne by one or more of several possible candidates, as product and factor prices adjust in response to the company tax: the owners of the company, the consumers of the company’s product (s), the workers of the company, the individuals who supply other inputs to the company, and even the owners of other companies. As another example, consider an excise tax on gasoline. The firm that collects the excise tax and remits it to the government will bear the statutory incidence of the tax, but again the economic incidence will depend upon the ways in which product and factor prices adjust to the excise tax. The final burden of the tax will likely be borne by consumers of gasoline via increased gasoline prices, or by those who supply inputs to the production of gasoline. As a final example, consider the employer’s share of a payroll tax. The statutory burden of the tax is borne by the legal entity of the firm, but the economic incidence will ultimately be borne by its stockholders

¹ Much of this work builds on the analysis of Harberger (1962). For comprehensive surveys, see McLure (1975), Kotlikoff and Summers (1987), and Fullerton and Metcalf (2002). For examples of applied work, see Pechman (1986) and Fullerton and Rogers (1993).

via a lower return, by its workers via lower wages, by its input suppliers via lower input prices, or by the consumers of its product via higher product prices. Tax incidence attempts to find ways to assign the burden of a tax to these individuals.

This reasoning suggests that a clear distinction must be made between who is legally or statutorily responsible for paying a tax and who ultimately bears the true burden of the tax economic incidence. The process by which the statutory incidence of a tax is moved from those legally responsible to those who bear the economic burden is commonly referred to as “tax shifting”. If a tax is shifted to consumers via higher product prices, then the tax is said to be “shifted forward”; if the tax is borne instead by workers or other input suppliers, then the tax is said to be “shifted backward”.

A second principle of tax incidence is that *incidence on both the sources of income and the uses of income should be considered*. A tax may affect the prices of the products that individuals consume (or their “uses” of income). The same tax may also affect factor prices (or the “sources” of income). A full understanding of the incidence of the tax must incorporate both sides. Consider once again the excise tax on gasoline. To the extent that the price of gasoline increases, then individuals who purchase gasoline will pay some of the excise tax. To the extent that individuals who work for the gasoline companies receive lower wages (as, say, the companies reduce their demands for labor), then these individuals will also bear some of the burden of the excise tax. Both the sources and the uses of income must be analyzed in incidence analysis.

A third principle may be less obvious. *Incidence depends upon on the nature of the budgetary change; that is, incidence depends upon how the tax revenues are used*. A basic government accounting identity requires that all government expenditures must be

financed from one or more of several sources: tax revenues, borrowing from (or the issuance of debt to) the public, or borrowing from the government via money expansion. Any change in tax revenues must be accompanied by a corresponding change in government expenditures, in government debt, in the money supply, or in another tax. The impact of any specific tax change on product and factor prices will clearly depend upon the precise change in these other instruments that accompanies the tax change.

The most common assumption here is that another tax (proportional to income) is changed in response to a specific tax change in order to keep revenues constant (or “differential tax incidence”), and this is the assumption that is made in the following incidence analysis. Other assumptions are possible.

A fourth principle is that *incidence depends upon market structure*. Tax incidence attempts to trace the impact of a tax on product and factor prices. Clearly, the ways in which prices are determined in these markets will affect the final burden of a tax. An excise tax imposed in a competitive market with many small firms will have a different impact on prices than the same tax imposed in a market that dominated by a few large firms. Similarly, a tax imposed in a market in which all demands and supplies come from domestic sources will have a different impact on prices if it is imposed in a market in which international agents participate either on the demand side or on the supply side.

A related subprinciple is that *in a competitive market the incidence of a tax does not depend upon where it is imposed – on consumers of the produce or on producers of the product*. The tax simply drives a wedge between the gross-of-tax price paid by consumers and the net-of-tax price received by producers, and the origin of the wedge

(e.g., from the demand side of the market or from the supply side of the market) is irrelevant.²

Finally, and most importantly, when a tax is imposed individuals will adjust their behavior to reduce their tax liabilities. Those who are better able to adjust their behavior – those who have a larger responsiveness, as measured by their “elasticity” – are better

² To illustrate this, consider a perfectly competitive labor market, in which the demand for labor is defined by $[W=a-bL]$ and the supply is defined by $[W=c+dL]$, where \mathbf{a} , \mathbf{b} , \mathbf{c} , and \mathbf{d} are positive constants, \mathbf{W} is the wage, and \mathbf{L} is the number of individuals employed. The equilibrium levels of the wage and of the employment are given by

$$L = (a-c)/(b+d)$$

$$W = (ad+bc)/(b+d).$$

(Note that these equations can be interpreted as demand and supply curves. The demand curve for labor has a price-intercept of \mathbf{a} and a slope of $-\mathbf{b}$, while the supply curve of labor has a price-intercept of \mathbf{c} and a slope of \mathbf{d} .) Now suppose that a unit wage tax \mathbf{T} is imposed. The existence of the tax drives a wedge between the wage paid by employers and the wage received by workers; that is, in the presence of the tax, there is a difference between what employers pay (the gross-of-tax wage \mathbf{W}_g) and what employees keep (the net-of-tax wage \mathbf{W}_n), with the tax \mathbf{T} creating the difference. Suppose first that the wage tax is imposed on employers. The presence of the tax does not affect the maximum amount that the employer is willing to pay for each unit of labor, but it does affect the wage that employees can expect to take home net-of-tax. Denoting \mathbf{W}_n as the net-of-tax wage and \mathbf{W}_g as the gross-of-tax wage, the existence of the employer wage tax can be viewed as changing the demand for labor to $[\mathbf{W}_n+\mathbf{T}=a-bL]$, or equivalently to $[\mathbf{W}_n=a-bL-\mathbf{T}]$; that is, the employer wage tax effectively shifts the demand curve down by the amount of the tax. The supply curve is unchanged at $[\mathbf{W}_n=c+dL]$. Solving these new equations gives

$$L = (a-c-T)/(b+d)$$

$$W_n = (ad+bc-dT)/(b+d)$$

$$W_g = W_n + T = (ad+bc+bT)/(b+d),$$

so that the tax reduces the amount of labor employed, reduces the net-of-tax wage \mathbf{W}_n , and increases the gross-of-tax wage \mathbf{W}_g . In all cases, the impact depends upon the elasticities of demand and of supply, as reflected in the magnitudes of \mathbf{b} and \mathbf{d} . Suppose instead that the tax is imposed on employees. Now the tax can be viewed as increasing the gross-of-tax wage \mathbf{W}_g that employees require to supply each unit of labor because employees only get to keep the net-of-tax wage \mathbf{W}_n ; that is, the tax effectively shifts the supply curve for labor up by the amount of tax. The new supply becomes $[\mathbf{W}_g=c+dL+\mathbf{T}]$, and the demand for labor is unchanged at $[\mathbf{W}_g=a-bL]$. Solving these equations gives

$$L = (a-c-T)/(b+d)$$

$$W_g = (ad+bc+bT)/(b+d)$$

$$W_n = W_g - T = (ad+bc-dT)/(b+d).$$

The impacts are identical, regardless of whether the tax is imposed upon the demand or the supply side.

able to shift the tax burden to others and will bear less of the burden of the tax. This leads to a fifth principle: *Incidence depends upon elasticities*. For example, if consumers have a low response to gasoline prices, then consumers will bear more of the incidence of an excise tax on gasoline. Similarly, if workers are able to reduce their work effort or to shift their labor to untaxed sectors in response to an individual income tax or a payroll tax, then workers will bear less of the burden of an income or a payroll tax.

So who bears the burden of the taxes imposed by the Government of Jamaica? Consider each of the major taxes.

Individual Income Tax

The crucial issue in the incidence of the individual income tax is the degree of responsiveness of labor to a change in its wage, or its “elasticity” of labor supply. If labor is fixed in supply to the taxable sector – or if its supply elasticity is zero – then labor will be unable to avoid bearing the full burden of the income tax. Conversely, the more responsive is labor to a wage change, the more will the tax burden be shifted elsewhere.

Much, though not all, of the empirical work in developed countries concludes that labor supply is almost completely inelastic, so the standard assumption made in nearly all applied incidence studies is that labor bears the full burden of the individual income tax. However, estimates of the labor supply elasticity in developing countries suggest that labor supply is not completely inelastic.³ One possible channel of labor supply response is migration. Of greater importance in Jamaica is the fact that only labor in certain

³ For example, see Kugler (2001) and Kugler and Kugler (2002) for the case of Colombia, Gruber (1997) for Chile, Angrist (1996) for Palestinian labor, and Marrufo (2001) for Mexico.

sectors of the Jamaican economy is taxed: labor can largely escape the burden by moving to the untaxed or uncovered sectors, such as the informal sector or the self-employed sector, by changing the form of compensation to untaxed forms, or by simply failing to report income tax liabilities to the government. These avenues of escape suggest that labor may be able to shift some of the income tax burden to other groups, even though the precise magnitude of the shifting is unknown (Wallace and Alm, 2004).

Even so, our burden analysis makes the standard incidence assumption: labor is assumed to bear the full burden of the individual income tax that falls on wages. As for the income tax on dividends and interest, the burden of these taxes is also assumed to fall on the recipients of these forms of income, in proportion to their shares of dividend and interest income.

Payroll Taxes and Contributions

For purposes of the burden analysis, the five payroll taxes and contributions can be classified into two main categories: those imposed upon employees, and those imposed on employers. In determining the incidence of the payroll programs, there are two main issues.

The first is whether the incidence of a tax or contribution depends upon how it is collected, whether from the employer or the employee. As noted above, it is widely accepted in economics that in competitive markets the incidence of a tax does not depend upon where the tax is statutorily levied; that is, a tax collected from an employer has the same economic effects as the same rate tax collected from an employee. However, when markets are not competitive because of, for example, monopolistic business practices,

this equivalence fails, and employers may be able to pass on their share of a tax to consumers.

The second issue is the incidence of the combined employee plus employer tax or contribution. As with the individual income tax, the dominant school of thought asserts that labor bears the full burden of payroll taxes and contributions, so that its net-of-tax income falls by the full amount of the taxes. Another school holds that labor is able to shift at least some of the tax elsewhere, via the same avenues of escape as with the individual income tax. If the imposition of the payroll taxes causes workers as a group to reduce the supply of labor, then the gross-of-tax wage will rise, and this increase in the gross-of-tax wage will in turn shift some of the burden of the payroll taxes elsewhere: to employers in the form of a higher cost of labor than would exist in the absence of the payroll taxes, to consumers in the form of higher product prices, to capital in the form of reduced rates of return on capital, or to other input suppliers in the form of lower input prices.⁴

To resolve this issue requires a general equilibrium model, and even a simple general equilibrium model can generate a wide range of results. For example, consider an economy in which there are two sectors, a sector in which labor is subject to payroll taxes and contributions and a sector in which labor is untaxed (e.g., an informal sector). If labor is mobile between these two sectors, then the imposition of payroll taxes and contributions in the taxed sector will cause labor to respond by moving to the untaxed

⁴ For example, suppose that an average worker has annual wages of J\$300,000. If there is a payroll tax of, say, 10 percent and if workers bear the full burden of the tax, then the average worker's net-of-tax wage income falls to J\$270,000. However, suppose that the presence of the 10 percent payroll tax causes workers to reduce their supply of labor to the taxed sector, perhaps by working fewer hours in total or by working fewer hours in the taxed sector and more in the untaxed, informal sector. If the average wage rises to, say, J\$310,000, then labor has been able to shift part of the 10 percent tax to employers via a higher gross-of-tax wage; employers may in turn shift some of their burden to consumers via higher product prices or to other input suppliers via lower input prices.

sector. This movement will affect the wage of labor, the return to other factors of production, and the prices of consumer products.

The crucial issue here, just as with the individual income tax, is the degree of responsiveness of labor to a change in its wage, or its “elasticity” of labor supply. If labor is fixed in supply to the taxable sector, then labor will be unable to avoid bearing the full burden of the programs. Conversely, the more responsive is labor to a wage change, the more will the tax burden be shifted elsewhere.

As noted earlier, the standard assumption about the incidence of the payroll programs is that labor is assumed to bear the full burden of both the employee and the employer shares of the payroll programs. This is the assumption that we make in our study. Some analysts have also considered a second scenario, where labor is assumed to bear the full burden of the employee shares of the programs but the employer shares are assumed to be shifted, half to consumers in the form of higher product prices and half to employees in the form of lower wages.

It should also be kept in mind that only the incidence of the tax and contribution component of the payroll programs is considered. If a program has benefits that are equal to the amount of taxes paid, then the individual essentially “breaks even” on the program. Several payroll programs do in fact have benefits: the Civil Service Family Benefits Scheme, the National Housing Trust, and the National Insurance Scheme. Even so, it is only the incidence of the taxes and contributions that is examined. In the absence of any actuarial studies of these programs, it is not possible to evaluate their actuarial fairness. Anecdotal evidence suggests that it is unlikely that benefits equal contributions (Alm and Wallace, 2004).

General Consumption Tax, Special Consumption Tax, and Excise Taxes

Who really pays the GCT, the SCT, and the various excise taxes? As with other taxes, the person or company *legally* responsible for paying the tax is irrelevant to the determination of who *actually* pays the tax (Edmiston and Bird, 2004). Consider, for example, an item that sells for J\$1 before the imposition of GCT. If the seller adds the full tax rate of the GCT, giving a final selling price to consumers of J\$1.15, then the buyer pays the tax because the tax has been shifted completely forward to him by the seller, even though the seller is the one who sends the revenue to government. Alternatively, the seller could lower his price to J\$0.87 following the imposition of the GCT, giving a final tax-inclusive selling price of J\$1.00 for consumers; in this case, the seller would pay the tax. Finally, the seller could lower his price partially (say, to J\$.95), thereby shifting part of the tax forward to the consumer and bearing the remainder of the tax himself. What actually happens depends on the relative responsiveness of sellers and buyers to changes in price (e.g., the elasticities of demand and of supply).

The standard assumption made in assigning the burden of these indirect taxes is that it is consumers who bear the burden of the tax, based on their consumption of the taxed commodities. This is the assumption that we make.

Company Income Tax

Perhaps the most controversy surrounds the incidence of the company income tax. As noted earlier, the company is merely a legal entity, and the economic incidence of the tax does not fall the legal entity of the firm but instead on one or more of several possible candidates, as product and factor prices adjust in response to the company tax: the owners of the company, the consumers of the company's product (s), the workers of the

company, the individuals who supply other inputs to the company, and even the owners of other companies.

Once again, the crucial issue here relates to elasticities, in this case the elasticity of supply of capital. Jamaica is a small, open economy that faces a supply of capital that is highly elastic; that is, capital will freely move into and out of Jamaica depending on the rate of return it can expect to earn in Jamaica and elsewhere. Any attempt by the Government of Jamaica to tax the return to capital more heavily in Jamaica will lead to the outflow of capital from Jamaica until its rate of return is reestablished at international levels; similarly, capital will move into Jamaica in response to, say, investment incentives until its rate of return is again reestablished at international levels (Rider, 2004).

Because of capital mobility, it is commonly assumed that the burden of the company tax in a small, open economy is largely shifted from capital to other, less mobile factors. However, not all forms of capital may be fully mobile, even in Jamaica. As a result, we assume that the incidence of the company tax is split equally between the owners of capital and workers; of the 50 percent of the company tax assumed to be borne by capital, we further assume that half of the burden is borne by owners of capital who live in Jamaica and half by owners outside of Jamaica.

Property Transfer Tax and Stamp Duty

The property transfer tax and the stamp duty are nominally paid by the buyer involved in the transaction (Bahl, 2004). However, this does not necessarily mean that it is the buyer who ultimately bears the true economic burden of the taxes. The true incidence of the taxes may bear no relation to their statutory incidence.

The division of the duties between buyers and sellers depends upon the elasticities of demand and of supply. If buyers are willing and able to pay the price inclusive of the stamp duties without significantly decreasing their purchases – that is, if demand is “inelastic” – then they are likely to bear most of the burden. On the other hand, if sellers offer for sale the same quantity without much regard to the price they receive (or an inelastic supply), then it is the sellers who will pay the taxes. With buyers and sellers both responsive to the price of the transaction, as seems likely with most transactions covered by the property transfer tax and the stamp duty, then the division of the duties is more difficult to determine. In general, those with the less responsive actions will bear the bulk of the burden.⁵

There are two main issues in determining the distributional effects of the taxes. First, who bears their burden, buyers or sellers? Second, given the economic incidence of the taxes, how do they affect the distribution of income?

The absence of much detailed information on the characteristics of markets in which the transfer tax and the stamp duty are imposed, especially urban land markets, means that it is not possible to determine precisely whether it is the buyer or the seller who pays the taxes. However, in some respects the division of the burden between buyers and sellers is unimportant. Because the taxes are borne by either the buyer or the seller of the property, and because either party seems likely to be among the higher income classes, it is hard to escape the conclusion that the property transfer tax and the

⁵ It is straightforward to show that impact of a unit tax T on the price P paid by consumers in a competitive market equals

$$\Delta P/\Delta T = [E_S / (E_S - E_D)],$$

where E_S is the elasticity of supply and E_D is the elasticity of demand. For example, if E_D is zero, or if E_S is infinite, then in either case the price will rise by the full amount of the tax, and buyers will bear the full burden.

stamp duty fall more heavily on the rich than on the poor. The burden analysis that we conduct later confirms this conclusion.

It is also likely that the taxes are borne in part by those owners who do not even trade their properties. Consider the property transfer tax on the sale of immovable property, like land. To the extent that the price of land net of the tax falls (e.g., sellers bear some of the burden), then all owners of land bear some of the tax, even those who do not sell their land, because all land is worth less. This “capitalization” implies that all owners of property subject to a transfer tax pay part of the tax.⁶ Because ownership of such property is concentrated in higher income groups, the burden of the stamp duties again falls more heavily on the wealthy.

⁶ To illustrate, consider a market for immovable property in which there are three types of participants. Agents 1 and 2 buy and sell property, respectively; agent 3 owns property but neither buys nor sells additional property. The total quantity of property Q_0 is assumed to be fixed, and the initial quantity owned by agent type i is denoted Q_i , where $\sum_i Q_i = Q_0$. In the absence of a property transfer tax on the purchase or sale of property, the demand for property of each agent type is assumed to take a simple linear form, or

$$Q^D_1 = a_1 - b_1 P$$

$$Q^D_2 = a_2 - b_2 P$$

$$Q^D_3 = a_3 = Q_3,$$

where P is the price of the property. Agents 1 and 2 have demands that respond to price; agent 3 demands the same fixed amount regardless of price. Equilibrium in this market requires that the sum of the individual stock demands equals the total stock of property; equivalently, equilibrium requires that the sum of excess demands for property (or the flow of property transfers) equals zero. In either case, the equilibrium price P of land can be shown to equal

$$P = [a_1 + a_2 + a_3 - Q_0]/[b_1 + b_2].$$

Now introduce a property transfer tax at rate t , imposed only on property that is bought or sold, where P_G denotes the gross-of-tax price and $P_N = P_G (1-t)$ is the net-of-tax price. The demand for transferred property depends upon the gross-of-tax price, while the supply depends on the net-of-tax price. Assuming without loss of generality that agent 1 is the net demander of property and agent 2 is the net supplier, then the equilibrium net-of-tax price P_N equals

$$P_N = (1-t) [a_1 + a_2 + a_3 - Q_0]/[b_1 + (1-t)b_2].$$

This net-of-tax price of property is the price of all property, whether transferred or not. As can be seen in the solution for P_N , an increase in the property transfer tax rate reduces the net-of-tax price (as long as $b_1 \neq 0$).

As for the horizontal equity of the taxes, individuals are likely to be treated very differently because all transfers and transactions are not treated equally. As discussed by Bahl (2004), many transactions are grossly undervalued, and many individuals are also able to avoid or evade the duties. As a result, there are likely to be many instances in which uniform treatment of individuals and of transactions is violated.

The property transfer tax and the stamp duty fall short of many criteria for an “equitable” tax. They are not tailored to the individual circumstances of the taxpayer. They may be evaded by those who are dishonest and avoided by those who find legal means to circumvent the duties, both of which affect the horizontal and vertical equity of the taxes. Nevertheless, their overall impact is likely to be similar to that of a modestly progressive tax. In this regard, evidence from a similar type of tax, the immovable property transfer tax in Bangladesh, even though somewhat dated, suggests that transfer taxes are a moderately progressive tax (Alm, 1989).

Property Tax

Jamaica’s property tax is levied on the value of unimproved land (Sjoquist, 2004). Given that the supply of land is very inelastic, the economic incidence of the property tax will be borne by owners of the land, as the tax is “capitalized” into land prices that are lower than they would be in the absence of the tax. To operationalize this assumption, we identify the owners of housing as those who bear the burden of the property tax.

Taxes on International Trade

A tariff is a tax on imports, levied at the border. Because Jamaica is a small, open economy, it is most likely the case that any tariff (and other charges) it imposes on

imports gets passed through to higher domestic prices. If domestic competing goods are perfect substitutes with imports, then their prices would rise by the same amount. These price increases would expand domestic production, leading to higher market shares on behalf of protected domestic producers. Thus, a tariff is equivalent to a tax on consumption combined with a subsidy to domestic production (Rioja and Maskus, 2004).

This analysis indicates that, if a good is only imported and if there is no domestic production, then an import tax is equivalent to a domestic consumption tax. Put differently, the Jamaican tariff and the GCT together form a consumption tax. However, domestic goods and imported goods may not be perfect substitutes. Rather, they may be differentiated in quality, performance, or other characteristics. In such cases the price impacts of the tariff are determined by how easily consumers and industrial users shift their consumption between imports and domestic goods, in conjunction with domestic supply elasticity.⁷

Given these considerations, we treat the incidence of trade taxes in the same way as we treat other indirect taxes: they are borne by consumers in proportion to their consumption of taxed commodities.

The Evolution of the Income Distribution and Inequality in Jamaica

Income Inequality 1950 -1970

Attempts at examining the distribution of income in a single country are often fraught with difficulties, because of the variety of sources from which data on income or

⁷ The ease with which consumers and users may switch their expenditures between imported goods and domestically produced goods is termed the “elasticity of substitution” in demand. Technically, it is the percentage change in consumption volume of the home good, given a one-percent rise in the price of import goods. In practical terms it simply refers to how much the demand for the home good rises as a result of an increase in the price of imported goods caused by a tariff increase.

expenditure may be derived. Very often, a single source may reflect definitional changes over time. The situation is even more complicated when comparisons are made across countries over time. Despite these difficulties, a careful analysis can provide useful information on income distribution and inequality.

The first major study of income distribution in Jamaica was done by Ahiram (1964), based on 1958 data that used a measure of income that included annual money income (before deductions) of wage and non-wage earners. Ahiram was concerned that certain items in the income estimates were not included in his definition of income; among these were income in kind, gifts, payments to pension funds, and receipts from capital transactions. In addition, only 80 of income was actually covered in the 1958 survey, which may have affected the distribution if unreported income was not randomly distributed.

Ahiram found the Gini coefficient to be 56 percent. In addition, he estimated that the top 20 percent of income earners received 62 percent of income, that the middle 40 percent of income earners received 30 percent of income, and that the bottom 40 percent received 8 percent of income.

McLure (1977, p.17, Table 4) compared the percentage of income received by the top 10 percent of income earners for 23 developed and developing countries between 1947 and 1972. His results suggested that the estimated share of 47.8 percent for Jamaica was extremely high even by developing countries standards. Only one other country, Colombia, had a higher share going to the top 10 percent of the population. The income share going to the top ten percent of income earners for Barbados in the year 1951-1952 was 34.2 percent, which was close to that of many developed countries.

Both McLure and Ahiram were perplexed about this degree of inequality.⁸ McLure argued that it was worthwhile to investigate the definition of income to seek an explanation, while Ahiram cautioned that “one has to remember that studies in this field, including the one on Jamaica, have a wide range of error.”

Ahiram pointed out that the main source of income inequality in Jamaica was the degree of inequality between urban and rural areas. He found that the Gini coefficients for rural and urban areas were 55 percent and 49 percent, respectively. Rural areas had a larger share of income going to the top 20 percent of income earners relative to urban areas. In addition, he found that urban incomes were on average twice as great as rural incomes, and that rural incomes had a greater disparity at the lower income levels. This explained why the Gini coefficient for Jamaica was greater than the Gini for either rural or urban areas.

Ahiram adjusted income for household size and found that income inequality remained the same. He concluded that it was differences in earning capacity of households rather than household structure that accounted for the degree of income inequality. He also argued that two other factors were crucial in explaining income inequality. The first was the significant difference in earnings between wage and non-wage workers. The Gini coefficient for non-wage earners was significantly greater than that of wage earners, and the Gini coefficient of wage earners in rural areas was greater than the coefficient of non-wage earners in rural areas. The second major factor affecting the level of inequality was the fact that a large percentage of the rural labor force was in

⁸ McLure (1977) found that his own estimate based on the 1971-1972 household survey of the share received by the top ten percent of income earners was 49.3 percent. Estimates based on data from the Central Planning Unit found a share of between 30.4 and 32.5 percent, while the estimate computed by Andic (1966) was 38 percent.

agriculture, for which average earnings were the lowest among all industrial sectors. The agricultural sector employed the largest number of workers, some 38.9 percent of the total labor force, while average earnings in agriculture constituted 37.1 percent of average earnings.

Other studies in this period also seemed to confirm a high degree of income inequality in Jamaica. See Table 1. For example, in a study that ranked Jamaica among 42 developing countries, Nissen (1984) found that the Jamaica distribution was among the most unequal, with a Gini of 57 percent.

Cumper (1971) also examined the personal distribution of income in Jamaica, over the period 1951 to 1965, focusing on the top 2.5 and 8.5 percent of income tax payers. He found that the income share of the top 2.5 percent of income earners was basically stable over this period, while the share of the top 8.5 percent declined slightly. Thus, the evidence is clear that in this early period the distribution of income was very unequal.

Table 1: Income Distribution in Latin America and the Caribbean

Country and Source of Data	Year of Data Collection	Percent of Income Earned By		
		Bottom 40 Percent	Middle 40 Percent	Top 20 Percent
Jamaica				
Ahiram	1958	8.20	30.60	61.20
Ahiram (Urban)	1958	11.50	33.00	55.50
Ahiram (Rural)	1958	8.90	30.20	60.90
Wasylenko	1975	9.31	35.17	55.52
Wasylenko (Urban)	1975	4.54	29.25	66.21
Wasylenko (Rural)	1975	17.10	44.80	38.10
Alleyne	1988/89	13.17	37.51	59.30
Stone	1983	13.00	31.00	56.00
Bahamas (Jain)	1970	12.20	37.20	50.60
Barbados (Jain)	1969/70	18.60	37.40	44.00
Colombia (Jain)	1970	12.40	35.80	51.80
Costa Rica (Jain)	1971	14.60	35.00	50.40
El Salvador (Jain)	1969	12.40	36.80	50.80
Guatemala (Jain)	1966	21.80	39.20	39.00
Honduras (Jain)	1967/68	13.10	32.30	54.60
Mexico (Jain)	1969	10.20	23.90	63.20
Puerto Rico (Mann)	1977	16.00	38.40	45.60

Sources: All the data except those from Alleyne (1999), Wasylenko (1985), and Ahiram (1964) were taken from Bird and Miller, Table 1, "The Low-Income Household Expenditure Survey: Description and Analysis", Jamaica Tax Structure Examination Project, Metropolitan Studies Program, Syracuse University, Board of Revenue, Government of Jamaica Staff Paper No.25. November 1985.

Income Inequality 1975-1989

Between 1975 and 1985, a number of studies were done that computed the distribution of income in Jamaica. See Table 2. For example, Boyd (1988) used both individual and household data to compute a Gini coefficient of 44.5 percent. Wasylenko (1985), Sjoquist and Green (1992), and Alleyne (1999) computed the income distribution as part of a larger tax incidence analysis.

Table 2: Gini Coefficients and Income Shares, Various Countries and Years

Countries	Year	GINI	Income Definition	Income share held by the				
				Lowest 20%	Second 20%	Third 20%	Fourth 20%	Top 20%
Bahamas (p)	1970	48.41	Income, Gross	3%	9%	15%	22%	51%
Bahamas (q)	1973	45.35	Income, Gross	4%	9%	17%	23%	47%
Bahamas (q)	1975	54.09	Income, Gross	3%	6%	12%	23%	56%
Bahamas (r)	1979	43.10	Income, Gross	4%	10%	16%	23%	47%
Bahamas (r)	1986	48.09	Income, Gross	3%	7%	14%	26%	49%
Bahamas (r)	1988	40.64	Income, Gross	4%	12%	17%	25%	43%
Bahamas (r)	1989	44.54	Income, Gross	3%	9%	16%	25%	48%
Bahamas (r)	1991	41.83	Income, Gross	4%	10%	19%	23%	44%
Bahamas (r)	1992	41.86	Income, Gross	3%	10%	20%	24%	43%
Bahamas (r)	1993	45.29	Income, Gross	4%	8%	18%	24%	47%
Barbados (n)	1951	45.49	Income, Gross	4%	7%	13%	22%	53%
Barbados (a)	1952	45.00	Income, Gross	4%	9%	14%	21%	52%
Barbados (o)	1979	48.86	Income, Gross	2%	8%	15%	24%	51%
Dominican Republic (m)	1984	43.29	Income, Gross	5%	9%	14%	23%	48%
Dominican Republic (k)	1989	50.50	Income	4%	8%	13%	20%	56%
Dominican Republic (f)	1996	48.70	Income	4%	8%	13%	21%	54%
Jamaica (g)	1958	54.31	Income, Gross	5%	8%	14%	29%	44%
Jamaica (a)	1958	56.00	Income, Gross	2%	6%	11%	19%	62%
Jamaica (h1)	1975	44.52	Expenditure	4%	9%	14%	22%	50%
Jamaica (h2)	1975	44.52	Expenditure, Net	4%	9%	14%	22%	50%
Jamaica (i)	1983	52.00	Income, Gross	2.61%	6.7%	12.57%	22.60%	55.52%
Jamaica, Urban (i)	1983	47.10	Income, Gross	.92%	3.62%	8.97%	20.28%	66.21%
Jamaica, Rural (i)	1983	52.60	Income, Gross	5.36%	11.74%	18.42%	26.38%	38.1%
Alleyne (j)	1983/84	44.00	Income, Gross	3.97%	9.20%	14.87%	22.65%	49.3%
Jamaica (f)	1988	39.00		5%	10%	14%	21%	49%
Jamaica (k)	1988	43.16	Expenditure, Net	5%	10%	14%	21%	49%
Jamaica (l)	1989	43.53	Expenditure, Net	5%	9%	14%	22%	49%
Jamaica (k)	1990	41.79	Expenditure, Net	6%	10%	14%	21%	48%
Jamaica (k)	1991	38.00		6%	10%	15%	22%	48%

Jamaica (k)	1991	41.10	Expenditure	6%	10%	15%	22%	47%
Jamaica (k)	1991	41.11	Expenditure, Net	6%	10%	15%	22%	47%
Jamaica (k)	1992	38.48	Expenditure, Net	6%	11%	15%	22%	45%
Jamaica (k)	1993	37.92	Expenditure, Net	7%	11%	15%	22%	45%
Jamaica (f)	1996	36.40	Expenditure	7%	12%	16%	22%	44%
Trinidad and Tobago (a)	1957	44.00	Income, Gross	3%	9%	15%	24%	49%
Trinidad and Tobago (b)	1958	46.02	Income, Gross	3%	9%	15%	24%	49%
Trinidad and Tobago (c)	1971	51.00	Income, Gross	2%	4%	18%	22%	53%
Trinidad and Tobago (d)	1976	46.09	Income, Gross	3%	9%	16%	23%	49%
Trinidad and Tobago (c)	1981	41.72	Income, Gross	3%	10%	16%	26%	45%
Trinidad and Tobago (f)	1992	40.30	Income	6%	10%	16%	23%	46%

Sources: (a) Paukert, F. "Income Distribution at Different Levels of Development: A Survey of Evidence", *International Labor Review*, 108 (July–Dec 1973), 97-125.

(b) Ahiram, E., "Distribution of Income in Trinidad and Tobago and Comparison with Distribution of Income in Jamaica", *Social and Economic Studies*, 15 (2) (June 1966).

(c) T& T Household Budget Survey (HBS).

(d) Dookeran, W., "The Distribution of Income in Trinidad and Tobago, 1957-1976", *Review of Income and Wealth*, 27 (2) (June 1981).

(f) WDI (2000).

(g) Ahiram, E., "The Distribution of Income in Jamaica, 1958", *Social and Economic Studies*, 13 (3) (September 1964).

(h1, Individuals and h2, Households) Boyd, D., *Economic Management, Income Distribution, and Poverty in Jamaica*, Praeger (1988).

(i) Wasylenko (1986).

(j) Alleyne (1996).

(k) Chen, Shao-hua, Guarav Datt, and Martin Ravallion, "Is Poverty Increasing in the Developing World?" Policy Research Department, The World Bank, Data Appendix, 1995, 359-376. (l) Psacharopoulos, G., S. Morley, A. Fiszbein, H. Lee, and B. Wood, "Power and Income Distribution in Latin America: The Story of the 1980s", Latin America and the Caribbean Technical Department Regional Studies Program Department Report 27, Washington D.C. (1992).

(m) Hausmann Ricardo and Roberto Rigobon, eds., "Government Spending and Income Distribution in Latin America", The Inter-American Development Bank, Washington D.C. (1993).

(n) Straw, K. H., "Some Preliminary Results of a Survey of Income and Consumption Patterns in a Sample of Households in Barbados", *Social and Economic Studies*, 1 (4) (1953).

(o) Downes, Andrew S., "The Distribution of Household Income in Barbados", *Social and Economic Studies*, 36 (4) (1987).

(p) DSCO Bahamas.

(q) UN 1981

(r) Bahamas Labor Force and Income Distribution Report (BLFID)

Wasylenko computed the income distribution for 1985 using the 1975 household expenditure survey (HES), which was grossed up by other components of income to arrive at pre-tax income and adjusted for inflation by the increase in the consumer price index (CPI). The Gini coefficient for Jamaica was found to be 52 percent, while for the urban and rural areas the coefficients were 47.1 and 52.6 percent, respectively.

Alleyne (1999) employed a methodology that was similar to Wasylenko's, and found a Gini coefficient of 44 percent. This study, however, did not have as many income components as Wasylenko's, such as estimates for non-reported income among the self-employed.

A number of important comparisons can be made in relation to 1958 results. First, the degree of inequality seemed to have been reduced relative to the 1958 results. Second, the Gini coefficient declined for rural earners, and the lower and middle 40 percent of income earners gained relative to the top 20 percent. Third, the bottom and middle 40 percent of urban earners had a smaller share of earnings relative to the upper 20 percent of income earners. Thus the upper 20 percent of income earners in urban areas improved their share relative to earlier studies.

The explanation for the high overall rural inequality, despite gains for the poor and middle income earners, was the low level of rural earnings relative to urban earnings; rural earnings were only 49 percent of urban earnings. The World Bank (2002) has argued that from the period of independence to the first oil shock in 1973 poverty should have declined, given the strong growth in aggregate income (5 percent per year) between 1966 and 1973. The early 1970s were also characterized by increases in welfare programs and deliberate attempts to redress the extreme inequality in the earlier period.

In contrast, the late 1970s were characterized by a deteriorating economic and fiscal situation, including a reduced tax base and increased social spending. By the 1980s, a series of Standby Agreements with the IMF saw retrenchment in the public sector, with price increases and wage guidelines being introduced. These changes might have reversed some of the earlier redistribution efforts, but the evidence in Table 2 shows no significant changes in income inequality.

Income Inequality in the 1990s

In the 1990s, measures of inequality tended to utilize expenditure rather than income data on Jamaica. Expenditure was thought to be a better measure of economic welfare since it might be more stable than income and since many low income earners may have seasonal income even though they always have some level of expenditure. A difficulty is in the top expenditure deciles, where incomes may be greater than expenditure so that the use of expenditure may understate the degree of inequality. Usually, however, when the emphasis of the study is on poverty reduction, consumption seems to be a better measure because it better reflects actual levels of consumption.

The Jamaica *Survey of Living Conditions* (SLC) was administered for the first time in 1988, and has been done annually since 1990. It is a nationwide survey designed to establish baseline measures of household welfare in order to measure the impact of Jamaica's human resource program on health, education, and nutrition. The SLC data suggested a definite decline in inequality in the 1990s, with some interruption in 1991 and 1992. Those years were characterized by high inflation coming on the heels of deregulation and liberalization of the Jamaican economy.

While the emphasis of the expenditure surveys is on poverty reduction, over a sufficiently long period of time the data also reflect the degree of income inequality.⁹ For example, the share of the poorest quintile consumption group increased from 2.2 percent in 1988 to 5.4 percent in 1988 (World Bank, p.35, Table 1.1), which seems consistent with the decline in inequality from income data. At the same time the headcount poverty index declined from 30.4 percent in 1989 to 16.8 percent in 1999 and remained at 16.8 percent in 2001.

Interestingly, over this same period the number of individuals in rural areas in poverty as a percent of the population fell significantly from 40.7 percent to 24.1 percent, a steady decline over the period (World Bank, p.36, Table 1.2). In addition, the overall population in poverty declined from 44.6 percent in 1991 to 16.9 percent in 2001. The Gini coefficient also declined from 0.38 and 0.39 percent in 1990 and 1991, respectively, to 37 percent in 1998 but rose again to 38 percent in 2001. These results suggest that a decline in poverty need not mirror significant declines in inequality.

Table 3 reports the quintile shares of consumption for Jamaica, Trinidad and Tobago, and St. Lucia. It appears that there are few country differences in the shares going to various quintile income groups. This result is in line with the World Bank (p. 36) conclusion that Jamaica is a country with medium inequality, having less inequality than most Latin American countries.

⁹ Miller and Stone (1985) have warned that on the basis of income different income groups can be defined to reflect the degree of inequality, but that this tells us little about absolute poverty.

Table 3: Quintile Income Share for Jamaica, St. Lucia, and Trinidad and Tobago

Country Name	Series Name	1992	1995	2000
Jamaica	Income share held by lowest 20%	..	..	6.67
Jamaica	Income share held by second 20%	..	..	10.67
Jamaica	Income share held by third 20%	..	..	14.96
Jamaica	Income share held by fourth 20%	..	..	21.70
Jamaica	Income share held by highest 20%	..	..	46.01
St. Lucia	Income share held by lowest 20%	..	5.23	..
St. Lucia	Income share held by second 20%	..	9.87	..
St. Lucia	Income share held by third 20%	..	14.81	..
St. Lucia	Income share held by fourth 20%	..	21.75	..
St. Lucia	Income share held by highest 20%	..	48.34	..
Trinidad and Tobago	Income share held by lowest 20%	5.51	..	..
Trinidad and Tobago	Income share held by second 20%	10.33	..	..
Trinidad and Tobago	Income share held by third 20%	15.53	..	..
Trinidad and Tobago	Income share held by fourth 20%	22.74	..	..
Trinidad and Tobago	Income share held by highest 20%	45.89	..	..

Source: World Development Indicators (2002).

Rural poverty remains the major source of overall poverty and inequality, with poverty in rural areas 24.1 percent higher than in Kingston (World Bank, p. 38). While poverty as a whole has declined the decline has been much faster in urban areas. There is also some correlation between the fortunes of agriculture and the degree of poverty and inequality, which may partially explain rural poverty.

The decline in poverty has not matched the performance of the economy. Growth in real per-capita income was negative from 1995 to 1999, and was at most 1.2 percent between 2000 and 2001. There is some concern that official GDP might be underestimated and that the growth of the informal sector might partly account for the poverty reduction that has been observed over time. Another explanation has been rising real wages. For example, nominal wages rose by 107 percent between 1995 and 2000, while the CPI rose by only 71 percent.

It appears that formal sector employees have gained at the expense of profits, as reflected in the increase in compensation of employees as a share of GDP from 41

percent in 1994 to 49.2 percent in 2001 (World Bank, p. 45). At the same time, the operating surplus declined from 39.6 percent in 1991 to 29.2 percent in 2001. These issues would seem to corroborate the finding of a decline in the level of poverty in the 1990s. Still, income inequality as measured by the Gini coefficient has shown no significant decline since 1991.

Review of Tax Burden Studies, 1960-1991

Review of Tax Burden Studies on Jamaica, 1960-1973

A number of tax burden studies were conducted over the period 1960 to 1973.¹⁰ The most significant were studies by Lovejoy (1963) and McLure (1977).

Lovejoy used the 1958 household expenditure survey (HES) to construct income and tax burden measures for nine income groups. He did not use the weekly wage reported in the survey as a measure of income, since wages were only one component of income; in addition, since the HES was based on weekly data, adjustment to an annual basis by multiplying by 52 may overestimate the earnings of low income households subject to seasonal employment. Lovejoy defined income in terms of the user side of the household budget (e.g., expenditure plus savings) because this may more closely approximate a measure of permanent income.

Lovejoy made a number of assumptions about tax shifting (Table 4). He assumed that indirect taxes were shifted forward to consumers. In addition, he assumed that 50 percent of the corporate income tax was shifted to consumers and a quarter of the rest was borne by capital holders in the eighth and a quarter in the ninth income groups; the balance of 50 percent was assumed to be paid by foreign owned corporations. As for

¹⁰ These included studies by Andic (1966), Cumper (1971), McLeod (1969), and McLure (1973).

direct taxes, Lovejoy assumed that the personal income tax (PIT), the property tax, and estate taxes were not shifted. Property taxes were based on the combined value of land and building, and Lovejoy assumed that renters and owner occupiers bore the tax. The HES did not contain enough information on personal income taxes, and so Lovejoy used a survey of income tax returns for 1958 to compute the tax burden. In merging the personal income tax returns with the HES expenditure, he assumed that the representative household filed one return.

Table 4: Burden Assumptions

Lovejoy's Study	
Taxes	Assumptions
PIT	Borne by individuals. This was based on 1958 tax returns and assuming filing by one individual.
Estate Tax	Borne by households in the eight and ninth deciles. This was calculated by dividing the aggregate income of eight and ninth income groups into an average of the 1954-1958 estate tax receipts.
CIT	50 percent of the tax absorbed as reduced earnings and dividends by corporations, and 50 percent shifted forward to consumers through increased price and allocated on the basis of household expenditure. To allocate the first 50 percent, one quarter was allocated to the eight and ninth income groups assumed to earn capital gains and dividends. The next quarter was assumed to be attributed to foreign corporations. Since corporate tax receipts for 1959 lagged one year behind earnings, corporate tax receipts for 1959 were used.
Property Tax	Borne by owner occupiers and renters.
Indirect Taxes	
Customs	Borne by consumers. Customs rates had to be computed at the retail level. To compute these

	rates, total customs revenue for each commodity was divided by the retail value of that commodity.
Excises	Borne by consumers. This was calculated by obtaining the retail prices for the commodities, and then by dividing excise taxes by the retail prices to get the effective tax rates for 1958.
Motor Vehicles	Borne by consumers. The ratio of non-commercial auto revenue to total non-commercial petrol revenue multiplied by petrol expenditure to total expenditure was calculated to estimate the percentage of income devoted to auto taxes other than petrol.
Other Indirect Taxes	Borne by consumers. Other indirect taxes (licences, entertainment tax, stamp duties, paper and manufacturers, warehouse fees, passenger duty, harbour fees, and others to the value of €2.1m) were allocated on the basis of annual expenditure on goods and services.

McLure's Study

PIT	Borne by those upon whom the tax is levied. Income tax estimates from Cumper (1971) were dovetailed with income distribution estimates from Ahiram (1964) to estimate the tax burden. There was no information on the rural urban distribution of income taxes, so this distinction was not made.
Corporate Taxes	Two assumptions were made about the incidence of corporate taxes on local companies: (a) it was borne by capitalists who are assumed to be in the highest income bracket; (b) it was shifted to consumers and thus allocated to households in relation to non-food expenditure.

Indirect Taxes

Excises	Borne by consumers. Most excises were allocated based on the level of consumption in the HES. Those that could not be specifically identified (or 3.6 percent of excise revenue) were allocated to non-food expenditure.
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Motor Spirits, Tires, and Tubes	Some motor spirits are used for transportation. It was assumed that households paid 40 percent of excises on motor spirits, 15 percent of excises on motor spirits were paid by taxis and buses, and 45 percent by operators of trucks. These percentages were used also to allocate tires and tubes. The three percentages were used to allocate taxes among households in relation to purchases on petrol, bus fares, and total expenditure.
Customs	88 percent of duties on motor vehicles were attributed to passenger cars, 8 percent to trucks, 4 percent to buses. These portions were allocated to households in relation to transportation purchases, private transport, all expenditures, and bus fares. The other duties were allocated according to expenditure in the HES or in relation to non-food expenditure.
Consumption Duties	Borne by consumers. This was allocated in relation to consumption expenditure.
Stamp Duties	\$1.1 million was allocated on the basis of mortgages. The rest was divided evenly between householders and wealth holders, the rationale being to capture the cost of doing business and the stamp duties paid by wealth holders.
Motor Vehicle Licenses	Using the HES, just over 50 percent of revenue from licenses was allocated to private cars, 10 percent to buses, and the rest to trucks.
Entertainment	Borne by consumers. Cinemas were allocated according to household expenditure on cinemas in urban areas, and the remainder was allocated to expenditure on gambling.
Other Licenses	Borne by consumers. Spirits were allocated according to expenditure on rum, and firearms were allocated according to expenditure on private transportation to reflect its luxury nature.

In terms of indirect taxes, manufactured prices on which taxes are imposed had to be converted to retail prices on which the HES is based. In the case of customs and

excise duties, Lovejoy computed the indirect tax amount owed for each commodity, and found the ratio of the tax to the retail price; this ratio was then multiplied by each household's expenditure on the goods in question to get the total taxes paid by the household. This approach could not be followed for all indirect taxes. The manufacturing level tax rates for taxes such as motor vehicles and parts, entertainment, and a few others were allocated according to expenditure on goods and services.

The burden results showed that indirect taxes were proportional through the first six weekly income groups, with the estimates of the average tax rates varying between 5.3 and 6.5 percent. These taxes appeared to be regressive, falling from 8 percent to 5 percent between the fifth (£8-£10) and eighth income group (£20-£30). The effective tax rate was 7.6 percent in the highest income group (over £30). Lovejoy was suspicious of the burden results for the fifth and sixth income groups, which largely reflected expenditures for tobacco, alcohol, and petrol. He argued that excluding these cases saw a roughly proportional tax burden for indirect taxes.

For personal income taxes, the overall pattern was generally progressive. The average tax rates rose from 2.37 percent in the first income group to 9.58 in the eighth and 13.54 percent in the ninth income group. The overall burden was generally progressive, rising from 7.74 percent in the first group percent to 21.18 percent in the last.

For all taxes, the overall tax burden was generally progressive due to the corporate, personal income and the property tax. Lovejoy pointed out that accounting for evasion might have given a lower tax burden.

McLure (1977) used information from the 1971-1972 household budget survey to develop a concept of income, and then computed the tax incidence for urban and rural households. McLure also did some simulations to incorporate the implications of potential changes in taxes to the Jamaican tax system. He commented that, while studies on income inequality have been carefully done for Jamaica, those on tax incidence have not been as careful, except for the Lovejoy study. However, since the Lovejoy study was done the tax system had changed considerably, and so McLure argued that this earlier work could not be relied upon to reflect the true current burden of taxes. McLure further argued that even the work by Andic (1966), which employed the 1963-1964 household budget survey, was also dated. The Andic study only estimated the burden of indirect taxes, the personal income tax, land, and death taxes, and omitted the company tax.¹¹

McLure pointed out that the 1971-1972 HES only accounted for 86 percent of personal income. Even so, he proceeded to use weekly wages and capital income with an adjustment such that the ratio of expenditure to income did not exceed 2 in the bottom income class or 1.5 for any other income class. Even after this adjustment, the distribution of income remained skewed. For example, his distribution suggested that 10 percent of the households with the highest income received 50 percent of the income.

McLure made a number of adjustments to his standard income measure to arrive at gross factor income. The first was to augment income by the shifted portion of corporate taxes on local corporations and retained earnings to get a better measure of pretax income. The second was to allocate retained earnings to the highest income group on the assumption that corporate taxes fell on consumers. In both cases he ruled out the possibility of the tax falling on workers.

¹¹ According to McLure, the income tax was 20 percent of total revenue in 1973-1974.

In terms of direct taxes, McLure assumed that the personal income tax was borne by those statutorily responsible for the tax; no account was taken of possible evasion. McLure could not get data on income taxes paid for the period of study, so he utilized figures from Cumper (1971) together with income figures from Ahiram (1964). The data on income taxes did not allow for a disaggregation into rural and urban areas.

McLure made two assumptions about the incidence of corporate taxes on locally owned companies: (a) it was borne by capital owners, assumed to be in the highest income bracket, and (b) it was shifted to consumers and thus allocated to households in relation to non-food expenditure, which was used as a proxy for corporate products consumed. The possibility of shifting to workers was ruled out. McLure pointed out that if expenditure, relevant only to the top income group, is used to calculate the tax burden, alternative (b) was assumed. However, if personal income is adjusted for retained earnings and the unshifted corporate taxes, then both (a) and (b) were considered.

McLure did not include property taxes in his burden analysis, in part because they were less than one percent of total revenue in 1971-1972 and also because there was no information in the survey that would have made this allocation possible.

McLure assumed that indirect taxes were borne by consumers, whether the tax was on intermediate or final goods. Identifiable customs and excise duties were allocated based on expenditure in the HES, and the others were allocated to non-food expenditure. Where neither was clearly possible, an allocation formula was assumed. See Table 4.

The incidence results are summarized in Table 5. Excluding the first income group, the burden of indirect taxes was essentially flat and tended to regressivity. For example, the effective tax rate was 17 percent in the second income group (\$500-\$999)

and 14 percent in the highest income group. Indirect taxes on beer, rum, and tobacco were regressive. McLure cautioned that he had to use 1970 data to allocate taxes for 1971-1972, and that in addition the use of non-food expenditure to allocate many items may not be accurate.

The personal income tax was progressive, with zero rates up to an income level of \$1,999. The effective rates then rose from 1.19 to 8.08 percent in the highest income group; the rate on the highest group increased to 11 to 14 percent depending on the assumption made about corporate income taxes and retained earnings. In terms of corporate tax rates, when capital owners bore the tax the rate was 9.14 percent; when the tax was assumed to be borne by consumers, the tax was somewhat progressive, due to increasing non-food expenditure as incomes rose. When the comparison is made with income, the tax was regressive due to the decline in consumption as incomes rose. The rates were lower in rural versus urban areas because of the importance of food in the rural budget and also because of the lower ratios of expenditure to income in urban areas.

Table 5: Comparison between Lovejoy and McLure's Burden Results

Income	Lovejoy			Income	McLure			Total Burden	
	Direct	Indirect	Total		Indirect	PIT	CIT	A	B
0-345.2	2.37	5.37	7.74	0-499	22.32	-	5.42	22.32	27.74
345.2-690.5	1.88	5.27	7.15	500-999	17.00	-	3.86	17.00	20.86
690.5-1035.8	1.77	6.96	8.73	1000-1499	18.41	-	4.28	18.41	22.59
1035.8-1381.1	1.91	6.57	8.48	1500-1999	17.01	-	4.56	17.01	21.57
1381.1-1726.4	2.00	8.06	10.06	2000-2499	15.18	1.19	4.02	16.37	20.39
1726.4-2589.6	2.50	5.89	8.39	2500-2999	16.19	2.24	4.04	18.43	22.47
2589.6-3452.8	4.20	6.32	10.52	3000-3499	14.71	3.57	3.90	18.28	22.18
3452.8-5179.2	9.58	5.70	15.28	3500-3999	15.98	4.81	3.93	20.79	24.72
Over 5179.2	13.54	7.64	21.18	4000-4499	14.99	6.06	4.13	21.05	25.18
				4500-4999	14.30	8.08	4.79	22.38	27.17
				Over 5000					
				I	9.21	14.10	1.94	23.61	25.22
				IIA	7.60	11.89	-	28.63	
				IIB	8.40	13.09	1.76	-	23.25

The income groups of the Lovejoy study were converted to dollars at the exchange rate £1=\$2. These were then converted to annual values and increased by the CPI to account for increased earnings. Total burden (A) excludes corporate taxes. *I* refers to personal income without accounting for retained earnings and personal income taxes. *IIA* assumes that local company taxes are shifted to capitalists, *IIB* assumes that they are shifted to consumers. When company taxes were shifted to capitalist the effective rate was 9.14 percent. Adding this to 7.60 and 11.89 gives 28.63.

Assuming that some corporate taxes are passed to consumers, the overall tax burden indicates that the rates were generally flat between the second and fifth income groups at between 20 and 22 percent, after which there was a slight progressivity up to 27 percent in the \$5,000 and over income group. Depending on the assumption with respect to retained earnings and corporate taxes, the rates for the highest incomes were slightly lower. There are no major differences between rural and urban sectors. Also, the effective rates were proportional from the second to the seventh income group, with some slight progressivity for the next three income groups due to the progressive personal income taxes.¹² Thereafter the incidence becomes regressive.

Comparing the Studies

The Lovejoy and McLure studies found different results with Lovejoy finding the system more progressive in 1958 than McLure in 1972. However, in making a comparison between the two studies, it is important to bear in mind that the tax system had changed considerably over the two study periods. If the tax system is examined in the period 1960-1961 and 1973-1974, direct taxes (or income, land and property taxes, death duties and the education tax) had increased their share of revenue from 35.6 percent to 44.4 percent. Among direct taxes, income taxes rose from 33.8 to 40.0 percent of revenue. On the other hand, the share of direct taxes had fallen from 64.4 percent of revenue to 55.6 percent. Significantly among these were excise duties, which increased from 15.9 percent to 19.8 percent, while customs duties fell from 43.3 percent to 19.6 percent.

¹² McLure sought to compare his results with that of Andic, but pointed out that the Andic study lacked detail for a proper comparison. The two studies differed markedly, with Andic finding a very regressive indirect tax structure. McLure suggested that Andic's failure to account for permanent income would lead to some regressivity.

The overall income levels also changed over the periods studied. Comparing the household income groups, McLure's median income of \$848 lies in the third income group of the Lovejoy study.¹³ Also, about 90 percent of the households lie in Lovejoy's first six income groups. Thus as Wasylenko (1986) points out, there is little that can be said about how taxes affect the lower half of the income distribution.

Wasylenko has also surmised that McLure's results may be biased towards regressivity. The reason is that, by using weekly income, many high income earners are placed into lower income groups. He argued that this may be because they may not have had income for that week, while expenditures and taxes paid would not fall. Weekly income is probably a bigger problem at the lower end of the income distribution.

Tax Burden Studies, 1985-1991

In the 1980s and 1990s three major tax burden studies were done for Jamaica. The first of these was by Wasylenko (1986). His analysis of the incidence of the Jamaican taxes was preliminary to a number of major reforms to the tax system in the 1980s. His analysis examined the tax burden at several levels. First, he presented a standard burden analysis accounting for overall tax incidence. Second, he examined the incidence by urban and rural areas. Third, he broke down households by adult equivalent units to account for household sizes and differing abilities to pay taxes. Thus, following a scale reported by Bird and Miller (1989), households were aggregated by adult consumption equivalent (ACE) units, which means that individuals 15 years or more are considered adults and those below are "half" an adult consumer. Finally, Wasylenko used a "representative" taxpayer analysis to determine the horizontal equity of the tax

¹³ In 1969, the Jamaican currency was changed from Jamaican pounds to dollars at the rate of 1£=J\$2.

system by identifying representative households in each decile. The median income in each decile was selected in 10 income categories as representative households. Five household sizes were selected for analysis one, two, four, six and eight person households. Crucial to the analysis was the distribution of income before taxes. Wasylenko used the 1975 HES and increased this to 1983 value using the increase in the CPI over the period.

The income base used was as follows:

$$\text{EXP} + \text{S} + \text{RE} + \text{PIT} + \text{PAY} + \text{CIT}$$

EXP is all household expenditures excluding imputed rent. S is the net additions to financial savings; when these are negative or zero, they were counted as zero. The other components constituted those aspects of income assumed shifted to households. These are retained earnings (RE), personal income tax (PIT), payroll taxes (PAY), and the corporate income tax (CIT). Estimates of the last four components of income were developed, as set out in Table 6. Because the PIT and PAY taxes were not part of the HES data base, a number of other sources were used to estimate income taxes. Samples and surveys such as the survey of allowances of 1984, a sample of 1983 tax returns, a sample of self-employed in 1980, and a sample of professionals in 1983 helped to generate the various payroll and income tax rates. The survey of professionals also helped to generate a profile of tax evaders. The tax rates were then used to gross up the (EXP + S) components of the HES in order to make the survey data and the HES income bases consistent. According the Wasylenko, the income in the survey that approximates the concept of income in the HES is:

Statutory Income + Allowances + Tax Evaded + Employer's Share of PAY.

The effective tax rates were computed based on the economic incidence. Income was then put into 34 categories, and, after placing the income on an after-tax basis, individuals were then matched with those in the HES. An income distribution was also generated for individuals in urban and rural areas. This work represents the most comprehensive concept of income developed so far for tax analysis in Jamaica.

Table 6: Direct Tax Assumptions for Studies by Wasylenko (1986), Sjoquist and Green (1992), and Alleyne (1999)

Wasylenko's Study	
Taxes	Assumptions
Income Tax	Taxes were borne by individuals and not shifted. Income was augmented by interest payments, retained earnings, corporate taxes, and estimates made for evasion.
Payroll Taxes	Two assumptions were made. The employees' and employers' share of the taxes were assumed shifted to labor. Alternatively, the employees' share and half the employers' share were allocated to labor, and the balance of the employers' share was allocated to household expenditure.
NIS	
NHT	
Education	
HEART	
CSFBS	
Corporate (Non-bauxite)	Two assumptions were made. First, corporate taxes were shifted to local and foreign consumers. The amount of corporate capital owned by Jamaicans was used to determine the amount of corporate taxes borne by local consumers. Since 50.7 percent of the corporate sector was domestically owned and the ratio of exports to GDP was 40.3 percent, 30.3 percent (.507*.597) of corporate taxes were allocated to local consumers based on their expenditure. This amount was allocated as a ratio of exports to GDP, assuming the tax was exported. The second assumption was that the tax fell on capital, so that 50.7 percent of the tax was shifted to the top income decile. The grossing up factor for retained earnings was 1.62 and for corporate taxes was 2.15.
Property Taxes	57.5 percent of property taxes were allocated to

	owner occupiers as the 1984. Since 32.3 percent of property taxes were from residential property, 18.6 (.323*.575) percent of property tax revenues were allocated to owner-occupiers and the rest to landowners.
Alleyne's Study	
Income Tax	Similar assumptions to Wasylenko. However, income did not include self-employed income, pensions, or estimates for evasion
Payroll Taxes NIS NHT Education HEART CSFBS	Similar assumptions to Wasylenko. Two assumptions were made. The employees' and employers' share of the taxes were assumed shifted to labor. Alternatively the employees' share and half the employers' share were allocated to labor, and the balance of the employers' share was allocated to household expenditure.
Corporate (non-bauxite)	Similar assumptions to Wasylenko. Grossing up factors were 1.7 for retained earnings and 2.4 for corporate taxes going to Jamaicans.
Property Taxes	Similar assumptions to Wasylenko. 41.2 percent of property taxes were allocated to owner occupiers as the 1984. Since 32.3 percent of property taxes were from residential property, 13.3 (.323*.42) percent of property tax revenues were allocated to owner-occupiers and the rest to landowners.
Sjoquist and Green's Study	
Income Tax	Taxes were borne by individuals and not shifted. The income concept used was similar to Wasylenko's, although the tax allocation was different. Interest and dividends were assumed to relate to savings
Payroll Taxes CSFBS	Assumptions were not reported with respect to the employers' portion of tax. The burden was not computed.
Corporate (non-bauxite)	It was assumed that the taxes were shifted to consumers of corporate products, and the Jamaican portion (52.6 percent) was allocated on the basis of total expenditure.
Property Taxes	Similar assumptions to Wasylenko.

A number of incidence assumptions were made. First, the personal income tax was assumed to fall on those who pay the tax. Two different assumptions were made for payroll taxes. The first was that the employees' and employers' share of the payroll tax is shifted to labor. An alternative assumption is that one half of the employers' plus the employees' share of the payroll tax is shifted to labor, and the other half of the employers' share is shifted to household expenditure. For corporate taxes, again two assumptions were made. The first allocates the share of domestic corporate taxes to capital owners on the assumptions that capital is not very mobile and that corporate and non-corporate capital are close substitutes. Domestic ownership of corporate capital was estimated to be 50.7 percent, and, as a result, this percentage of the corporate tax was added to capital income to get before-tax income. Assuming that capital bears the tax, 50.7 percent of the corporate tax was allocated to the top income group. Alternatively, capital is likely to be mobile over the long run, in which case capital will not bear the burden and the burden is shifted to consumers. Since there was no information on the proportion of corporate products exported, the ratio of exports to GDP (40.3 percent) was used to allocate the corporate tax abroad. The remaining 30 percent ($.507 * .597$) of the corporate tax was allocated to Jamaicans based on their expenditure.

In a later paper Wasylenko (1987) argued that in a small, open economy consumers are not likely to bear the tax and thus the burden falls on labor. The allocation was then made on the basis of labor compensation (e.g., wages plus allowances). This is probably a more reasonable assumption than one that assumes the exporting of taxes by a small country.

In the case of property taxes, Wasylenko found that 32.3 percent of the property tax revenue was from residential property, and he allocated residential revenue to owners and renters. Since 57.5 percent of households were owner occupiers, 18.6 percent ($.323 \times .575$) of the property tax was allocated to owner occupiers in relation to their property tax payments in the HES. The balance was allocated to landlords, assumed to be in the highest income decile.

For indirect taxes, the basic assumption was that these were shifted to consumers, an assumption that may not hold for a range of goods. Within the partial equilibrium framework, and lacking information on supply elasticities, this is the assumption usually employed. Tables 6 and 7 summarize the assumptions and the allocation procedures. Table 8 presents the incidence results.

Incidence Results

Wasylenko's tax burden results were reported for the exclusion and inclusion of corporate taxes as follows; the results are discussed only for the case where corporate taxes are excluded because the overall results are not significantly different.

For indirect taxes, the pattern is generally proportional with an average effective rate of 17.33 percent. The overall results are what may be referred to as "wandering proportionality", as rates were generally between 16 and 17 percent in the first nine deciles then rose to 19.10 percent in the top decile. Wasylenko pointed out that the overall burden was due to the interplay of a number of taxes, some of which were progressive and some regressive. Thus, cigarettes, beers and rum were regressive, while gasoline was progressive due to larger expenditures at higher income levels.

Table 7: Allocation Procedure for Tax Burden Assumptions in Studies by Wasylenko (1986), Sjoquist and Green (1992), and Alleyne (1999)

Taxes	Wasylenko	Alleyne	Sjoquist and Green
Import duties and Consumption Duties on Imports	Allocated according to expenditure on respective items in the 1975 HES. When a commodity was not identified the tax was allocated to households according to total expenditure.	Similar approach in the 1984 survey	Similar approach in the 1984 survey
Stamp Duty on Imports			
Food, Beverages, Tobacco	Allocated to the relevant items	Similar	Similar
Motor Cars	Allocated according to expenditure on motor cars	Expenditure on gasoline	Expenditure on gasoline
Others	Allocated to non-food expenditure	Non-food	Non-food
Other Stamp Duties	NA	Savings	Savings
Excise Taxes	Allocated in relation to relevant expenditures	Similar	Similar
Tires and Tubes	Allocated according to tires and tubes	Similar	Similar
Other excises	According to goods other than tires and tubes	Similar	Similar
Local Consumption Duties			
Cigarettes, Beer, Rum	Allocated in relation to purchases of these items	Similar	Similar
Gasoline	To expenditure on petrol and expenditure	Similar	Similar
Diesel Oil, Other	Allocated to total expenditure	Similar	Similar
Motor Vehicle Registration	68% allocated on the basis of motor car ownership, 32% to household expenditure	80.9% and 19.1%	68% and 32%
Other licenses	According to expenditure on rum	Similar	NA
Retail Sales Tax			
Motor Cars	Allocated according to expenditure on motor cars	Similar	Similar
Others	According to expenditure on specific items	Similar	Similar
Motor Car Second Sales	Allocated on the basis of motor car purchases	Similar	Similar
Entertainment	Allocated to expenditures on cinemas and sports	Similar	Similar
Betting and Gaming	Allocated to race track and gambling events	Similar	Similar
Travel Tax	40.5% allocated to Jamaicans who traveled	Similar	Similar
Telephone Tax	NA	Based on telephone use	Similar

Direct taxes were about 6 percent in the first decile and then rose to 22 percent in the eighth decile. The burden became regressive thereafter, and fell to 19 percent in the ninth decile and 12 percent in the tenth.

The overall pattern of incidence is progressive for the first eight deciles and regressive for the two highest deciles. For example, the effective tax rate was 22.39 percent in the first decile, 37.85 percent in the eighth decile, and then fell to 35 and 31 percent in the last two deciles. The overall average burden was 32.9 percent. When

Wasylenko examined the burden pattern by area, the results were not very different. Rural households paid on average 33.2 percent of their income in taxes, and urban households paid 32.7 percent.

Table 8: Tax Burden Results for Direct, Indirect, and Total Taxes for Studies by Wasylenko (1985), Sjoquist and Green (1992), and Alleyne (1999)

Income Deciles	Direct Taxes			Indirect Taxes		
	Wasylenko	Alleyne	Sjoquist and Green	Wasylenko	Alleyne	Sjoquist and Green
1	6.37	8.13	5.98	16.02	10.18	14.32
2	6.35	7.60	6.47	17.17	11.71	12.86
3	6.42	6.60	7.47	17.55	11.73	12.28
4	12.27	8.54	13.10	17.19	10.86	14.69
5	16.12	10.59	16.72	15.92	10.51	14.84
6	18.20	14.43	21.40	15.99	11.71	13.27
7	20.94	18.51	25.73	15.21	12.07	13.17
8	22.00	20.66	23.10	15.85	12.69	13.94
9	18.80	8.22	17.13	16.82	13.42	13.29
10	12.03	9.52	14.60*	19.10	14.31	16.19*

Total Tax Incidence Results					
Income Deciles	Wasylenko Corporate Taxes		Alleyne	Sjoquist and Green	
	Excluded	Included		With Avoidance	No Avoidance
1	22.39	22.14	18.31	20.30	19.97
2	23.52	22.88	19.31	19.33	18.56
3	23.97	23.39	18.33	19.75	18.22
4	29.46	28.85	19.40	27.79	22.92
5	32.04	31.48	21.10	31.56	24.47
6	34.19	33.68	26.14	34.67	24.49
7	36.15	35.54	30.58	38.90	26.79
8	37.85	37.26	33.35	37.04	30.81
9	35.62	35.30	21.64	30.42	34.07
10	31.13	31.75	23.83	30.79*	41.54*

*Sjoquist and Green split their highest decile into two. An average of both is presented as decile 10. In addition, their results are adjusted for when income was evaded and when income was not evaded.

Wasylenko also reported the burden for ACE units. In this analysis income is defined excluding the corporate income tax because it is assumed that consumers bore the burden of the corporate income tax. The results here were not dramatically different

from the previous results. Indirect taxes were found to be mildly progressive. Direct taxes, particularly the PIT, were slightly more progressive. When corporate taxes were added back to income, the results became only slightly less regressive.

Review of Studies by Alleyne and Sjoquist and Green

On the heels of the 1986 tax reform, two studies of the post-reform tax system were done. The first was done by Alleyne for the year 1984-1985, and the second was by Sjoquist and Green who examined the tax burden for the year 1990-1991.

Alleyne examined the distributions of tax burden by decile expenditure groups, and followed closely the assumptions used by Wasylenko. He utilized the HES for 1984, and computed the overall tax burden with no accounting for areas or household characteristics. The income concept used was similar to Wasylenko's, without accounting for tax evasion, and included expenditure from the HES 1984, net savings adjusted for retained earnings, corporate taxes, and the shifted portion of payroll taxes. Income was computed under two alternative assumptions. The first was that the employers' portion of payroll taxes was shifted fully to workers; the second was that only half was shifted to workers. A payroll sample of 2048 employees conducted in May 1986 was used to compute the effective income and payroll tax rates.

The usual assumption about income taxes was that they were not shifted from their statutory burden. Consistent with the income concept, two assumptions were made about the incidence of payroll taxes: that both the employers' and employees' share of taxes were borne by labor, and that only half the employers' portion was borne by labor.

It was also assumed that the full burden of property taxes could not be borne by property owners given the level of arrears, the resistance to paying the current three

graduated rate structure, and the level of derating of agricultural and hotel properties. Thus, given that the HES 1984 showed that 41.2 percent of households were owner occupiers and given also that 32.3 percent of property taxes were from residential property, 13.3 percent ($.323 \times .412$) of property tax revenues were allocated to owner-occupiers, and the rest was allocated to landlords, who were assumed to be in the highest decile.

For corporate taxes, Alleyne was assumed that capital owners bore the full burden of the tax. In the case of indirect taxes, full shifting to consumers was assumed. See Tables 6 and 7.

The incidence results are summarized in Table 8. The effective tax rates for direct taxes were found to fall from 8.13 percent in the first decile income group (\$0-\$5,021) to 6.60 percent in the third decile (\$7,903-10,299). The rates then increased progressively to 20.66 percent in the eighth decile before falling to 9.52 percent in the tenth decile. The degree of regressivity in the eighth and ninth deciles is surprising given that significant changes had been made to the direct tax system. The problem might be due to the lack of data on self-employed income earners. Indirect taxes were found to be proportional between the first and sixth deciles, and then became slightly progressive thereafter. See Table 8.

The overall tax system was progressive up to the eighth decile, with average tax rates rising from 18.31 percent in the first decile to 33.35 percent in the eighth decile; thereafter the rates declined to 21.64 and 23.83 in the top two deciles, respectively. It is surprising that the direct tax incidence was so regressive in the highest income groups,

given that a number of allowances had been removed. The explanation might be that the tax system in 1984-1985 was still in transition with many new changes being introduced.

The next incidence study for Jamaica was by Sjoquist and Green (1992) for the year 1990-1991. The objective was to update the 1984 estimates of the distribution of tax burdens, in order to judge the effects of the reforms. The study employed a differential income approach, and, like the two prior studies, treated households as the unit of analysis. The study began with the observation that the first step in estimating the distribution of tax is to determine an accurate measure of household income and its distribution. The study used the HES of 1984, and adopted an income measure similar to Wasylenko's, or an approach that makes use of the equivalence of the sources and uses of income. Since the personal income tax (PIT) and the payroll taxes (PAY) could not be estimated from the HES data, the effective tax rates computed by Wasylenko were used to gross up the expenditure plus savings in the HES to generate before-tax income. It is not clear how this would bias the results, but Sjoquist and Green acknowledged that the use of similar tax rates after the tax system had changed was not ideal.

The Jamaican share of retained earnings was added to after-tax income to estimate gross factor earnings. Since the HES contained no information on retained earnings, the retained earnings from Wasylenko's study were utilized, and were allocated to households in the highest decile. Expenditures from the HES of 1984 were raised to the 1990 values by using the CPI.

The approach to allocating direct taxes was a bit different from that followed by the two prior studies. A survey of employees was conducted as part of the incidence study, and was based on individual income earners; however, only wages and salary

incomes were recorded. Other taxable income components such as interest earnings, dividends, and income from self-employment were not available. The approach followed was to calculate “a synthetic income tax” for each household. The personal income tax collected was then allocated across households on the basis of the household’s share of the tax.

Sjoquist and Green point out that the first step is arriving at their ‘synthetic income tax’ was to remove all non-taxable income.¹⁴ The next step was the allocation of income between wages and salaries, interest, and dividends, and also the allocation among individuals at the household level. The assumption was that interest and dividends were related to savings levels. These were then allocated to households based on their share of savings. It was assumed that interest and dividend incomes were equal to three times the interest and dividend revenues allocated to the household. To account for tax avoidance, the share of income subject to tax was adjusted by the share of income evaded found in the Alm, Bahl and Murray (1986) study. A further adjustment was made for the standard deduction to account for the fact that households can have multiple earners at various income levels.

The final step in the allocation of household earnings was to determine the number of months worked by each individual between ages 16 and 69 in the HES. This was then aggregated by households, and the share of months worked was used to allocate income to each individual. The effective tax rates had already been calculated by the level of earnings. These rates were then used to calculate the “synthetic” income tax for each person in the household. Sjoquist and Green recognized that their sample was 0.79

¹⁴ Pension benefits were ignored on the assumption that they were not significant.

percent of the total PAYE tax revenue, and thus only 0.79 percent of revenue was allocated to the sample.

Sjoquist and Greene cautioned that their measure of income was broader than taxable income and therefore, the effective rate may be lower. They also noted that, if their sample was not representative of the population, then their results would be biased. The same strategy employed for PAYE taxes was employed for payroll taxes except for the incidence of the Civil Service Family Benefits Scheme (CSFBS) contribution, which was not computed. PAYE taxes were assumed to be borne fully by employees.

Company taxes were assumed to be shifted to consumers of corporate products. The amount shifted for non-bauxite taxes was allocated on the basis of the ratio of exports to GDP (47.4 percent), and the burden was allocated to Jamaicans in relation to their total expenditure on goods and services.

Property taxes were assumed to be borne by property owners. It was assumed that 57.5 percent of the property tax was on residential property, and this was allocated according to property tax payment in the HES. The remainder was allocated to landlords in the upper income deciles. Finally, the standard assumption of full shifting of indirect taxes to consumers was employed.

The burden results were reported for eleven income classes. These were the first nine deciles plus a division of the tenth decile into two subdeciles with 5 percent each. Table 8 presents an average tax burden for the last two groups as decile ten.

The pattern of total direct taxes was progressive in the first seven deciles, from an effective tax rate of 5.98 percent (income \leq J\$6,212) to 25.73 percent ($J\$36,268 < \text{income} \leq J\$45,901$), and then become regressive thereafter. The burden of

indirect taxes was again characterized by a wandering “proportionality”. Sjoquist and Green point out that indirect taxes were proportional with higher rates in the top quintiles due to stamp duties, property transfers, and imported luxuries. The overall tax burden was slightly progressive through the first eight deciles, and then became regressive, declining from 37 percent in the eighth decile to 30 percent thereafter.

Sjoquist and Green also reported results assuming that avoidance is unaccounted for in their sample. Surprisingly, when avoidance is accounted for the lower end of the distribution shows higher effective rates. It is unclear why the tax burden would be higher under avoidance. One explanation might be that the structure of avoidance as found by Wasylenko might have changed, given that several tax loopholes especially for PAYE workers had been closed. The allowance survey of 1986 also suggests that individuals had moved to the allowances that were now available.

Bird and Miller’s Study of Low Income Households

The final study to be reviewed is one by Bird and Miller (1989), which specifically examined the incidence of Jamaican taxes in relation to lower income households. Their justification was that there was considerable inter-class differentiation among low income households, and a focus only on horizontal equity would overlook this. Their data came from a special low income survey of 145 households in Jamaica (Miller and Stone, 1985). This was a sample designed to include a range of low income households across various types of urban, semi-urban, and rural settings. The sample was divided into six expenditure categories, and individuals were then grouped as adult consumption equivalent (ACE) units. The tax incidence study related taxes paid to

expenditure plus savings, since expenditure was thought to be more reliable than income among low income earners.

The incidence assumptions employed were different from the standard approach. Except for such items as tobacco, alcohol and fuel, land, and income taxes, for which taxes paid were available, tax rates were estimated on the basis of nominal rates on different products, sources of tax revenue by commodity, and an assumed distributive margin. Bird and Miller pointed out that, in addition to taxes levied on different consumer goods at the manufacturing stage, other tax elements are also included in the retail price of taxed and untaxed goods because intermediate goods bear taxes. The impact of such taxes was computed from an input–output table of the Planning Institute of Jamaica (PIOJ).

Their results showed clearly that indirect taxes (rather direct taxes) most affected low income earners. The overall tax burden was 6 percent, and the distribution of average tax rates was roughly proportional. The burden results found by Bird and Miller were the lowest of any study done before. Bird and Miller argued that the tax burden seemed relatively light but that it was still significant since a 6 percent burden on a group that spent US\$6 a week per adult equivalent in 1983-84 was not trivial.

Commenting on McLure's results, Bird and Miller suggested that his results might have been biased upwards due to more aggregated data. They also suggested that a similar problem may be reflected in the results by Wasylenko. They further identified a number of reasons for the different results. Among these were that the income bases were different, for example the use of a 1975 survey inflated to 1983 versus a survey of low income earners in 1983-84, and a general survey versus a more focused analysis on

low income households. They further pointed out that one partial explanation might be the fact that, while alcohol and tobacco were only 2.2 percent of total expenditure in their survey, in the 1975 HES it was 5 percent.

The results for some individual taxes were interesting. Taxes on transportation were progressive, while taxes on food were regressive. These taxes together accounted for 64 percent of total taxes, and their offsetting tendencies accounted for the proportionality of the indirect taxes. Although the expenditures on tobacco and alcohol were just 2 percent, the taxes were 16.5 percent of total indirect taxes. The three taxes alcohol, tobacco, and transportation (vehicles and fuel) accounted for 43 percent of all taxes paid by the poor compared to 8 percent of their expenditure. Also of interest was that 37 percent of taxes fell on food consumed by the poor.

Bird and Miller reported results for the rural-urban division of the population. While the indirect tax burden was almost equal for both areas, food taxes were 43 percent of total taxes paid by the poor in rural areas and 32 percent in urban areas. The opposite was true for transportation, with 36 percent of taxes borne by urban households and 20 percent for rural households. They also found that taxes were heavier for couple-headed households versus female-headed households.

Overall, the results of Bird and Miller provide a strong argument for examining the tax burden among the poor in greater detail by using more disaggregated and more focused survey data. They also suggest that there are differences in burden among the poor based on rural and urban locations, between employed and unemployed individuals, and between couple-headed and female headed households.

Comparing the Studies

The studies by Wasylenko, Alleyne, and Sjoquist and Green estimated the tax burden of the Jamaican tax system before the tax reforms of the 1980s and after several major tax changes. Thus they reflected the evolution of the burden of Jamaica taxes. A question of interest is whether the tax system had become more progressive and less burdensome over time. There is some basis for comparing the studies, even though the income limits in each decile are not the same.¹⁵ The studies attempted to account for income growth and increases in household expenditures over time, and the median incomes for the studies were almost in the same decile income class. For example, the median income for Wasylenko's study was \$8,278 in the income class \$8,278-\$10,988 which was in the sixth decile; in Alleyne's study the median income was \$16,284, and in the income class 13,163-\$16,296 (or the fifth decile); and the median income for Sjoquist and Green was \$28,255.08, which is in the income class \$21,220-\$28,280 (again, the fifth decile income class). It is clear then that the distributions are close to each other and are

¹⁵ The income classes for the studies are as follows:

<i>Wasylenko</i>	<i>Alleyne</i>	<i>Sjoquist and Green</i>
<i>Under J\$1,815</i>	<i>0 – J\$5,021</i>	<i>Under J\$6,213</i>
1,815 – 2,987	5,022 – 7,902	6,213 – 10,287
2,988 – 4,314	7,903 – 10,299	10,288 – 15,555
4,315 – 6,258	10,300 – 13,162	15,556 – 21,220
6,259 – 8,279	13,163 – 16,296	21,221 – 28,280
8,280 – 10,999	16,287 – 20,062	28,281 – 36,268
11,000 – 14,574	20,063 – 24,810	36,269 – 45,901
14,575 – 19,403	24,811 – 32,090	45,902 – 59,089
19,404 – 29,702	32,112 – 44,235	59,090 – 81,137
<i>Over J\$29,702</i>	<i>Over 44,235</i>	81,138 – 103,941
		<i>Over J\$103,941</i>

In Sjoquist and Green's study, income classes up to J\$81,137 are deciles and the top two are subdeciles that contain 5 percent each.

reasonably comparable by decile income class. Table 8 presents the results for the three studies.

Figure I graphs the direct tax burden for the three studies.¹⁶ Except for the first three deciles and the eighth decile, the Sjoquist and Green study suggests a higher tax burden in the post-reform period. Alleyne's study reported considerably lower burdens after the third decile throughout the income range, a result that may reflect some underestimation since the several income sources used by Wasylenko were not available for this study. Methodological differences in the way the individual sample and the HES were integrated may also play some part in explaining the differences among the results. Since Sjoquist and Green used the proportions used by Wasylenko to determine income evaded, this may explain their strong correlation between the two results; however, the pattern of evasion might have changed over time.

The post-reform studies for direct taxes showed a general pattern of progressivity after the third decile and then a regressive pattern after the eighth. The results by Sjoquist and Green suggested that the regressivity began about the seventh decile. The lower burdens in the bottom deciles are due to the standard deduction that was introduced and the progressivity resulted from the 33 1/3 tax rate. Sjoquist and Green suggested that the regressivity at the upper end was largely due to evasion among the self-employed.

When indirect taxes are compared the results are much more consistent (Figure II). The overall burden definitely declined in the post-reform period, with a slight tendency to progressivity after the sixth decile. Figure III graphs the overall tax burden for the three studies. The study by Sjoquist and Green suggested that households from

¹⁶ The graph of Wasylenko's total burden results exclude taxes on capital since they do not vary significantly from other assumptions. In addition, the graph for Sjoquist and Green's results account for tax evasion.

the first, to those between the fifth and sixth decile, benefited from the tax reforms, together with those households in the ninth and tenth deciles. The study by Alleyne suggested that all groups benefited, but higher income earners benefited more.

There is a considerable difference in magnitude between the results of the two post-reform studies. Part of this difference can be accounted for in Table 8, which reports the results by Sjoquist and Green when no account is made for avoidance among households. In this case the two overall burden results are similar up to the eighth decile, after which the tax burden in the Sjoquist and Green's study increased to 34 and 41 percent in the last two deciles. These are high rates indeed, and it is unclear why the rate should be this high.

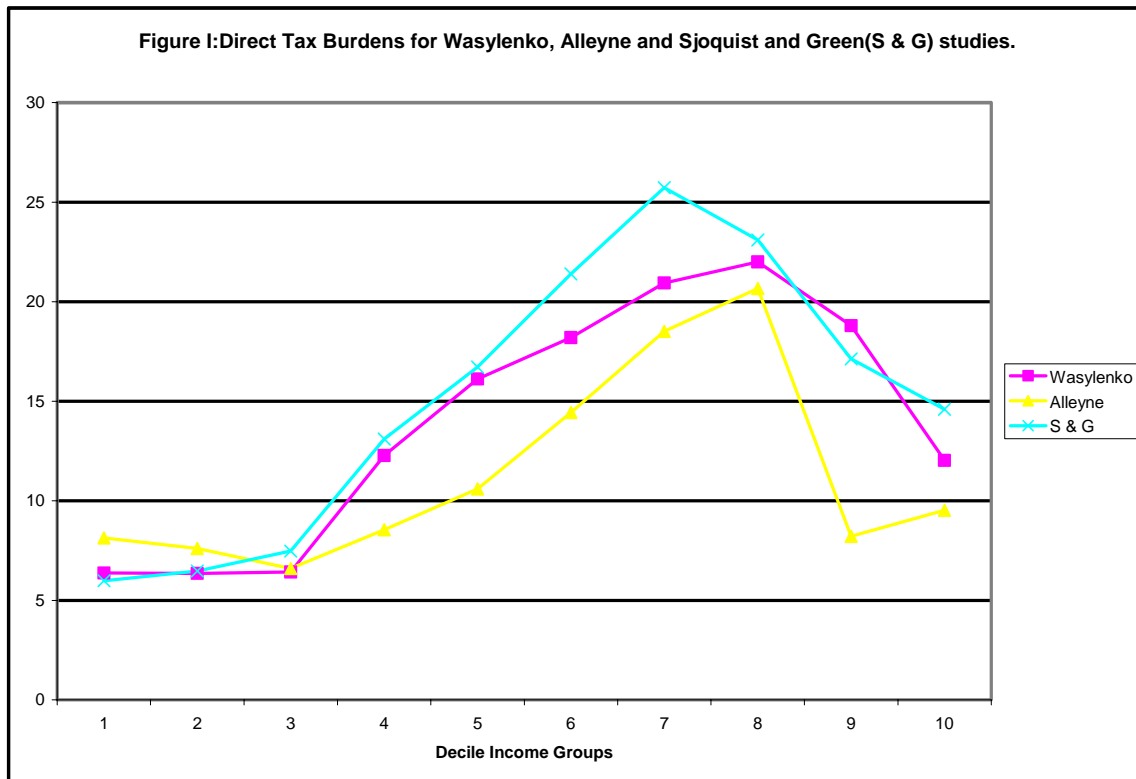


Figure II: Indirect Tax Burdens for Wasylenko, Alleyne and Sjoquist and Green(S & G) studies.

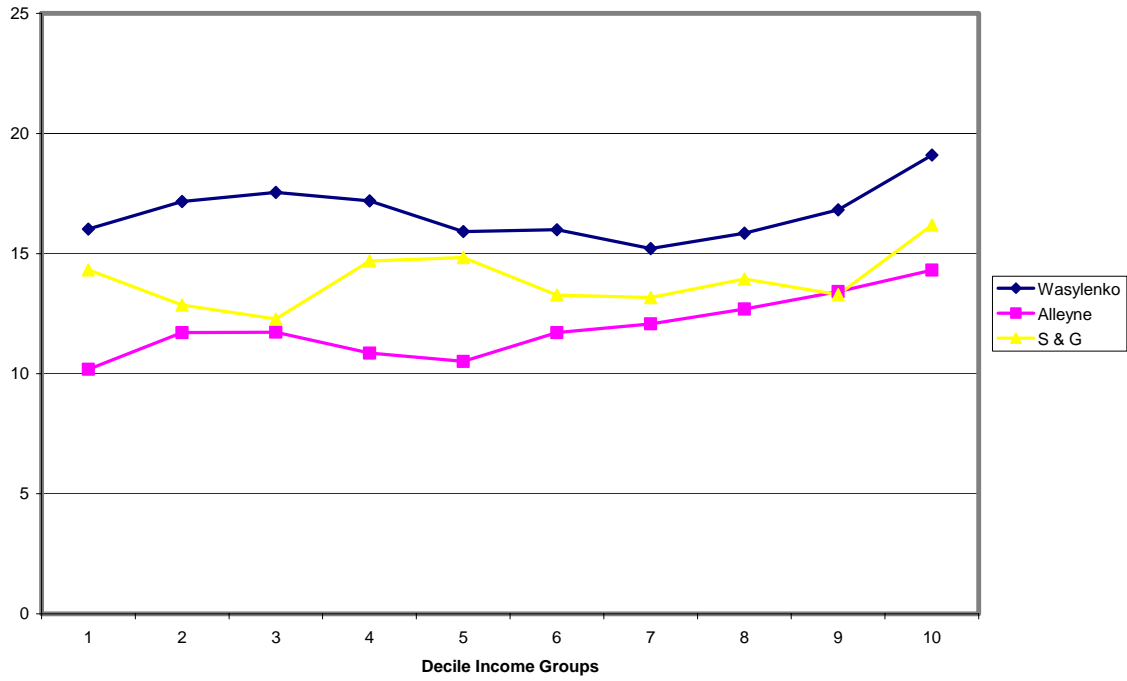
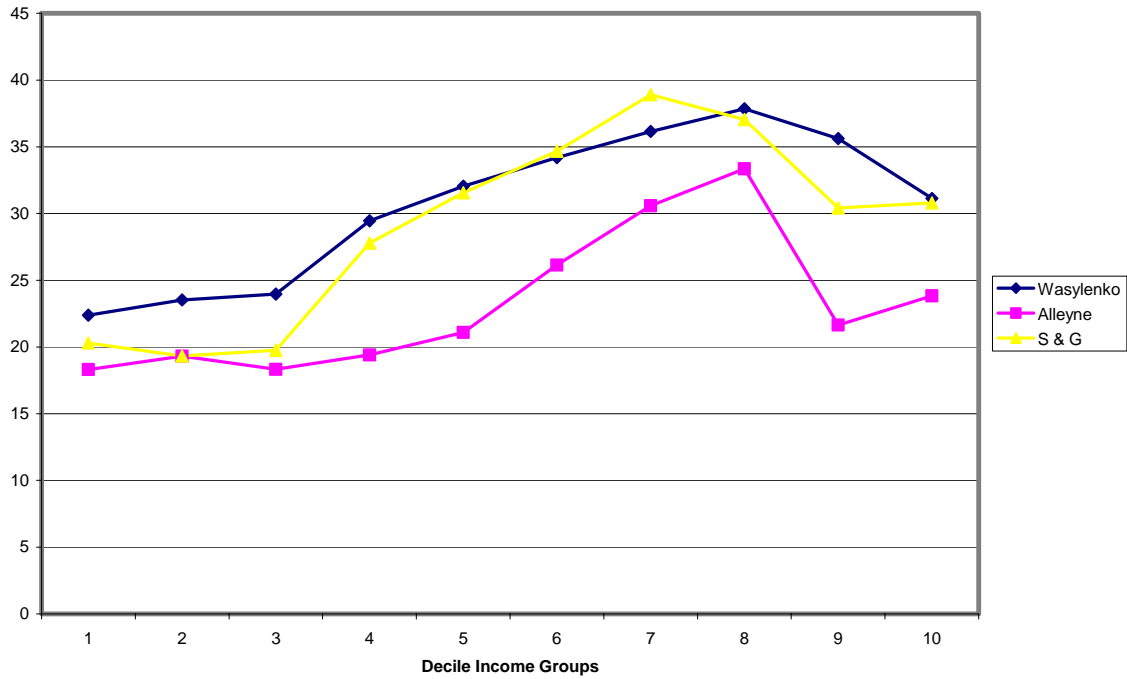


Figure III: Total Tax Burdens for Wasylenko, Alleyne and Sjoquist and Green(S & G) studies



The general conclusions are that the tax burden has declined since 1985 and that there is probably more progressivity in the tax system. Several factors may account for this. First, the standard deduction removed many low income households from the direct tax net, while the removal of several tax loopholes offered less opportunity for evasion among PAYE workers. The gain in direct taxes at the lower end is small probably due to the Education Tax and the ceiling on the National Insurance Scheme (NIS). The major opportunity for increasing the progressivity of the direct the tax system therefore seems to lie with reducing evasion among the self-employed and raising the threshold for low and middle income earners.

Estimating the Distribution of Tax Burdens in Jamaica, 2003

This current study uses many of the techniques mentioned in the previous sections. A basic issue facing studies of tax burden is whether the individual or household should be used as the unit of analysis. Households are thought to be the economic unit of interest for most studies. Consumption, work, savings, and other decisions are made on the basis of the household and not simply the individual. If we take the example of a household in which only one individual works, then the income tax burden on the single individual may be high while the income tax burden on the household may not be so large relative to other households. As another example, consider such a household in which the non-wage earner is the primary consumer. If we allocate the GCT to the non-wage earner, again we possibly skew the picture of tax burden as this individual will rate a very large tax burden relative to income, but at the household level the burden would not be so extreme. Consequently, in this study we use

the household as the unit of analysis, which we believe is a more appropriate and useful reflection of the impact of Jamaica's taxes on the population.

Income Measure

The starting point for a study of tax burden in Jamaica must be a measure of income of households. As pointed out by Wasylenko, if there were no data constraints, we would use a measure of permanent comprehensive income before taxes as our basic measure of household income. This definition of income can be expressed as:

$$Y = W + INKIND + IC + IOOH + FB + TRANSFER + RE + CIT + PROPTAX$$

where W = gross (pre-tax) wages and salaries

$INKIND$ = income in kind

IC = income from capital

$IOOH$ = income from owner occupied housing

FB = fringe benefits

$TRANSFER$ = transfer payments

RE = retained earnings

CIT = corporate taxes that reduce returns

$PROPTAX$ = property taxes that reduce returns

However, the data requirements for measuring this form of income are tremendous. Not only are data needed for each item, but data are needed for a series of years to estimate a "normal" or "permanent" income based on individual years. For those reasons, this comprehensive income definition is not attainable in most countries, and it is not attainable in Jamaica due to data limitations.

The next best method suggests using as comprehensive a measure of income as possible for a given a year. Because we do not have a household survey or micro data on income from the Jamaica Census, we use the Jamaica Survey of Living Conditions (SLC) micro data file to build up our comprehensive income measure. The SLC is an annual

survey of a sample of representative households in Jamaica administered by STATIN.¹⁷ We rely on the micro data file from the 2002 Survey, which contains a usable sample of 6,760 households representing a total of 742,000 households in Jamaica.

The SLC asks a number of detailed questions about such things as the health of household members, education, receipt of transfer payments (food stamps, NIS payments), miscellaneous income, detailed food and non-food expenditures, housing conditions, and a roster of all household members. There is a companion survey, the Labor Force Survey (LFS) that provides supplemental information on labor force participation, earnings, type of work, and the like for the same households and individuals surveyed for the SLC.¹⁸ Technically, the SLC is a subset of the LFS.

While the SLC provides some information on types of income (e.g., wages, interest, dividends, and rents) and while the LFS asks about wages, the level of non-response to those income items in both surveys calls into question their usefulness in measuring income. In the LFS over 40 percent of the respondents report no wages at the same time that they report expenditures greater than zero. In the SLC, only 10 individuals report dividends (less than 0.05 percent of the sample), and only 143 report interest (0.7 percent of the sample).¹⁹ For these reasons, we cannot rely on the SLC/LFS

¹⁷ The SLC publication and analysis is a joint publication of the Planning Institute of Jamaica (PIOJ) and the Statistical Institute of Jamaica (STATIN).

¹⁸ Detailed information regarding the SLC can be found in *Jamaica Survey of Living Conditions 2002* (PIOJ and STATIN, April 2003).

¹⁹ Also, as noted in Wallace and Alm (2004), attempts to reconcile aggregate income information from the SLC, the Ministry of Finance and Planning, and the National Income Accounts suggests that that SLC aggregate data on rental income, interest, and dividends are not an accurate representation of total income in Jamaica from those sources. Officials from STATIN have reiterated that the SLC is not done for purposes of estimating wages and other forms of income.

to provide us with a level of income for wages and capital income. This is a problem that has been long documented in Jamaica (Wasylenko, 1986; Sjoquist et al., 1993).²⁰

However, the SLC does provide a measure of total individual and household expenditures on food and non-food consumption (durable goods). This allows us to use an equivalence between the sources side of income and the uses side to define comprehensive income:

$$Y = W + \text{INKIND} + \text{IC} + \text{IOOH} + \text{FB} + \text{TRANSFER} + \text{RE} + \text{CIT} + \text{PROPTAX}$$

$$= \text{EXP} + \text{S} + \text{RE} + \text{INKIND} + \text{PAYROLL} + \text{PIT} + \text{CIT} + \text{PROPTAX}$$

This equivalence says that the sources side of income (W, INKIND, IC, IOOH, FB, TRANSFER, RE, CIT, PROPTAX) must equal the uses side (expenditures EXP, savings S, retained earnings RE, in-kind income INKIND, corporate income taxes CIT, payroll taxes PAYROLL, personal income taxes PIT, and property taxes PROPTAX; these taxes reduce returns to capital and labor). To decide whether to approach the incidence study using the sources or uses side of the equation, we look for what we can more accurately measure. We can measure EXP from the SLC, and, as we discuss later, we can impute the relevant taxes. We can measure savings (or what is not consumed) by the flow of interest and dividend income, and can then input these estimates to the SLC. Retained earnings are another component of income that is not currently consumed. We also can impute RE to the SLC observations. We have a measure of some forms of in-kind compensation via the emoluments survey, at least those that are made by compliant employers to their employees, and so we can input the relevant value of those to the SLC.

²⁰ This situation could be improved if the Census were done on a timely basis with some emphasis given to measuring income of households. Also, annual or bi-annual surveys could be made with more attention given to the income questions.

Based on the data that are available, we therefore utilize the uses side of the income equation in the development of our incidence study, expressing income as:

$$Y = EXP + S + RE + INKIND + PAYROLL + PIT + CIT + PROPTAX$$

We work with the SLC for 2002, so we adjust the expenditures to 2003 levels by the increase in the overall consumer price index over this year.

Calculating Income

There are many steps that are involved in operationalizing this measure of income. On the assumption that income and payroll taxes are ultimately paid by the employee in the form of lower net income, household income must be grossed up by the amount of income and payroll taxes that are deducted from households. To estimate the taxes paid by the households, we use a method similar to that used by Wasylenko (1986). We have very good estimates of income and payroll tax liabilities from the Emoluments Survey; see Wallace and Alm (2004) and Alm and Wallace (2004). These data allow us to simulate income and payroll taxes for non-capital income. We can therefore estimate a tax rate on any type of income in the Emoluments Survey. The estimated tax rate, applied to the same definition of income in the SLC, gives us an estimate of the income tax and the payroll taxes paid by a household in the SLC sample.

The type of income used in each sample, the Emoluments Survey and the SLC, must be consistent in order to follow this methodology since we are estimating the tax rates using the Emoluments Microsimulation Model and imputing them by income class to the SLC. In the Emoluments Microsimulation Model, we have a hybrid of emoluments that include wages and reported in-kind benefits and allowances but that do

not include the employer’s share of the payroll taxes. In the SLC data, we start (before any imputations) with expenditures, which are derived from net emoluments and self-employed income reported to the tax authorities, but which also include emoluments and self-employed income not reported to the tax authorities (e.g., evaded or non-compliant income). Therefore, there is a mismatch of income types, as indicated in Table 9.

Table 9: Types of Income Contained in Microsimulation and SLC Databases

Data base	Emoluments?	Self-employed Income?	Non-compliant Income?	Savings (Capital Income)?
Emoluments Microsimulation Model	Hybrid (includes employees but not employers share of payroll taxes)	No	No	No
SLC	Net	Yes	Yes	No

We can make the income definitions between the two sources more consistent if we add non-compliant income, self-employed income (compliant and non-compliant), and the employer’s share of payroll taxes to the Emoluments Microsimulation Model data, and then add the payroll (employer and employee share) and income tax liabilities to the SLC to gross up the emoluments. We impute savings (interest, dividends, and retained earnings) to both sources, using the distribution of interest and dividends reported in the IT05 file.

We add in the compliant self-employed income using the data from the Self-employed Microsimulation Model, and IT01 based file (Wallace and Alm, 2004; Alm and Wallace, 2004). We also allocate a portion of the \$10 billion in reported profits reported by Fiscal Services, based on a similar comprehensive income definition between the two microsimulation files. For example, in the self-employed file the lowest income group, as defined by total income reported on the IT01 form, reported a loss of profit

equivalent to 12 percent of the total profits reported by all self-employed; to this lowest group in the emoluments file, we therefore subtract $0.12 * \$10$ billion, or \$1.2 billion.²¹

The non-compliance component of income is very difficult to estimate, both the level and the distribution. For the non-self-employed, we subtract reported emoluments from the Emoluments Survey from the reported “compensation of employees” in the National Income Accounts (NIA). The latter includes all forms of compensation of employees, while reported emoluments are all tax-compliant forms of employee compensation. The NIA estimates compensation of employees of \$192 billion million for 2003, and the weighted total emoluments in the sample are \$165 billion. This suggests relatively mild non-compliance of compensation of employees of \$27 billion ($\$192 - \165 billion), or 17 percent of the reported amount. Wallace and Alm (2004) estimated that 120,000 employees did not report emolument income, suggesting an average of \$225,000 income for these types of evaders. The average emolument level in the Emolument Survey was \$252,686, a figure that is relatively close to the non-reported average. For this reason, we assume that the total noncompliance of the non-self-employed is \$27 billion, and we distribute \$27 billion in additional employee income based on the same distribution as reported emoluments.

For the self-employed, we have little detailed information on non-compliance. We turned to the LFS to estimate the distribution of non-compliance. As noted earlier, there are a number of individuals in the LFS who report expenditures but report zero income. The LFS allows us to tabulate the number and distribution of these individuals, by household decile and also by employment status. This exercise shows that the large majority of individuals reporting no wages but reporting expenditures are also reporting

²¹ Note that these need to be grossed up for the payroll taxes paid statutorily by the employer.

themselves as self-employed. This may be evidence of the evasion that makes its way into the tax system: if these individuals do not report their income in a survey, then they may be more likely to not report to the tax authorities.

The distribution of these individuals is found in Table 10. Most individuals report no wages, but they do report expenditures. Also, the self-employed are more likely to report no wages while reporting expenditures, and the distribution of these individuals suggests that there are more of those individuals in the lower income end than the higher income end.

While we understand that this is not a definitive study of the distribution of non-compliance for the income tax, we believe that there is credible evidence of both a type of non-compliance for the self-employed and for the distribution of non-compliant individuals. We still do not have a finely-tuned estimate of the level of this non-compliance. However, if we assume that the average income within the household deciles is similar for the compliant and non-compliant, then we can make such an estimate by decile, and we can use this estimate to adjust the emoluments data. We take the average emoluments by income group i in the emoluments data, and, by income group, we gross up the total income in that group by:

$$(\text{Mean Emoluments}_i) * ((\text{NoncomplianceRate}_i * \text{Emolumentobs}_i) / (1 - \text{NoncomplianceRate}_i))$$

This adjustment brings the definition of income in the emoluments data into line with that of the SLC, so that we can impute the income and payroll tax rates from the Emoluments Microsimulation Model to the SLC. See Table 10.

Table 10: Computation of Non-compliance Rate from the Labor Force

(1) Household Group (ranked by expenditures)	(2) Total Observations	(3) Number of Observations Reporting No Wages	(4) Percent of Observations Reporting No Wages	(5) Percent of Observations Reporting No Wages and Reporting Self- employed	(4)*(5) Non-compliance Rate
1	213	158	74.18	88.61	65.73
2	213	156	73.24	75.64	55.4
3	213	143	66.82	69.23	46.26
4	213	132	61.97	69.7	43.19
5	213	127	59.62	74.8	44.6
6	213	136	63.55	65.44	41.59
7	213	148	69.48	62.84	43.66
8	213	118	55.14	68.64	37.85
9	213	136	63.85	64.71	41.31
10	213	135	63.38	54.07	34.27
11	213	125	58.41	57.6	33.64
12	213	145	68.08	54.48	37.09
13	213	136	63.55	47.79	30.37
14	213	131	61.50	48.09	29.58
15	213	126	59.15	50.00	29.5
16	213	133	62.15	41.35	25.7
17	213	121	56.81	46.28	26.29
18	213	126	58.88	38.10	22.43
19	213	128	60.09	32.03	19.25
20	213	108	50.94	24.07	12.26

The Emoluments Survey data do not include interest income, dividend income, or income from retained earnings. The SLC data also do not contain these capital income items. While there are alternative methods to impute these forms of capital income, we take the following approach.

First, we determine the amount of interest, dividend and retained earnings held by Jamaican households. For interest and dividends, our starting point is the withheld taxes on interest and dividends. There, we have total taxes withheld for both corporations and individuals, and, in the case of dividends, taxes are only for the dividends of non-publicly listed stocks. We have information on interest payments made by the Government of

Jamaica by person or company, which suggests that over 90 percent of interest income is paid to companies. We assume, therefore, that of the total interest withheld, 90 percent is held by corporations and 10 percent by individuals. We do the same for dividends.

For 2003, interest income tax withheld was \$9.3 billion. If we assume a 31 percent effective tax rate (a weighted average between the individual and corporate tax rates), we estimate a level of interest income of \$30 billion. Of this, \$3 billion is attributed to individuals, and is added to the emoluments data.²² For dividends, we estimate that in 2003 there were \$2.8 billion in dividends (including those listed on the stock exchange), and 10 percent (or \$0.3 billion) is allocated to individuals. To estimate retained earnings, we analyze data from the Jamaica Stock Exchange on gross profits, net profits, and dividends. As noted in Wasylenko, obtaining a ratio of retained earnings (from a sample of firms) to corporate income taxes can be used to estimate national retained earnings. From the JES data, we calculate a ratio of retained earnings to corporate profits of 73 percent; applying this to national corporate profits, this suggests that retained earnings are \$5.1 billion. Of this, we assume that 50 percent is attributable to Jamaican households. Retained earnings are distributed in the same manner as dividends, using data from the IT05 file. We allocate these amounts in the emoluments data by income group (20 groups), and we then calculate by income group the shares of interest, dividends, and retained earnings in total emoluments plus the evaded income. We then use those shares as a percent of expenditures in the SLC to impute capital income.

²² We implicitly assume that these withheld taxes are paid by Jamaican individuals.

Once these imputations have been made to the emoluments data, we estimate the amount of tax paid by SLC expanded income group, as we now have the income and payroll tax rates imputed from the Emoluments Survey.

Incidence Assumptions

We make several incidence assumptions. We assume that the PAYE, self-employed, and payroll taxes are all paid by labor in the form of lower returns to labor. As noted in other studies, an alternative assumption – that half of this burden is paid by companies in the form of lower profits – has little impact on the burden distribution.

We deal with three other income taxes in this study: the withholding tax on interest, the tax on dividends, and corporate income tax. In 2003, the revenues for each were \$9.3 billion, \$0.3 billion, and \$6.7 billion. To attribute these to the observations in the SLC sample, we must first determine the amount of these levels that is attributed to the observations in our sample (SLC), and then distribute according to the assumptions of the incidence of these taxes. We assume that the interest and dividend taxes are borne by owners of those assets. For the corporate income tax, we assume that 50 percent of the tax is borne by capital and 50 percent is borne by labor; of the 50 percent borne by capital, we assume that half is in Jamaica and half is outside of Jamaica.²³ We therefore distribute half of the appropriate level of tax revenue based on capital holdings (interest, dividends, and retained earnings) in our sample, and distribute the other 50 percent based on labor income. For interest and dividends, we assume that of all the withheld tax is paid by Jamaicans, and we also assume that most is paid (90 percent) by corporations. Accordingly, we allocate 10 percent of the tax revenues to individuals based on interest

²³ This is supported by Wasylenko (1986) and by our survey of the JES listed stocks' annual reports.

and dividends. For the corporate component of the withheld taxes, we assume that half is paid via foreign corporations and half by Jamaican corporations; of the half paid in Jamaica, we distribute the tax revenue by retained earnings.

How much of the national totals of these taxes “belong” to our survey observations? First, some of the corporate tax burden, if allocated to capital, will be borne by capital owners outside the country. We used a calculated population weight of the SLC survey to adjust these aggregates.²⁴ In 2002 there were approximately 742,000 households in Jamaica. The total number of households in the survey is 6,790. A population weight of 109.4 applied to the 6,790 sample observations closely approximates the total of 742,000.²⁵ If we now apply the ratio of 1/109.4 to the tax receipts for the other income taxes, we have a reasonable level of tax to attribute to our sample.²⁶ Based on this method, we attribute the following income taxes to our sample:

Corporate Income Tax to Capital: \$14.2 million
 Corporate Income Tax to Labor: \$28.3 million
 Interest Withholding to Interest: \$8.5 million
 Interest Withholding to Retained Earnings: \$38.3 million
 Dividend Withholding to Dividends: \$0.3 million
 Dividend Withholding to Retained Earnings: \$1.2 million

²⁴ We assume that all interest and dividend withholding is paid by Jamaican owners of capital due to tax treaties for a number of foreign residents.

²⁵ STATIN suggests that the sample is a random sample of the population, but does not provide actual weights for the total sample or for individuals, households, or deciles.

²⁶ An alternative approach is as follows. We could take a ratio of tax revenues to a national aggregate that is a good estimate of our SLC income, and then apply the ratio to the total tax revenue to determine how much of a tax should be allocated to our sample. Since we have adjusted the income in our sample to represent comprehensive income, it closely approximates national income. Therefore, we can measure the ratio of corporate income tax to national income, and then apply that ratio to total corporate tax revenue to determine what portion to attribute to our sample. This application, however, lead to unreasonably small levels of tax to attribute. For example:

Corporate Tax Attribution:

$$\frac{(\text{Corporate Tax Revenue}/\text{National Income}) * (\text{Total Sample Income}/\text{National Income}) * \text{Total Corporate Tax Revenue}}$$

$$(3,100/401,000) * (2,399/401,000) * 3,100 = \$135,160$$

The property tax and stamp duty tax are also distributed via an “allocation method.” The level of property tax revenue for 2003 is \$924 million. We assume that the owners of housing bear the burden of the tax. We have two issues to determine: who are owners in our sample, and what is the appropriate level of tax to allocate to the sample? We apply the same aggregate weight estimate to our property tax data, and allocate \$8.4 million to our sample. Our distribution method relies on the reported homeownership by income group and income (presuming that higher income households have more expensive housing).

Stamp duty revenues are \$3.8 billion for 2003. We allocate \$34.7 to the SLC via percent of total distribution of income. We would like something closer to the various assets used for the stamp duty, but we do not have such information.

We allocate the consumption taxes based on expenditure categories. Using the SLC, we estimate the total amount of consumption of a particular category (say, tobacco), and then apply the appropriate domestic GCT rate (and special consumption taxes where appropriate). We then sum these expenditures and taxes for each type of expenditure by household decile, and divide by the total amount of comprehensive income in the decile. This gives us an estimate of the effective tax burden, measured as the effective tax rate on comprehensive (total) income.

For the trade taxes, we take a slightly different approach. We allocate the tax revenues by a particular consumption category (say, food) using the following formula for major consumption categories j :²⁷

²⁷ We used the following consumption categories for the international trade taxes and allocated the tax revenue based on the relative amount of consumption of each individual item based on SLC data:

$$Tax_i/GDP_i = ((\sum_j (Exp_{ij}/Total\ Expenditure)/(Income_{ij}/Total\ Income))*Tax\ Revenue/GDP)/N$$

where Tax_i = tax paid by each income decile (i)

$Exp(i, j)$ = SLC expenditure for household j in each decile i

$Income(i, j)$ = SLC income for household j in each decile i

N = Number of households in decile i

Total Expenditure = Total expenditure for all households

Total Income = Total income for all households

We utilize this second approach for the trade taxes because it is not possible to attribute all of the taxes on imports to direct consumption and therefore to link up to expenditure items in the SLC.

Results

The results of this analysis are found in Tables 11, 12, and 13 and in Figure 4. In all tables, the households are grouped according to household income, where the first group is the group with the lowest amount of income. Income groups are based on household deciles, so each group represents 10 percent of Jamaican households.

The data show a mild progressivity to these measured components of Jamaica's tax system, including all major taxes. For the indirect taxes, it is possible to calculate tax burdens by much more detailed expenditure categories, and the distribution of burden for any particular item could be progressive or regressive. Overall, however, we find that the system is mildly progressive. The direct tax component is somewhat more progressive than we expected. Recall that our income definition includes non-compliance and capital income. We estimated that non-compliance was relatively heavy in all deciles, but particularly in the lower deciles. If we ignore the non-compliant income, the distribution would not be as progressive.

beverages, furniture, footwear, processed food, transportation, apparel, tobacco, and all other international tax revenue (allocated based on expenditures on all other items).

As noted earlier, some studies have found the system to be more or less progressive. Changes to the tax system, such as the taxation of interest and an increase in the threshold for NIS contributions, would increase the progressivity relative to the earlier studies.

Table 11: Distribution of Direct Taxes^a

Income	Income Tax Burden (PAYE)	Payroll Taxes (Total)	HEART	NHT	NIS	Education Tax	CSFBS
0 - 79,260	0	4.17	0.67	1.1	1.14	1.1	0.16
79,260 - 117,769	0	6.12	0.97	1.68	1.75	1.67	0.05
117,770 - 156,853	1.12	5.26	0.83	1.44	1.49	1.43	0.07
156,853 - 213,051	2.67	6.56	1.2	1.58	1.84	1.74	0.2
213,051 - 243,195	3.31	7.26	1.33	1.86	1.96	1.86	0.25
243,195 - 299,701	4.24	7.57	1.4	1.95	2.01	1.93	0.28
299,701 - 369,404	6.21	7.65	1.4	2	2.05	1.96	0.24
369,404 - 477,446	8.59	7.97	1.49	2.03	2.1	1.99	0.36
477,446 - 693,008	13.15	8.37	1.66	2.07	2.09	2.04	0.51
Greater than 693,008	15.55	8.38	1.8	2.2	1.57	2.15	0.66

Income	Interest	Dividend	Corporate Income Tax	Property Tax	Total Direct Taxes
0 - 79,260	1.69	0.05	1.93	0.63	8.47
79,260 - 117,769	0.9	0.02	1.43	0.7	9.17
117,770 - 156,853	0.88	0.02	0.72	0.62	8.62
156,853 - 213,051	1.11	0.03	0.65	0.58	11.6
213,051 - 243,195	0.83	0.02	0.59	0.56	12.57
243,195 - 299,701	1.07	0.03	0.77	0.54	14.22
299,701 - 369,404	3.04	0.08	1.49	0.36	18.83
369,404 - 477,446	2.36	0.07	1.28	0.34	20.61
477,446 - 693,008	1.27	0.05	1.13	0.35	24.32
Greater than 693,008	1.92	0.07	2.3	0.34	27.56

All burden estimates are expressed as a percent of the total (comprehensive) income.

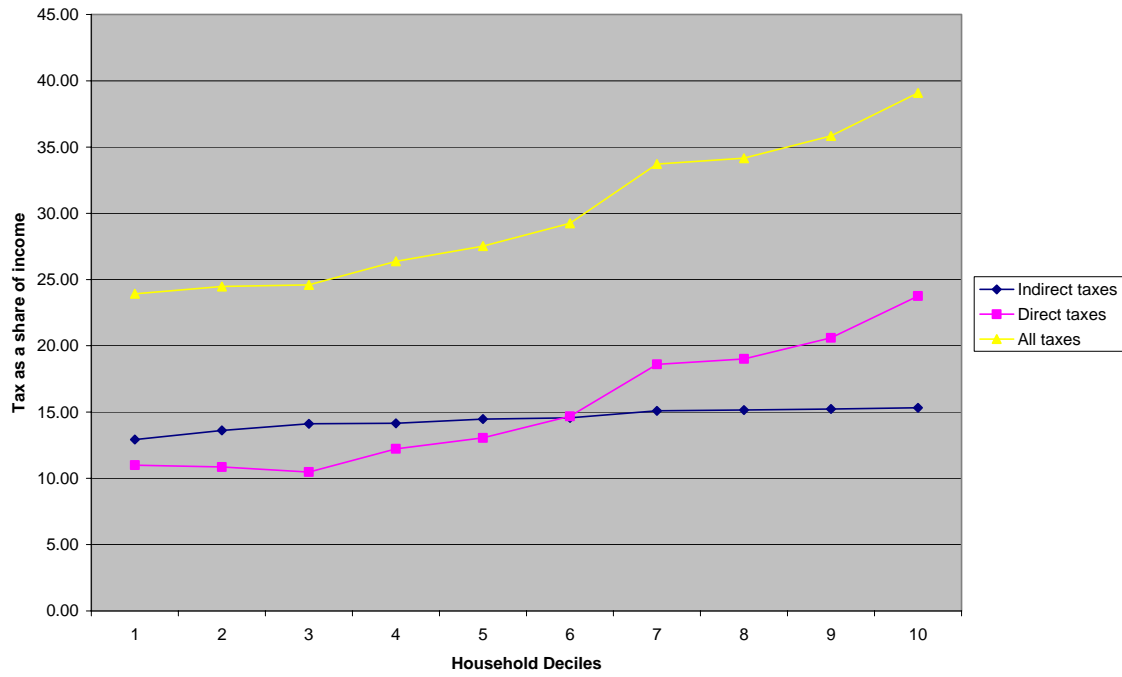
Table 12: Distribution of Indirect Taxes

Household Income	International		International		International		Total Indirect Taxes
	Stamp Duty	Beverages	Processed Foods	Other	Total	Domestic GCT	
0 - 79,260	1.11	0.03	1.38	0.89	2.3	9.60	15.3096
79,260 - 117,769	1.31	0.04	1.03	1.4	2.47	9.83	16.0845
117,770 - 156,853	1.34	0.04	0.94	1.85	2.83	9.99	16.9866
156,853 - 213,051	1.29	0.04	0.9	2.04	2.98	9.92	17.1678
213,051 - 243,195	1.27	0.05	0.85	2.28	3.18	10.04	17.6657
243,195 - 299,701	1.35	0.05	0.82	2.42	3.29	9.93	17.8644
299,701 - 369,404	1.38	0.05	0.77	2.89	3.71	10.01	18.8083
369,404 - 477,446	1.39	0.05	0.7	3.2	3.95	9.82	19.113
477,446 - 693,008	1.45	0.05	0.63	3.43	4.11	9.68	19.3489
Greater than 693,008	1.53	0.05	0.49	4.3	4.68	8.76	19.8101

Table 13: Total Tax Distribution

Household Income	Total Indirect Taxes	Total Direct Taxes	Grand Total
0 - 79,260	12.93	10.99	23.92
79,260 - 117,769	13.61	10.86	24.47
117,770 - 156,853	14.13	10.47	24.60
156,853 - 213,051	14.16	12.23	26.39
213,051 - 243,195	14.47	13.06	27.53
243,195 - 299,701	14.56	14.68	29.24
299,701 - 369,404	15.10	18.61	33.71
369,404 - 477,446	15.15	19.01	34.16
477,446 - 693,008	15.24	20.60	35.84
greater than 693,008	15.32	23.76	39.08

Figure 4: Distribution of tax burden



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